**Ústav anorganickej chémie SAV, v. v. i.**

# Výročná správa
# o činnosti a hospodárení
# za rok 2023

# Obsah

## ČASŤ A – Výročná správa o činnosti organizácie

**ČASŤ B – Výročná správa o činnosti organizácie**

# Výročná správa o činnosti organizácie za rok 2023

## ČASŤ A

Bratislava
február 2024

# 1. Základné údaje o organizácii

## 1.1. Kontaktné údaje

**Názov:** Ústav anorganickej chémie SAV, v. v. i.
**Riaditeľ:** doc. Ing. Miroslav Boča, DrSc.
**Zástupca riaditeľa:** Ing. Helena Pálková, PhD.
**Vedecký tajomník:** doc. Ing. Zoltán Lenčéš, PhD.
**Predseda vedeckej rady:** Mgr. Monika Tatarková, PhD.
**Člen Snemu SAV:** Ing. Peter Tatarko, PhD.
**Adresa:** Dúbravská cesta 9, 845 36 Bratislava 45

http://www.uach.sav.sk/

**Tel.:** 02/59410401
**E-mail:** uachsekr@savba.sk

**Názvy a adresy organizačných zložiek a detašovaných pracovísk:**

Organizačné zložky: nie sú

Detašované pracoviská:

- **Vitrum Laugaricio - Centrum kompetencie skla, spoločné pracovisko ÚACH SAV, TnU AD, RONA, a.s. a FCHPT STU**
  Študentská 2, 911 50 Trenčín
- **VC SAV – Pavilón materiálových vied**
  Dúbravská cesta 9/6319, Bratislava
- **Pracovisko pre röntgenovú práškovú difraktometriu**
  Ústav merania SAV, Dúbravská cesta 9, 841 04, Bratislava 4

**Vedúci organizačných zložiek a detašovaných pracovísk:**

Organizačné zložky: nie sú

Detašované pracoviská:

- **Vitrum Laugaricio - Centrum kompetencie skla, spoločné pracovisko ÚACH SAV, TnU AD, RONA, a.s. a FCHPT STU**
  prof. Ing. Dušan Galusek, DrSc.
- **VC SAV – Pavilón materiálových vied**
  doc. Ing. Miroslav Boča, DrSc.
- **Pracovisko pre röntgenovú práškovú difraktometriu**
  doc. Ing. Miroslav Boča, DrSc.

**Členovia Snemu SAV za organizačné zložky:**
nie sú

**Typ organizácie:** Verejná výskumná inštitúcia od roku 2022

## 1.2. Údaje o zamestnancoch

Tabuľka 1a Počet a štruktúra zamestnancov

| Štruktúra zamestnancov | K | K | | K do 35 rokov | | F | P | T | O |
|---|---|---|---|---|---|---|---|---|---|
| | | M | Ž | M | Ž | | | | |
| **Celkový počet zamestnancov** | 79 | 39 | 40 | 9 | 6 | 76 | 62.53 | 47 | 0 |
| **Vedeckí pracovníci** | 50 | 30 | 20 | 6 | 4 | 48 | 41.75 | 41.25 | 0 |
| **Odborní pracovníci VŠ** (výskumní a vývojoví zamestnanci[1]) | 9 | 6 | 3 | 3 | 1 | 8 | 6.03 | 5.75 | 0 |
| **Odborní pracovníci VŠ** (ostatní zamestnanci[2]) | 6 | 1 | 5 | 0 | 1 | 6 | 3.69 | 0 | 0 |
| **Odborní pracovníci ÚS** | 10 | 2 | 8 | 0 | 0 | 10 | 8.56 | 0 | 0 |
| **Ostatní pracovníci** | 4 | 0 | 4 | 0 | 0 | 4 | 2.5 | 0 | 0 |

*[1] odmeňovaní podľa 553/2003 Z.z., príloha č. 5*
*[2] odmeňovaní podľa 553/2003 Z.z., príloha č. 3 a č. 4*
*K – kmeňový stav zamestnancov v pracovnom pomere k 31.12.2023 (uvádzať zamestnancov v pracovnom pomere, vrátane riadnej materskej dovolenky, zamestnancov pôsobiacich v zahraničí, v štátnych funkciách, členov Predsedníctva SAV, zamestnancov pôsobiacich v zastupiteľských zboroch)*
*F – fyzický stav zamestnancov k 31.12.2023 (bez riadnej materskej dovolenky, zamestnancov pôsobiacich v zahraničí v štátnych funkciách, členov Predsedníctva SAV, zamestnancov pôsobiacich v zastupiteľských zboroch)*
*P – celoročný priemerný prepočítaný počet zamestnancov*
*T – celoročný priemerný prepočítaný počet riešiteľov projektov*
*O – celoročný priemerný prepočítaný počet obslužného personálu podieľajúceho sa na riešení projektov (technikov, laborantov, projektových manažérov a pod.) mimo zamestnancov v administratíve, správe a údržbe budov, upratovačiek, vodičov a pod.*
*M, Ž – muži, ženy*

Tabuľka 1b Štruktúra vedeckých pracovníkov (kmeňový stav k 31.12.2023)

| Rodová skladba | Pracovníci s hodnosťou | | | | Vedeckí pracovníci v stupňoch | | |
|---|---|---|---|---|---|---|---|
| | DrSc. | CSc./PhD. | prof. | doc. | I. | II.a. | II.b. |
| **Muži** | 6 | 26 | 4 | 4 | 6 | 14 | 10 |
| **Ženy** | 2 | 19 | 0 | 2 | 2 | 10 | 8 |

Tabuľka 1c Štruktúra pracovníkov podľa veku a rodu, ktorí sú riešiteľmi projektov

| Veková štruktúra (roky) | < 31 | | 31-35 | | 36-40 | | 41-45 | | 46-50 | | 51-55 | | 56-60 | | 61-65 | | > 65 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | A | B | A | B | A | B | A | B | A | B | A | B | A | B | A | B | A | B |
| **Muži** | 1 | 1.0 | 6 | 4.5 | 7 | 7.0 | 5 | 5.0 | 6 | 4.8 | 2 | 1.6 | 2 | 2.0 | 0 | 0.0 | 5 | 3.2 |
| **Ženy** | 2 | 1.3 | 3 | 2.5 | 3 | 2.8 | 1 | 1.2 | 5 | 5.0 | 2 | 2.0 | 2 | 1.6 | 0 | 0.0 | 2 | 1.8 |

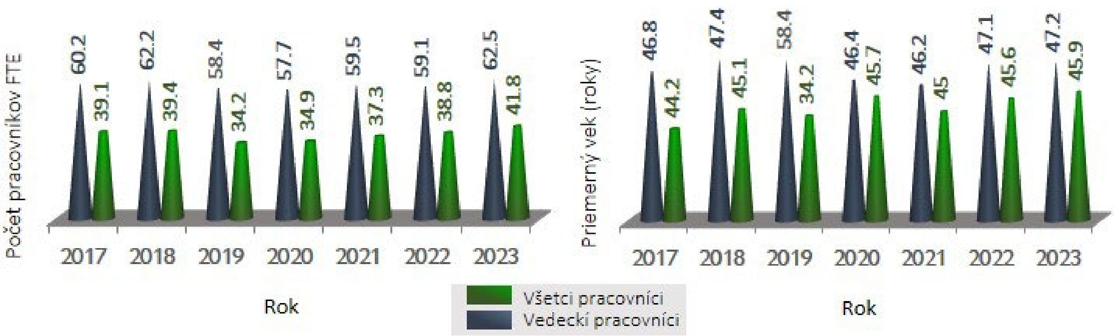
*A - Prepočet bez zohľadnenia úväzkov zamestnancov*
*B - Prepočet so zohľadnením úväzkov zamestnancov*

Tabuľka 1d Priemerný vek zamestnancov organizácie k 31.12.2023

| | Kmeňoví zamestnanci | Vedeckí pracovníci | Riešitelia projektov |
|---|---|---|---|
| **Muži** | 46.7 | 46.2 | 46.0 |
| **Ženy** | 47.7 | 45.3 | 45.5 |
| **Spolu** | 47.2 | 45.9 | 45.8 |

**1.3. Iné dôležité informácie k základným údajom o organizácii a zmeny za posledné obdobie (v zameraní, v personálnej štruktúre a pod.)**

Ústav anorganickej chémie SAV v roku 2023 nezaznamenal žiadne zásadné zmeny v organizačnej štruktúre. Prepočítaný počet pracovníkov v roku 2023 je na úrovni 62,53 FTE (z toho 41,75 vedeckých pracovníkov), čo je vyšší stav v porovnaní s rokom 2022 (59,15 a 38,84). V roku 2023 bol priemerný vek všetkých pracovníkov ústavu 47,2 roka a priemerný vek vedeckých pracovníkov 45,9 roka, čo predstavuje mierny nárast v porovnaní s rokom 2022. Vzhľadom na to, že nedochádza k plynulej generačnej výmene, postupne sa zvyšuje aj priemerný vek zamestnancov. V roku 2023 sa na ústave zamestnali traja vedeckí pracovníci zo zahraničia, z toho jeden z nich spadá do kategórie do 35 rokov. Zamestnávanie mladých schopných post-doktorandov na ústave je naďalej jednou z hlavných priorít, avšak nevieme ju v požadovanej miere naplniť. V priebehu roka ukončili zamestnanecký pomer dvaja zamestnanci s nízkym úväzkom, keďže im skončila pracovná zmluva na ústave.



# 2. Vedecko-výskumná činnosť – projekty, výsledky

## 2.1. Domáce projekty

Tabuľka 2a Domáce projekty riešené v roku 2023

| ŠTRUKTÚRA PROJEKTOV | Počet | | Čerpané financie (€) | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | A | | | | B | |
| | | | Zo zdrojov SAV | | Z iných zdrojov | | Zo zdrojov SAV | Z iných zdrojov |
| | A | B | Spolu | Pre organizáciu | Spolu | Pre organizáciu | | |
| **1. Projekty VEGA** | 10 | 2 | 118599 | 118599 | - | - | - | 7985 |
| **2. Projekty APVV** | 6 | 9 | - | - | 308636 | 240873 | - | 110085 |
| **3. Projekty EŠIF/OP ŠF, Plán obnovy EÚ** | 0 | 2 | - | - | - | - | - | 30015 |
| **4. Projekty SASPRO, MoRePro, IMPULZ** | 2 | 0 | 33130 | 33130 | - | 65760 | - | - |
| **5. Iné projekty (FM EHP, Vedecko-technické projekty, na objednávku rezortov a pod.)** | 3 | 0 | 6500 | 6500 | - | - | - | - |

*A - organizácia je nositeľom projektu*
*B - organizácia sa zmluvne podieľa na riešení projektu*

Tabuľka 2b Domáce projekty podané v roku 2023

| **Štruktúra projektov** | **Miesto podania** | **Organizácia je nositeľom projektu** | **Organizácia sa zmluvne podieľa na riešení projektu** |
|---|---|---|---|
| **1. Účasť na nových výzvach APVV r. 2023** | - | 10 | 5 |
| **2. Projekty výziev EŠIF podané r. 2023** | Bratislava | | |
| | Regióny | | |

**Ústav ako podávateľ projektu:**

**Názov projektu**: Roztavené fluoridové systémy na báze prvkov vzácnych zemín a ostatných kritických kovov: Interakcie a analýzy pre recykláciu (Molten fluoride systems based on rare earth elements and other critical metals: interactions and analysis for recovery and recycling)
**Evidenčné číslo**: APVV-23-0377
**Akronym**: MOLIERE
**Koordinátor**: ÚACh SAV, v.v.i. (M. Boča)
**Stav**: podaný

**Názov projektu**: Pokročilé materiály pre zelené technologické aplikácie dizajnované na atomárnej úrovni

(Advanced materials for green technology applications designed at the atomic level)
**Evidenčné číslo**: APVV-23-0100
**Akronym**: ADAM
**Koordinátor**: ÚACh SAV, v.v.i. (E. Scholtzová)
**Stav**: podaný

**Názov projektu**: Roztavené a tuhé fluoridy: reakcie, štruktúra a materiálové vlastnosti oxo-fluóro-hlinitanov pre elektronické aplikácie (Molten and Solid Fluorides: Reactions, Structure and Material Properties of Oxo-Fluoro-Aluminates for Electrochemical Applications)
**Evidenčné číslo**: APVV-23-0345
**Akronym**: MOREMAS
**Koordinátor**: ÚACh SAV, v.v.i. (F. Šimko)
Partneri: Fyzikálny ústav SAV, v.v.i.
**Stav**: podaný

**Názov projektu**: Nové biouhlím funkcionalizované geopolyméry na báze hlinitokremičitanov: Uplatniteľnosť pri nakladaní s nebezpečným odpadom (Novel biochar functionalized geopolymers based on aluminosilicates: Applicability in hazardous waste management)
**Evidenčné číslo**: APVV-23-0249
**Akronym**: BIOGEOALU
**Koordinátor**: ÚACh SAV, v.v.i (M. Slaný)
Partneri: SvF STU v Bratislave, UCM Trnava, TRUNI Trnava
Priemyselný partner: GEOFIX s.r.o.
**Stav**: podaný

**Názov projektu**: Dvojnásobne funkcionalizované materiály na báze vrstevnatých silikátov (Doubly functionalized materials based on layered silicates)
**Evidenčné číslo**: APVV-23-0656
**Akronym**: DoFunSil
**Koordinátor**: ÚACh SAV, v.v.i. (H. Pálková)
**Stav**: podaný

**<u>Ústav ako partner:</u>**

**Názov projektu**: Advanced Modelling of Light-Matter Interactions on Near-Term ExaScale Supercomputers
**Evidenčné číslo**:
**Akronym**: MOLIMEXA
**Koordinátor**: Univerzita Komenského v Bratislave, Prírodovedecká fakulta
**Partneri:** ÚACh SAV, v.v.i. (S. Komorovský), Národné superpočítačové centrum, z. z. p. o.
**Stav**: podaný

**Názov projektu**: Základ k ekologicky udržateľným sodíkovo-iónovým batériám pre nízko nákladovú technológiu (Towards Eco-sustainable Sodium-ion batteries for a LOW-cost technology)
**Evidenčné číslo**: APVV-23-0474
**Akronym**: TESLOW
**Koordinátor**: Centrum pre využitie pokročilých materiálov SAV, v. v. i.
**Partneri**: ÚACh SAV, v.v.i. (Z. Lenčéš)
**Stav**: podaný

**Názov projektu**: Multifunkčné kompozitné materiály pre cielenú detekciu, adsorpciu a dekontamináciu nebezpečných organických molekúl (Multifunctional composite materials for detection, adsorption and decontamination of hazardous organic molecules)
**Evidenčné číslo**: APVV-23-0635
**Akronym**: MULCOMAT
**Koordinátor**: Ústav Polymérov SAV, v.v.i.
Partner: ÚACh SAV, v.v.i. (Ľ. Jankovič)
**Stav**: podaný

**Názov projektu**: Studené spekanie skiel (Cold sintering of glass)
**Evidenčné číslo**: APVV-23-0424
**Akronym**: CoSinG
**Koordinátor**: TnU AD (D. Galusek)
Partner: ÚACh SAV, v.v.i. (M. Michalková)
**Stav**: podaný

**Názov projektu**: Funkcionalizované 3Dsklokeramické membrány na pokročilé fotokatalytické čistenie pitných vôd (Functionalized 3D glass-ceramic membranes for advanced photocatalytic drinking water treatment)
**Evidenčné číslo**: APVV-23-0352
**Akronym**: 3DGALACTYC
**Koordinátor**: TnU AD (J. Kraxner)
**Partneri**: ÚACh SAV, v.v.i. (M. Michalková), FChPT STU
**Stav**: podaný

**Bilaterálne APVV**

**Názov projektu**: Analýza molekulárnej magnetickej odozvy: Integrácia kvantovo-chemických a matematických prístupov
**Evidenčné číslo**: SK-AT-23-0014
**Akronym**: MAGIC
**Koordinátor**: ÚACh SAV, v.v.i. (O. Malkin)
**Partner**: Univerzita Paris Lodron v Salzburgu, Rakúsko
**Stav**: podaný

**Názov projektu**: Nové vysokoentropické perovskity pre termoelektrické aplikácie (New high entropy perovskites for thermoelectric applications)
**Evidenčné číslo**: APVV-SK-SRB-23-0050
**Akronym**: HEPTA
**Koordinátor**: ÚACh SAV, v.v.i. (P. Tatarko)
Partner: Belgrade University, Institute for Nuclear Sciences, Belgrade, Srbsko
**Stav**: podaný

**Názov projektu**: Nové vysokoentropické borido-karbidy pre vysokoteplotné aplikácie (Novel high entropy diborodicarbides for ultra-high temperature applications)
**Evidenčné číslo**: APVV-SK-CN-23-0015
**Akronym**: BoroCar
**Koordinátor**: ÚACh SAV, v.v.i. (P. Tatarko)
Partner: Ningbo Institute of Materials Technology & Engineering, Chinese Academy of Sciences, Ningbo, Čína
**Stav**: podaný

**Názov projektu**: Kompozity na báze vrstevnatých silikátov ako účinný adsorbent $CO_2$: vplyv dopovania priemyselne zaujímavými kovmi (Composites based on layered silicates as effective adsorbent of $CO_2$: the influence of doping with industrially interesting metals)
**Evidenčné číslo**: SK-PL-23-0056
**Akronym**: MetalSi
**Koordinátor**: ÚACh SAV, v.v.i. (H. Pálková)
Partner: Jerzy Haber Institute of Catalysis and Surface Chemistry, Krakow
**Stav**: zamietnutý

**Názov projektu:** Corrosion Behavior of Incoloy®800H, Hastelloy®G35® and 316L Stainless Steel in Molten Carbonates and Theirs Vapors under Molten Carbonate Electrolysis Conditions

**Evidenčné číslo:** SK-PL-23-0069
**Akronym:** CORBEIM
**Koordinátor:** ÚACh SAV, v.v.i. (Viliam Pavlík)
**Partner:** Warsaw University of Technology
**Stav:** zamietnutý

## 2.2. Medzinárodné projekty

### 2.2.1. Medzinárodné projekty riešené v roku 2023

Tabuľka 2c Medzinárodné projekty riešené v roku 2023

| ŠTRUKTÚRA PROJEKTOV | Počet | | Čerpané financie (€) | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | A | | | | B | |
| | | | Zo zdrojov SAV | | Z iných zdrojov | | Zo zdrojov SAV | Z iných zdrojov |
| | A | B | Spolu | Pre organizáciu | Spolu | Pre organizáciu | | |
| 1. Projekty Horizont 2020 a Horizont Európa | 0 | 1 | - | - | - | - | 4928 | 47295 |
| 2. Projekty ERA.NET, ESA, JRP | 2 | 0 | 50000 | 50000 | - | - | - | - |
| 3. Projekty COST | 0 | 1 | - | - | - | - | - | 1053 |
| 4. Projekty EUREKA, NATO, UNESCO, CERN, IAEA, IVF, ERDF a iné | 0 | 1 | - | - | - | - | 22299 | - |
| 5. Projekty v rámci medzivládnych dohôd | 0 | 0 | - | - | - | - | - | - |
| 6. Bilaterálne projekty MAD, Mobility, Open Mobility | 0 | 0 | - | - | - | - | - | - |
| 7. Bilaterálne projekty ostatné | 2 | 0 | - | - | - | - | - | - |
| 8. Podpora MVTS z národných zdrojov (SAV, APVV a iné) | 1 | 0 | - | - | 40416 | 40416 | - | - |
| 9. SAS-UPJŠ ERC Visiting Fellowship Grants | 0 | 0 | - | - | - | - | - | - |
| 10. Iné projekty | 0 | 0 | - | - | - | - | - | - |

*A - organizácia je nositeľom projektu*
*B - organizácia sa zmluvne podieľa na riešení projektu*

### 2.2.2. Medzinárodné projekty Horizont Európa podané v roku 2023

Tabuľka 2d Počet projektov Horizont Európa v roku 2023

| | A | B |
|---|---|---|
| **Počet podaných projektov Horizont Európa** | | 1 |

*A - organizácia je nositeľom projektu*
*B - organizácia sa zmluvne podieľa na riešení projektu*

**Názov projektu**: Synergistic effects of hybrid material systems for blast and ballistic protection
**Evidenčné číslo**: SEP-210967382 (v rámci výzvy - EDF-2023-RA-SI-MATCOMP-HPM)
**Akronym**: HYMAS
**Koordinátor**: Vojenský výzkumný ústav, s. p. (Ing. Regina Mikulíková, Ph.D)
**Partneri**: ÚACH SAV, v.v.i.; Výzkumný ústav stavebních hmot, a.s. (CZ); BOGGES, SPOL. s r.o. (CZ); SVSFEM s.r.o. (CZ); Ministerul Apararii Nationale (Romania); Politecnico Di Milano (IT); Universiteit Gent (Belgium); Amazemet SP.z.o.o. (PL); Universidad Carlos III DE MADRID (Spain); Katholieke Universiteit Leuven (Belgium); RISE Research Institutes of SWEDEN AB
**Stav**: podaný

*Údaje k domácim a medzinárodným projektom sú uvedené v Prílohe A-2.*

### 2.2.3. Zámery na čerpanie Európskych štrukturálnych a investičných fondov v ďalších výzvach

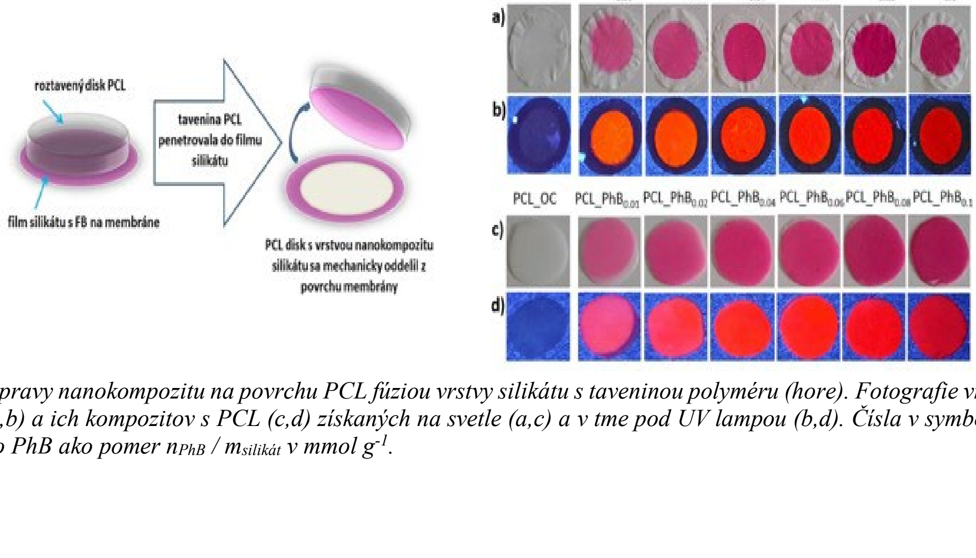
ÚACH SAV, v. v. i. sa plánuje zapojiť do výziev, ak budú vyhlásené.

## 2.3. Výber najvýznamnejších výsledkov vedeckej práce organizácie v roku 2023

### 2.3.1. Výsledky na báze základného výskumu

**Fotoaktivita a antimikrobiálne vlastnosti nanokompozitu poly(kaprolaktónu).**

Moderné aplikácie polymérov často vyžadujú úpravy ich povrchov. V tejto práci sa realizovala modifikácia povrchu poly(kaprolaktónu) (PCL) pomocou častíc vrstevnatého silikátu (saponitu) funkcionalizovaných molekulami fotosenzibilizátora, floxínu B (PhB). Princípom modifikácie bola fúzia tenkej vrstvy silikátu s taveninou PCL (**Obr. 1**). Následkom fúzie došlo k interkalácii reťazcov PCL medzi vrstvy silikátu, čím sa dosiahlo pevné spojenie fázy vzniknutého nanokompozitu (hrúbky niekoľkých μm) s matricou polyméru. PhB si zachoval fotoaktivitu, čo potvrdili merania fluorescencie, časovo-rozlíšenej fluorescencie a kvantových výťažkov. Hlavnými výsledkami boli fotoaktívne a antimikrobiálne vlastnosti povrchu materiálu. Kompozit s najvyššou koncentráciou PhB pri ožarovaní zeleným svetlom vykazoval zníženie rastu biofilmu mikroorganizmu S. aureus na 3 % oproti kontrole. Predpokladáme, že uvedená metóda môže nájsť široké uplatnenie v modifikácii povrchov polymérov.



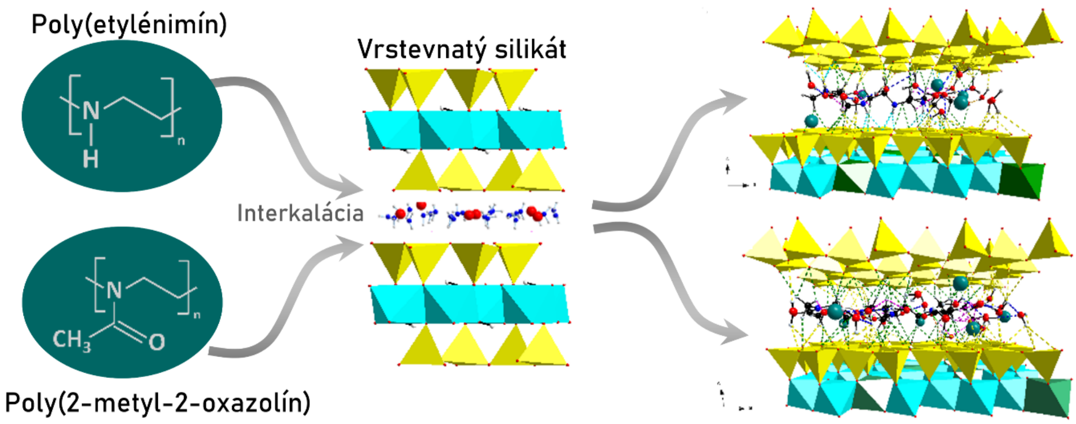

***Obr. 1**. Schéma prípravy nanokompozitu na povrchu PCL fúziou vrstvy silikátu s taveninou polyméru (hore). Fotografie vrstiev silikátu na membránach (a,b) a ich kompozitov s PCL (c,d) získaných na svetle (a,c) a v tme pod UV lampou (b,d). Čísla v symboloch vzoriek vyjadrujú množstvo PhB ako pomer $n_{PhB}$ / $m_{silikát}$ v mmol $g^{-1}$.*

**Publikácia**:

SKOURA, Eva - BOHÁČ, Peter - BARLOG, Martin - PÁLKOVÁ, Helena - MAUTNER, Andreas - BUGYNA, Larysa - BUJDÁKOVÁ, Helena - BUJDÁK, Juraj** Structure, photoactivity, and antimicrobial properties of phloxine B / poly(caprolactone) nanocomposite thin films. In Applied Clay Science, 2023, vol. 242, no. 107037. (**5.6 - IF, Q1**). https://doi.org/10.1016/j.clay.2023.107037
**Projekty**: APVV-18-0075, APVV-21-0302

### Bionanokompozitné materiály pripravené modifikáciou vrstevnatého silikátu polykatiónom

Po prvý krát sa interkaláciou podarilo pripraviť kompozity na báze vrstevnatého silikátu a dvoch, štruktúrne podobných, ale z nábojového hľadiska rozdielnych polymérov: katiónovým poly(etylénimínom) (PEI) a neiónovým poly(2-metyl-2-oxazolínom) (PMeOx). Výsledky, získané pomocou experimentálnych metód, ukázali rozdiely medzi vrstevnatým silikátom modifikovaným polykatiónom PEI a neiónovým polymérom PMeOx. Kým katiónový PEI sa interkaloval do medzivrstvia len do limitovaného množstva, v prípade neiónového PMeOx sa pozoroval jeho postupný nárast so stúpajúcim množstvom polyméru použitého na prípravu vzoriek. *Ab initio* DFT výpočty ukázali, že obidva polyméry sú naviazané na povrch montmorillonitu slabými až stredne silnými vodíkovými väzbami a systémy vykazujú vysokú energetickú stabilitu. Biokompatibilné kopolyméry, ktoré budú pripravené kontrolovanou polymerizáciou obidvoch študovaných polymérov a budú interkalované do medzivrstvového priestoru vrstevnatého materiálu by mohli byť perspektívne ako nosiče liekov alebo ako nano-plnivá do biodegradovateľných polymérov.

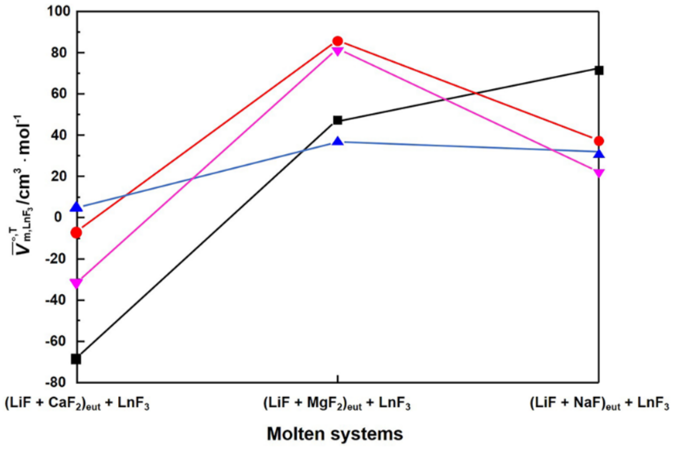



*Obr. Schematické znázornenie interkalácie polymérov do medzivrstvového priestoru silikátu*

**Publikácia**:
MADEJOVÁ, Jana** - BARLOG, Martin - SLANÝ, Michal - BASHIR, Sanam - SCHOLTZOVÁ, Eva - TUNEGA, Daniel - JANKOVIČ, Ľuboš. Advanced materials based on montmorillonite modified with poly(ethylenimine) and poly(2-methyl-2-oxazoline): Experimental and DFT study. In Colloids and Surfaces A: Physicochemical and Engineering Aspects, 2023, vol. 659, art. no. 130784. (**5.2 - IF, Q2**). ISSN 0927-7757. https://doi.org/10.1016/j.colsurfa.2022.130784
**Projekty**: APVV-19-0487, Vega 2/0166/21

### Fluoridové systémy pre recykláciu lantanoidov

V súčasnej dobe sa problematika takmer úplnej závislosti Európskej únie na dodávkach materiálov kritických prvkov z mimoeurópskeho prostredia rieši aj v Európskom parlamente alebo Európskej komisii. Našim výskumom sa snažíme prispieť k rozvoju procesov, ktoré by viedli k efektívnej výrobe/recyklácií kritických prvkov, konkrétne vybraných ľahkých prvkov vzácnych zemín s dôrazom na neodým. Z analýzy elektrickej vodivosti roztavených fluoridových systémov vyplýva, že vhodnými médiami na recykláciu sú niektoré eutektické zmesi s obsahom fluoridu lítneho, pričom vodivosť s prídavkom $NdF_3$ klesá nasledovne: $\kappa[(LiF\text{-}CaF_2)_{eut}\text{-}NdF_3] \cong \kappa[(LiF\text{-}NaF)_{eut}\text{-}NdF_3] > \kappa[(LiF\text{-}MgF_2)_{eut}\text{-}NdF_3]$, zatiaľ čo systém $(NaF\text{-}CaF_2)_{eut}\text{-}NdF_3$ vykazuje výrazne nižšiu elektrickú vodivosť, čo je nežiadúce pre elektrochemické aplikácie. Z analýzy objemových vlastností vyplýva, že v uvedenom poradí systémov tiež rastie nežiadúci efekt objemovej expanzie s prídavkom $NdF_3$. Tento trend bol navyše pozorovaný aj pre systémy s prídavkom $SmF_3$ a $GdF_3$.




**Publikácie**:

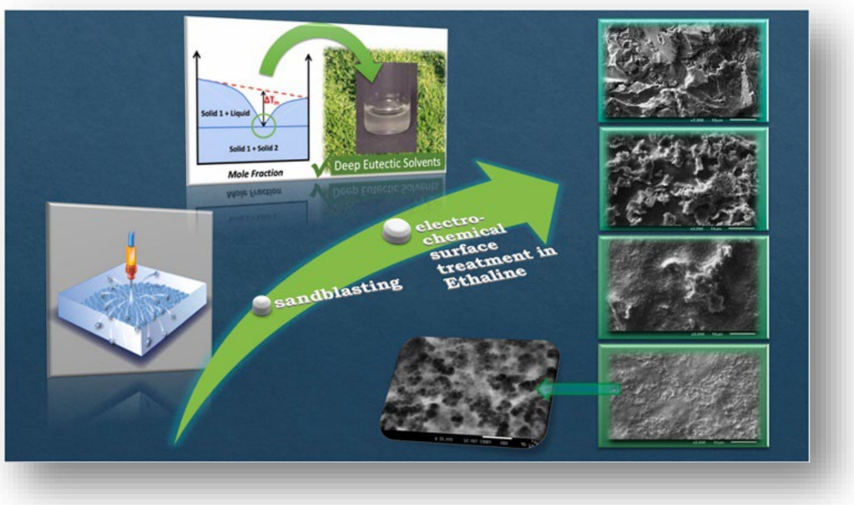
MLYNÁRIKOVÁ, Jarmila – BOČA, Miroslav – KUBÍKOVÁ, Blanka. Densities and Volume Properties of the Melts of the Systems $(LiF + NaF)_{eut} + SmF_3$, $(LiF + NaF)_{eut} + GdF_3$, and $(LiF + NaF)_{eut} + NdF_3$. In Journal of Chemical and Engineering Data, 2023, vol. 68, no. 5, p. 1133-1144. (**2.6 – IF, Q2**). https://doi.org/10.1021/acs.jced.3c00084

KRISHNAN, Dhiya - KORENKO, Michal** - ŠIMKO, František** - AMBROVÁ, Marta - SZATMÁRY, Lóránt - RAKHMATULLIN, Aydar. Ionic Conductivity of the Molten Systems $(LiF–CaF_2)_{eut}–NdF_3$, $(LiF–NaF)_{eut}–NdF_3$, $(NaF–CaF_2)_{eut}–NdF_3$, and $(LiF–MgF_2)_{eut}–NdF_3$. In Ionics, 2023, vol. 29, iss. 12, pp. 5139-5146. (**2.8 - IF, Q2**) https://doi.org/10.1007/s11581-023-05232-3

## 2.3.2. Výsledky aplikačného typu

### Inovatívny prístup elektrochemickej povrchovej úpravy kovov a zliatin v hlboko eutektických rozpúšťadlách pri izbovej teplote

Elektrochemická úprava kovov a zliatin je jedným z efektívnych spôsobov modelovania povrchových vlastností kovových výrobkov. Tím výskumníkov z Oddelenia keramiky Ústavu anorganickej chémie SAV prišiel s inovatívnou metódou elektrochemickej úpravy kovov a zliatin, s funkčným a biomedicínskym využitím. Navrhovaný postup ponúka úpravu v hlboko eutektických rozpúšťadlách na báze vitamínu B4 pri izbovej teplote, je šetrný k životnému prostrediu, efektívne využíva zdroje a je výhodnou alternatívou k elektrochemickým metódam využívajúcim vodné elektrolyty. Okrem toho je možné navrhovanú technológiu použiť na vytvorenie vysoko účinných foto- a elektrokatalyzátorov na výrobu „zeleného" vodíka elektrolýzou z vodných roztokov a ľahko skombinovať s inými metódami povrchovej úpravy.




**Obr. 1.** Morfológie povrchu 3D tlačených substrátov z titánovej zliatiny po pieskovaní a elektroleštení v hlboko eutektickom rozpúšťadle.

Počas realizácie projektu APVV-20-0322 sa ukázalo, že navrhovaná metóda aplikovaná po pieskovaní vzoriek umožňuje získať zliatiny titánu s vysoko drsným povrchom pozostávajúcim z mikro- a nano-štruktúr podobných skutočnému kostnému tkanivu (Obr. 1), pričom došlo k zlepšeniu aj iných fyzikálno-chemických vlastností. Tento pokrok má potenciál prispieť k oblasti biomedicínskeho inžinierstva a získané výsledky sa stali podkladom pre medzinárodnú patentovú prihlášku a rad vedeckých článkov v prestížnych impaktovaných časopisoch.

**Patenty:**

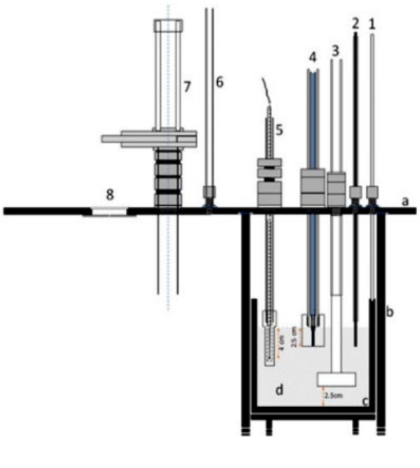
**1.** KITYK, Anna - HNATKO, Miroslav. An international patent application entitled "A method for electrochemical surface treatment of biomedical products made of titanium or Ti-based alloys" with registration number PCT/SK2023/050006 (12.04.2023).

**Publikácia:**

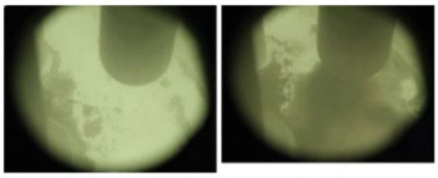
**1.** KITYK, Anna** - ŠVEC, Peter Jr. - ŠOLTÝS, Ján - PAVLÍK, Viliam - HNATKO, Miroslav. Deep inside of the mechanism of electrochemical surface etching of α + β Ti6Al4V alloy in room-temperature deep eutectic solvent Ethaline. In Journal of Molecular Liquids, 2023, vol. 375, no. 121316. (**6 - IF, Q1**) https://doi.org/10.1016/j.molliq.2023.121316.
**2.** KITYK, Anna** - PAVLÍK, Viliam - HNATKO, Miroslav. Exploring deep eutectic solvents for the electrochemical and chemical synthesis of photo- and electrocatalysts for hydrogen evolution. In International Journal of Hydrogen Energy, 2023, vol. 48, iss. 100, pp. 39823-39853. (**7.2 - IF, Q1**) https://doi.org/10.1016/j.ijhydene.2023.07.158.
**3.** KITYK, Anna** - PAVLÍK, Viliam - HNATKO, Miroslav. Green electropolishing using choline chloride-based deep eutectic solvents: A review. Journal of Molecular Liquids, 392 (2023) 123519. (**6 - IF, Q1**) https://doi.org/10.1016/j.molliq.2023.123519.

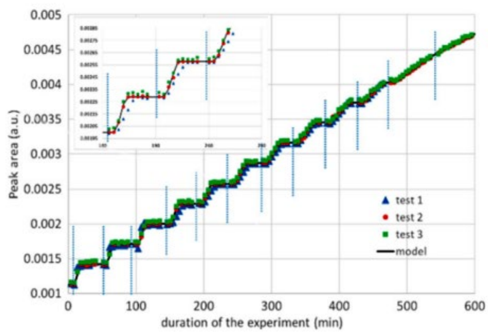
**Vývoj metódy a meranie dynamiky rozpúšťania komerčných alumín v priemyselnom kryolitovom elektrolyte**

V rámci tohto projektu bola vyvinutá a úspešne otestovaná metóda merania dynamiky rozpúšťania rôznych druhov priemyselných alumín (primárnych aj sekundárnych) v priemyselnom cryolitovom elektrolyte. Metóda je založená na meraní square wave volatemtrie (voltametria obdlžnikovým reverzným signálom) oxidácie elektroaktívnych častíc na báze Al─O na rotačnej diskovej elektróde vyrobenej zo sklenného grafitu. Metóda používa výrazne vyššie návažky ako v bežných laboratórnych podmienkach (3,6 kg kryolitového elektrolytu a 12 ´ 120 g aluminy) a vysokoteplotné (960 °C) elektrochmické meranie dynamiky rozpúšťania je zároveň doplnené on-line video záznamom postupného rozpúšťania alumín na hladine roztaveného elektrolytu. V rámci tejto významnej a pre ústav ekonomicky veľmi úspešnej spolupráce (spoločnosti Hydro aj RIO TINTO sú globálni hráči vo výrobe hliníka) bola vyprodukovaná aj jedna vedecká publikácia a unikátna metóda merania bola prezentovaná na prestížnom TMS mítingu v USA (TMS 2023 Annual Meeting & Exhibition, March 19–23, 2023, San Diego, California, USA).



Cross-section of the experimental setup


Images from video recordings showing the bath before (left) and moments after alumina addition (right)



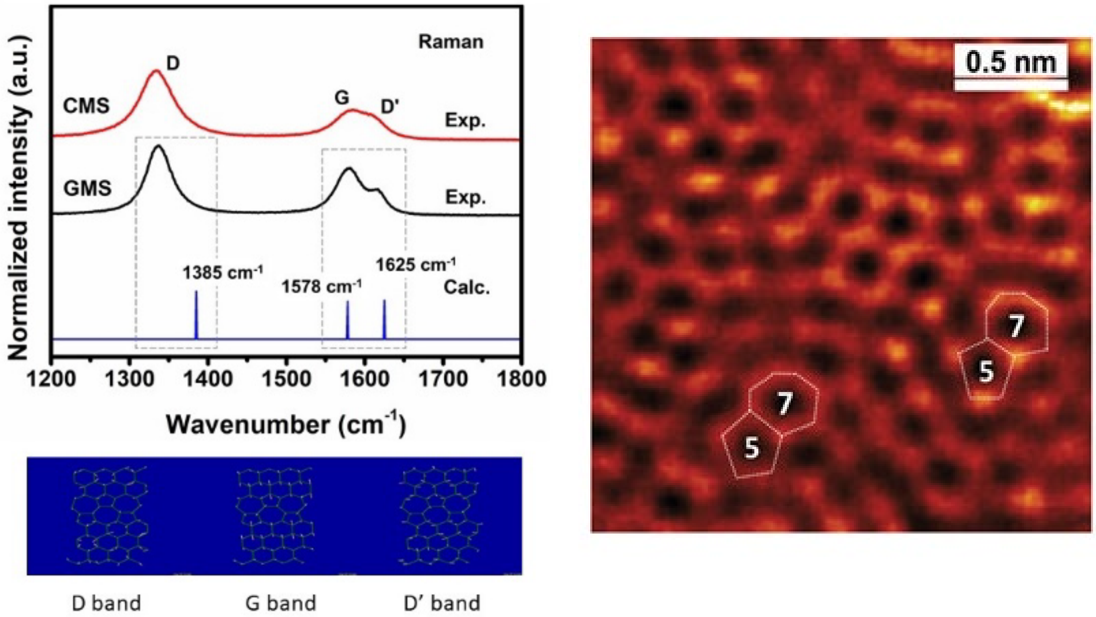
Evolution of the peak area of the SWV with time for alumina additions

**Publikácia:**
MARINHA, Daniel** - MEYER, Astrid J. - KUCHARÍK, Marián - BOUVET, Silvie - BOČA, Miroslav - KORENKO, Michal - DANIELIK, Vladimír - ŠIMKO, František. Following Alumina Dissolution Kinetics with Electrochemical and Video Analysis Tools. In Minerals, Metals and Materials Series: *Light Metals 2023*, 2023, pp. 77-86. (**0.196 - SJR, Q3**) https://doi.org/10.1007/978-3-031-22532-1_10
**Spolupráca medzi ÚACH SAV, v.v.i.** (Odelenie Taveninových Systémov) a konzorciom HYDRO ALUMINIUM AS (Porsgrunn, Nórsko) a RIO TINTO ALUMINIUM PECHINEY (Voreppe, Francúzsko)

### 2.3.3. Výsledky na báze medzinárodnej spolupráce

**Kombinované štúdium vlastností defektnej uhlíkovej katódy pre vysokovýkonné LiO batérie.**

V rámci medzinárodnej spolupráce v projekte AtomDeC v 2. spoločnej výzve V4-Japan v JRC programe sme sa venovali charakterizácii materiálu pre uhlíkovú katódu na báze defektného grafénu vo vysokovýkonných LiO batériách teoretickými metódami. Defektami sa rozumejú 5 a 7 členné kruhy, ktoré substituovali časti (6 členné kruhy) pravidelnej štruktúry čistého grafénu. Vznikli tak domény, ktoré významne zlepšili vlastnosti katódového materiálu. K celkovej charakterizácii daného materiálu ako aj potvrdeniu prítomnosti 5 a 7 členných kruhov významne prispela aj analýza vypočítaných vibračných módov v Ramanovom spektre štruktúrnych modelov tohto materiálu, kde boli detegované charakteristické D, D' a G pásy (Obr. 1), ktorých prítomnosť potvrdila defektnú štruktúru experimentálne pripraveného materiálu na partnerskom praovisku v Tohoku university, Japonsko.

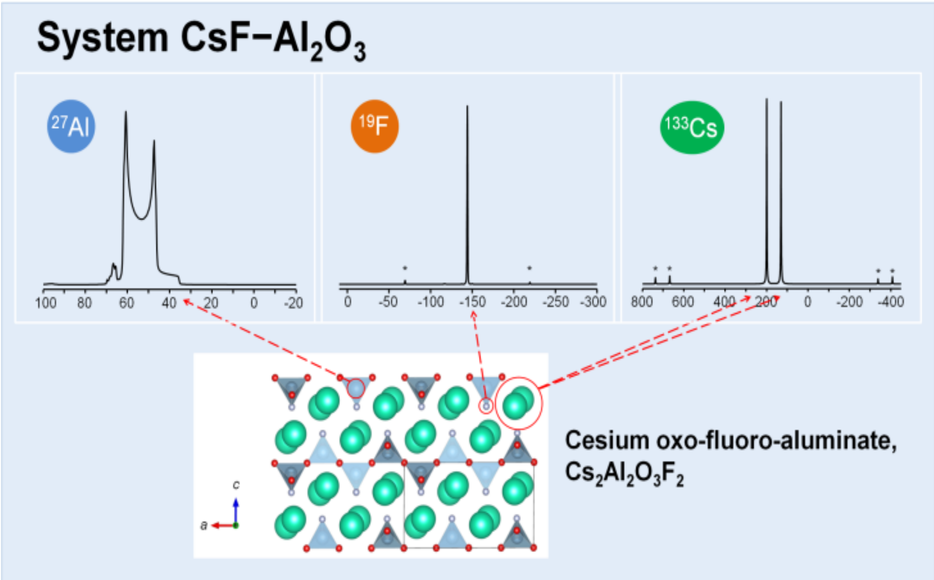



*Obr. 1 Experimentálne Ramanove spektrá uhlíkovej mezošpongie, CMS (čistý grafén) a grafénovej mezošpongie, GMS (defektný grafén) spolu s vypočítaným (Calc.) Ramanovým spektrom (vľavo hore), znázornenie vibrácií charakteristického D, G a D' módu (vľavo dole) a TEM snímka GMS s atómovým rozlíšením odčítaná pri 80 kV (vpravo).*

**Publikácia**:
YU, Wei - YOSHII, Takeharu - AZIZ, Alex - TANG, Rui - PAN, Zheng-Ze - INOUE, Kazutoshi - KOTANI, Motoko - TANAKA, Hideki - SCHOLTZOVÁ, Eva - TUNEGA, Daniel - NISHINA, Yuta - NISHIOKA, Kiho - NAKANISHI, Shuji - ZHOU, Yi - TERASAKI, Osamu - NISHIHARA, Hirotomo. Edge-Site-Free and Topological-Defect-Rich Carbon Cathode for High-Performance Lithium-Oxygen Batteries. In Advanced Science, 2023, vol. 10, no. 16, art. no. 2300268-1-2300268-10. (**15.1 - IF, Q1**) https://doi.org/10.1002/advs.202300268

**Oxofluórohlinitan cézny, $Cs_2Al_2O_3F_2$, ako nová fáza a jej existencia v kvarternárnom komplexnom systéme $CsF{-}AlF_3{-}Al_2O_3{-}Cs_2O$**

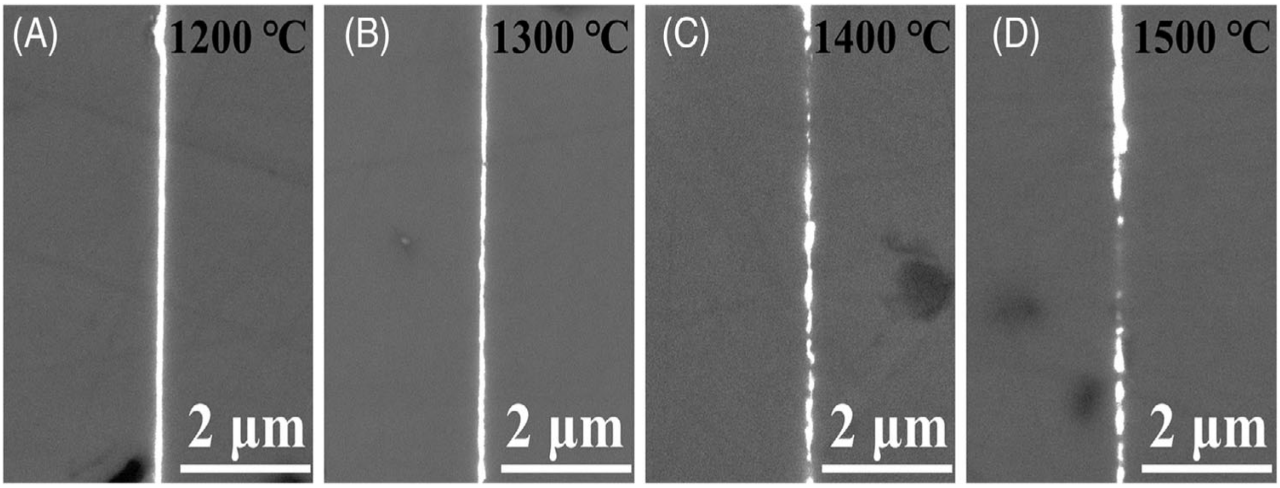
Uskutočnila sa komplexná štruktúrna a fázová analýza systému $CsF{-}Al_2O_3$. Metódou termickej analýzy sa zadefinovali fázové polia vo fázovom diagrame a identifikovali sa tuhé fázy, existujúce v skúmanom systéme. Systém reprezentuje stabilnú diagonálu kvartérneho systému $CsF–Al_2O_3–AlF_3–Cs_2O$. Bola identifikovaná nová fáza, a to oxofluórohlinitan cézny, $Cs_2Al_2O_3F_2$, pričom sa stanovila aj jej štruktúra. Charakteristikou tejto kryštálovej štruktúry je prítomnosť vrstiev, zložených z jednotlivých ($AlO_3F$) tetrédrov, zdieľajúcich navzájom spoločné rohy, v ktorých sú umiestnené atómy kyslíka, zatiaľ čo atómy fluóru oddeľujú jednotlivé vrstvy. Počet a množstvo neekvivaletných kryštalografických polôh jednotlivých atómov, prítomných v uvedenej štruktúre sa určil pomocou $^{19}F$, $^{27}Al$ a $^{133}Cs$ MAS NMR spektier v tuhom stave. Okrem $Cs_2Al_2O_3F_2$ sa z binárneho podsystému $CsF–Al_2O_3$ zráža iba α-$Cs_3AlF_6$ ako sekundárna tuhá fáza. Toto správanie sa líši od predtým skúmaných systémov $MF{-}Al_2O_3$ (M=K, Rb), kde $M_2Al_{22}O_{34}$ (M=K, Rb) dominovala, ako sekundárna tuhá fáza.




**Publikácia:**
ŠIMKO, František** – RAKHMATULLIN, Aydar – KING, Graham – ALLIX, Mathieu – BESSADA, Catherine – NETRIOVÁ, Zuzana – KRISHNAN, Dhiya – KORENKO, Michal**. Cesium Oxo-fluoro-aluminates in the $CsF{-}Al_2O_3$ System: Synthesis and Structural Characterization. In Inorganic Chemistry, 2023, vol. 62, iss. 38, pp. 15651−15663. (**4.6 – IF, Q1**). https://doi.org/10.1021/acs.inorgchem.3c02386

**Vysokopevné spoje SiC materiálov pripravené pri relatívne nízkej teplote (1400°C)**

Keramické materiály na báze karbidu kremičitého (SiC) sú vďaka ich nízkej hustote, výborným mechanickým vlastnostiam aj pri vysokých teplotách, a odolnosti voči žiareniu považované za jedny z najdôležitejších konštrukčných keramických materiálov pre jadrový a vesmírny priemysel. Nakoľko je výroba veľkých rozmerov a komplexných tvarov z týchto materiálov veľmi náročná, táto práca sa venovala vývoju inovatívneho spôsobu ich spájania. Vysokopevné spoje SiC materiálov boli pripravené pri relatívne nízkej teplote (1400°C) použitím 100 nm povlaku Pr. Počas spájania došlo reakciou medzi vrstvou Pr a substrátom SiC k vytvoreniu prechodnej fázy $Pr_3SiC_2$, ktorá ďalej reagovala so substrátom SiC za vzniku tekutej fázy a nano-precipitátov SiC. Prítomnosť tekutej fázy zvýšila difúziu atómov na rozhraní, a uľahčila zhutnenie nano-precipitátov SiC s matricou SiC. To viedlo k tvorbe čiastočne bezšvového spoja. Pevnosť spojov dosiahla úroveň pevnosti základného SiC materiálu (227 ± 12 MPa) s iniciátorom lomu mimo v základnom materiály, čo potvrdilo, že pevnosť rozhrania bola vyššia ako pevnosť základného materiálu.




Obr. 1: Spätne odrazené SEM snímky spojov SiC/Pr/SiC pripravených pri rôznych teplotách: (a) 1200°C, (b) 1300°C, (c) 1400°C, (d) 1500°C.

Publikácia:

XU, Jie - **TATARKO, Peter** - CHEN, Lianghao - SHAN, Xu - HUANG, Qing - ZHOU, Xiaobing**. High-strength SiC joints fabricated at a low-temperature of 1400°C using a novel low activation filler of Praseodymium. In Journal of the American Ceramic Society, 2023, vol. 106, iss. 10, pp. 5679-5688. (**3.9 - IF**, **Q1**) https://doi.org/10.1111/jace.19229.

**Projekt: APVV-SK-CZ-RD-21-0089**

## 2.4. Publikačná činnosť (zoznam je uvedený v prílohe A-3)

Tabuľka 2e Štatistika vybraných kategórií publikácií

| **PUBLIKAČNÁ A EDIČNÁ ČINNOSŤ** | **Počet v r. 2023/ doplnky z r. 2022** |
|---|---|
| **1. Vedecké monografie a monografické štúdie vydané v domácich vydavateľstvách** (AAB, ABB) | **0 / 0** |
| **2. Vedecké monografie a monografické štúdie vydané v zahraničných vydavateľstvách** (AAA, ABA) | **0 / 0** |
| **3. Odborné monografie, vysokoškolské učebnice a učebné texty vydané v domácich vydavateľstvách** (BAB, ACB, CAB) | **0 / 0** |
| **4. Odborné monografie a vysokoškolské učebnice a učebné texty vydané v zahraničných vydavateľstvách** (BAA, ACA, CAA) | **0 / 0** |
| **5. Kapitoly vo vedeckých monografiách vydaných v domácich vydavateľstvách** (ABD) | **0 / 0** |
| **6. Kapitoly vo vedeckých monografiách vydaných v zahraničných vydavateľstvách** (ABC) | **0 / 0** |
| **7. Kapitoly v odborných monografiách, vysokoškolských učebniciach a učebných textoch vydaných v domácich vydavateľstvách** (BBB, ACD) | **0 / 0** |
| **8. Kapitoly v odborných monografiách, vysokoškolských učebniciach a učebných textoch vydaných v zahraničných vydavateľstvách** (BBA, ACC) | **0 / 0** |
| **9. Vedecké práce registrované v Current Contents Connect** (ADCA, ADCB, ADDA, ADDB) | **71 / 1** |
| **10. Vedecké práce registrované vo Web of Science Core Collection alebo Scopus** (ADMA, ADMB, ADNA, ADNB) | **10 / 0** |
| **11. Vedecké práce v ostatných domácich časopisoch** (ADFA, ADFB) | **0 / 0** |
| **12. Vedecké práce v ostatných zahraničných časopisoch** (ADEA, ADEB) | **1 / 0** |
| **13. Vedecké práce v domácich recenzovaných zborníkoch** (AEDA) | **4 / 0** |
| **14. Vedecké práce v zahraničných recenzovaných zborníkoch** (AECA) | **0 / 0** |
| **15. Publikované príspevky na domácich vedeckých konferenciách** (AFB, AFD) | **1 / 0** |
| **16. Publikované príspevky na zahraničných vedeckých konferenciách** (AFA, AFC) | **5 / 0** |
| **17. Vydané periodiká evidované v CCC, WoS Core Collection, SCOPUS** | **0** |
| **18. Ostatné vydané periodiká** | **0** |
| **19. Zostavovateľské práce knižného charakteru** (FAI) | **0 / 0** |
| **20. Preklady vedeckých a odborných textov** (EAJ) | **0 / 0** |
| **21. Heslá v odborných terminologických slovníkoch a encyklopédiách** (BDA, BDB) | **0 / 0** |
| **22. Recenzie v časopisoch a zborníkoch** (EDI) | **0 / 0** |

*Evidujú sa len tie práce zamestnancov a doktorandov, v ktorých je uvedená afiliácia k organizácii*

Tabuľka 2f Štatistika vedeckých prác podľa kvartilu vedeckého časopisu

| **Kvartil vedeckého časopisu** | **Q1** | **Q2** | **Q3** | **Q4** | **Spolu** |
|---|---|---|---|---|---|
| **Podľa IF z r. 2022 (zdroj JCR)** *Počet článkov / doplnky* | 41 / 0 | 27 / 1 | 3 / 0 | 3 / 0 | 74 / 1 |
| **Podľa SJR z r. 2022 (zdroj Scimago)** *Počet článkov / doplnky* | 50 / 1 | 24 / 0 | 5 / 0 | 2 / 0 | 81 / 1 |

Tabuľka 2g Ohlasy

| OHLASY | Počet v r. 2022/ doplnky z r. 2021 |
|---|---|
| **Citácie vo WOS (1.1, 2.1)** | 2346 / 531 |
| **Citácie v SCOPUS (1.2, 2.2)** | 211 / 104 |
| **Citácie v iných citačných indexoch a databázach (9, 10, 3.2, 4.2)** | 0 / 0 |
| **Citácie v publikáciách neregistrovaných v citačných indexoch (3, 4, 3.1, 4.1)** | 1 / 0 |
| **Recenzie na práce autorov z organizácie (5, 6, 7, 8)** | 0 / 0 |

## 2.5. Aktívna účasť na vedeckých podujatiach

Tabuľka 2h Vedecké podujatia

| | |
|---|---|
| **Prednášky a vývesky na medzinárodných vedeckých podujatiach** | 85 |
| **Prednášky a vývesky na národných vedeckých podujatiach** | 87 |

### 2.6. Vyžiadané prednášky

*Ak boli príspevky publikované, sú súčasťou prílohy A-3, kategória (AFC, AFD, AFE, AFF, AFG, AFH)*

#### 2.6.1. Vyžiadané prednášky na medzinárodných vedeckých podujatiach

KOMOROVSKÝ, Stanislav. Relativistic theory of pNMR and EPR. In XVth Workshop on Modern Methods in Quantum Chemistry, Mariapfarr, Rakúsko, 26. 02. – 03. 03 2023.
BUČKO, Tomáš. Accessing free energetics of the adsorption problem via constrained thermodynamic integration in internal coordinates. 17$^{th}$ International Congress of Quantum Chemistry, Bratislava, Slovensko, 26. 6. – 1. 7. 2023
MALKIN, OLGA. The multipath model of NMR spin-spin couplings: true or false? Modern Methods in Quantum Chemistry, Mariapfarr, Rakusko, 26.02.2023 – 03.03.2023.
MALKIN, Vladimír Transmission of spin-polarization by pi-orbitals. Modern Methods in Quantum Chemistry, Mariapfarr, Rakúsko, 26.02.2023 – 03.03.2023.
LEMKEN, Florian Long-range indirect $^{13}C$-$^{31}P$ Coupling in isostructural nickel, palladium, and platinum complexes. Modern Methods in Quantum Chemistry, Mariapfarr, Rakúsko, 26.02.2023 – 03.03.2023.
AKUSEVICH, A. – PECUŠOVÁ, B. – PRNOVÁ, A. – MICHÁLKOVÁ, M. – ŠVANČÁREK, P. – PARCHOVIANSKÝ, M. – KLEMENT, R. – GALUSEK, D. DSC/TG, RTG a SEM analýza teplotného správania hlinitanových skiel, 25. ročník Konference o Speciálních Anorganických Pigmentech a Práškových Materiálech, Pardubice, 2023, Univerzita Pardubice, Česká republika
TATARKO, Peter* – ZHUKOVA, Inga – HOSSEINI, Naser – ÜNSAL, Hakan – CHLUP, Zdeněk – TATARKOVÁ, Monika – KOVALČÍKOVÁ, Alexandra – DUSZA, Ján – DLOUHÝ, Ivo. New high-entropy ceramics for extreme environment applications. 7$^{th}$ Conference of the Serbian Society for Ceramic Materials, Belgrade, Srbsko, 14-16.06.2023
TATARKO, Peter* – ZHUKOVA, Inga – HOSSEINI, Naser – GRASSO, Salvatore – KOMBAMUTHU, Vasanthakumar – CHLUP, Zdeněk – KOVALČÍKOVÁ, Alexandra – TATARKOVÁ, Monika – DLOUHÝ, Ivo – DUSZA, Ján. Novel diboride ceramics for extreme environment applications. Advanced Ceramics and Applications XI – New frontiers in multifunctional material science and processing, Belgrade, Srbsko, 18-20.09.2023
HOSSEINI, Naser – CHLUP, Zdeněk – CASALEGNO, Valentina – ZHOU, Xiaobing – VALENZA, Fabrizio – KOVALČÍKOVÁ, Alexandra – DLOUHÝ, Ivo – TATARKO, Peter*. Joining of Advanced Ceramics using Field Assisted Sintering Technology. The 15$^{th}$ Pacific Rim Conference of Ceramic Societies (PACRIM 15) & The 13$^{th}$ International conference on high-performance ceramics (CICC-13), Shenzhen, Čína, 05-09.11.2023
TATARKO, Peter* – KOMBAMUTHU, Vasanthakumar – ZHUKOVA, Inga – HOSSEINI, Naser – CHLUP, Zdeněk – KOVALČÍKOVÁ, Alexandra – TATARKOVÁ, Monika – CSANÁDI, Tamás – DUSZA, Ján – DLOUHÝ, Ivo – ŠAJGALÍK, Pavol. Novel diboride-based high entropy ceramics. Enginnering Ceramics, Smolenice, Slovensko, 07-11.05.2023

HOSSEINI, Naser – CHLUP, Zdeněk – KOVALČÍKOVÁ, Alexandra – ZHOU, Xiaobing – VALENZA, Fabrizio – CASALEGNO, Valentina – DLOUHÝ, Ivo – TATARKO, Peter*. Wetting and joining of ceramic matrix composites with refractory transition metals-based alloys. 11th International Conference on High Temperature Ceramic Matrix Composites, Jeju, Južná Kórea, 27-31.08.2023
DE LA TORRE OLVERA, Guido – LABUDOVÁ, Martina – HIČÁK, Michal – HNATKO, Miroslav – ŠAJGALÍK, Pavol – TATARKOVÁ, Monika*. Silicon nitride – from inert to bioactive by surface modification. ECERS 2023, XVIII Conference and Exhibition of the European Ceramic Society, Lyon, Francúzsko, 02-06.06.2023

**2.6.2. Vyžiadané prednášky na národných vedeckých podujatiach**

**2.6.3. Vyžiadané prednášky na významných vedeckých inštitúciách**

KOMOROVSKÝ, Stanislav. Modern DFT methods for prediction of spectroscopic parameters of species containing heavy elements? Eötvös Loránd University, Budapešť, Maďarsko, 28. 04. 2023.
HANZEL, Ondrej. Thermal and electrical conductivity of ceramic carbon nanostructure composites. Yeungnam University, Daegu, Južná Kórea, 25.08.2023
HANZEL, Ondrej. Thermal and electrical conductivity of ceramic carbon nanostructure composites. Korea Institute of Materials Science, Changwon, Južná Kórea, 25.08.2023
SCHOLTZOVÁ, Eva. DFT study of the structural behaviour of montmorillonite under different pressure and temperature conditions. University of Patras, Patras, Grécko, 22.08.2023.
SCHOLTZOVÁ, Eva Computational study of adsorption properties of modified 17rapheme for methylene blue. Carbon Friday minisymposium of AtomDec project, University of Szeged, Maďarsko. 20.09.2023.

**2.7. Patentová a licenčná činnosť na Slovensku a v zahraničí v roku 2023**

**2.7.1. Vynálezy, na ktoré bol v roku 2023 udelený patent**

**a) na Slovensku**

**b) v zahraničí**

**2.7.2. Vynálezy prihlásené v roku 2023**

**a) na Slovensku**

**b) v iných krajinách ako prioritná prihláška**

**c) PCT**

Názov vynálezu: A method for electrochemical surface treatment of biomedical products made of titanium or Ti-based alloys
Krajina: Slovensko
Číslo prihlášky: PCT/SK2023/050006
Dátum priority: 12.4.2023
Majiteľ / spolumajiteľ: CEMEA SAV, v. v. i.; ÚACH SAV, v. v. i.
Pôvodcovia vynálezu: Kityk Anna, Hnatko Miroslav

**d) EP**

**e) v iných krajinách v rámci tzv. národnej fázy po PCT, resp. po validácii EP**

**2.7.3. Úžitkové vzory na Slovensku**

**a) prihlásené v roku 2023**

**b) udelené v roku 2023**

### 2.7.4. Realizované vynálezy

**a) predané patenty resp. prihlášky vynálezov (v prípade úplnej zmeny majiteľa patentu)**

**b) predané licencie (v prípade že majiteľom ostáva organizácia SAV)**

*Finančný prínos pre organizáciu SAV v roku 2023 a súčet za predošlé roky sa neuvádzajú, ak je zverejnenie v rozpore so zmluvou súvisiacou s realizáciou patentu.*

## 2.8. Účasť expertov na hodnotení národných projektov (APVV, VEGA a iných)

Tabuľka 2i Experti hodnotiaci národné projekty

| Meno pracovníka | Typ programu/projektu/výzvy | Počet hodnotených projektov |
|---|---|---|
| Boča Miroslav | APVV | 1 |
| Najafzadehkhoee Aliasghar | Internal grant for PhD students, FunGlass, Trenčianska univerzita A. Dubčeka | 2 |
| Pavlík Viliam | APVV-2022 | 11 |
| Tatarko Peter | APVV-SK-FR-22-0005 | 1 |
| | APVV-VV22 | 5 |
| | VEGA | 3 |

## 2.9. Účasť na spracovaní hesiel do encyklopédie Beliana

Počet autorov hesiel: 0

## 2.10. Recenzovanie knižných publikácií a príspevkov vo vedeckých časopisoch

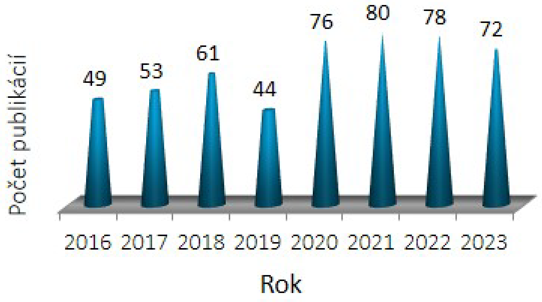
Tabuľka 2j Počet vypracovaných recenzií na vedecké monografie, vedecké štúdie a zborníky

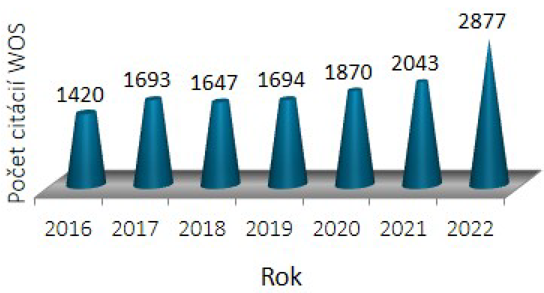
| Meno pracovníka | Ved. monografie | | Príspevky v časopisoch | | | Zborníky | |
|---|---|---|---|---|---|---|---|
| | Domáce | Zahra-ničné | WoS, SCOPUS | Iné databázy | Ostatné | Domáce | Zahra-ničné |
| Boča Miroslav | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| Boháč Peter | 0 | 0 | 4 | 0 | 0 | 0 | 0 |
| Bučko Tomáš | 0 | 0 | 9 | 0 | 0 | 0 | 0 |
| Hanzel Ondrej | 0 | 0 | 3 | 0 | 0 | 1 | 0 |
| Kityk Anna | 0 | 0 | 5 | 0 | 0 | 0 | 0 |
| Kubíková Blanka | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| Kureková Valéria | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| Lenčéš Zoltán | 0 | 0 | 28 | 0 | 0 | 0 | 0 |
| Madejová Jana | 0 | 0 | 2 | 0 | 0 | 0 | 0 |
| Malkin Oľga | 0 | 0 | 3 | 0 | 0 | 0 | 0 |
| Michálková Monika | 0 | 0 | 3 | 0 | 0 | 0 | 0 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Najafzadehkhoee Aliasghar | 0 | 2 | 2 | 0 | 0 | 0 | 0 |
| Pavlík Viliam | 0 | 0 | 4 | 0 | 0 | 0 | 0 |
| Pribus Marek | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| Prnová Anna | 0 | 0 | 8 | 0 | 0 | 2 | 0 |
| Slaný Michal | 0 | 0 | 7 | 0 | 0 | 0 | 0 |
| Tatarko Peter | 0 | 0 | 15 | 0 | 0 | 0 | 0 |
| **Spolu** | **0** | **2** | **95** | **0** | **0** | **3** | **0** |

## 2.11. Iné informácie k vedecko-výskumnej činnosti.

Vývoj počtu časopiseckých karentovaných publikácií registrovaných v databáze WOS ukazuje schéma nižšie. V závislosti na metodike, na ktorú kategóriu sa vzťahuje prepočítaný podiel publikácie, je možné uvažovať o kategóriách: vedeckí pracovníci, ostatní vedeckí pracovníci s VŠ vzdelaním, ostatní pracovníci zapojení do riešenia projektov a doktorandi. Vzhľadom na to, že nie je k dispozícii jednoznačné usmernenie, budeme vychádzať z usmernenia poslednej akreditácie, kedy sa počet publikačných výstupov vzťahoval na počet zamestnancov s univerzitným titulom zapojených do výskumných projektov v danom roku. Cieľom je dosiahnuť a udržiavať dve (prípadne viac) publikácie na počet zamestnancov s univerzitným titulom zapojených do výskumných projektov, čo odpovedá štandardu vyspelých vedeckých pracovísk s podobným zameraním. V roku 2023, sa publikovalo 72 publikácií v CCC časopisoch, t.j. 1,7 publikácie na vedeckého pracovníka. V obrázkoch a tabuľkách uvedených ďalej je možné sledovať trendy v posledných rokoch vo vývoji počtu karentovaných publikácií, ako aj trendy v počte karentovaných publikácií vztiahnutých na FTE vedeckých pracovníkov. Ďalším sledovanými parametrami sú ohlasy na práce s afiliáciou ústavu uvedených vo WOS databáze a ich prepočet na jedného vedeckého pracovníka.




Tabuľky tiež ukazujú vývoj priemerného impakt faktoru výstupov (podľa JCR). Podstatnou skutočnosťou je, že stabilne rastie počet publikácií v časopisoch s vyšším IF.

| Rok | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 |
|---|---|---|---|---|---|---|---|
| Vedeckí prac. | 39,1 | 39,4 | 34,2 | 34,9 | 37,3 | 38,8 | 41,8 |
| Pub/ 1 VP* | 1,4 | 1,5 | 1,3 | 2,2 | 2,1 | 2,0 | 1,7 |
| cit/1 ved. prac. | 37,6 | 41,8 | 45,3 | 40,8 | 42,0 | 41,1 | 68,8 |

| Rok | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 |
|---|---|---|---|---|---|---|---|
| Priemerný IF | 2.83 | 3.41 | 3.66 | 4.17 | 4.32 | 5.64 | 4.76 |
| Medián IF | 3.10 | 3.06 | 3.45 | 3.26 | 3.65 | 4.88 | 4.60 |

| IF | Počet publikácií / Number of publications CCC (ADC and ADD) | | | | | | |
|---|---|---|---|---|---|---|---|
| | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 |
| < 1 | 5 | 3 | 1 | 5 | 1 | 0 | 0 |
| 1-2 | 11 | 5 | 8 | 4 | 2 | 3 | 6 |
| 2-3 | 8 | 20 | 6 | 23 | 17 | 9 | 6 |
| 3-4 | 19 | 19 | 12 | 13 | 21 | 13 | 13 |
| 4-5 | 6 | 10 | 11 | 25 | 11 | 18 | 16 |
| 5< | 2 | 4 | 6 | 6 | 28 | 35 | 31 |
| ∑ | 51 | 61 | 44 | 76 | 80 | 78 | 72 |

Významnou časťou vedeckej aktivity je účasť na výzvach v rôznych projektových schémach. Každoročne, jednotlivé vedecké tímy na ústave podávajú niekoľko APVV projektov, ako vo všeobecnej, tak aj v bilaterálnych výzvach. V schéme VEGA projektov je ústav riešiteľom stabilne vysokého počtu projektov (aj spoločných spolu s univerzitnými pracoviskami).
Tiež je potrebné vyzdvihnúť úspešnosť ústavu naprieč všetkými vnútornými výzvami SAV; získané štipendiá v rámci Schwarzovho fondu (v roku 2023 mal ústav dvoch držiteľov štipendia), doktorandských projektov, bilaterálne medzinárodné projekty (TUBITAK-1, MOST-1, V4-Japan-1) vrátane projektu SASPRO II (aktuálne dva projekty). V minulom roku, bol ukončený projekt ŠF CEMEA, na ktorom ústav participoval. V rámci projektu sa zakúpila nová infraštruktúra, ktorá je k dispozícii všetkým zamestnancom ústavu.
V rámcí výziev EÚ sa okrem výziev Horizon Europe ústav zapojil aj do výzvy v rámci schém **Era-net**.
Názov: Metal-doped graphene for battery industry; Výzva: M-ERA.NET Call 2023; koordinátor: Norwegian University of Science and Technology; partneri: CealTech AS, ÚACH SAV, v.v.i. (M. Matejdes), Karlova Univerzita, Česká republika, São Paulo State University, Brazília; stav: nepodporený

V roku 2023 sa ústav aktívne zapájal do rôznych výziev v rámci **Plánu obnovy SR**. Bolo podaných:
**09I03-03-V04 -** Štipendiá pre excelentných výskumníkov a výskumníčky R2-R4 - 12x
**R2**
· Marek Pribus: Príprava materiálov s antibakteriálnymi vlastnosťami na báze ílových minerálov
· Aliasghar Najafzadehkhoee: Design, analysis and mechanical characterization of laminar ceramics
· Florian Lemken: Study of C-C Coupling Propagated by π-Orbitals
· Daniel Moreno: A theoretical approach to defects in clay minerals
· Michal Slaný: Functionalized clay/biochar nanocomposites for mobilization of heavy metals from soil and wastewater

**R3**
· Peter Grančič: Interactions between hydrophobic (poly)aromatic compounds and clay
· Peter Boháč: Corona-shape photo-functional nanoparticles for environmental applications
· Eva Scholtzová: Effect of structural substitutions on properties of inorganic layered structures, a basis for atomically designed advanced materials for green technological applications, studied by modelling approach
· Michalková Monika: Development of advanced luminescent glass 3D structures
· Viliam Pavlík: High temperature corrosion behavior of ceramics and refractory materials in molten mixtures.
· Michal Korenko: Physico-Chemical Analysis of Molten Fluoride-Based Systems with the Metals Identified as Critical for the European Union
· Márius Kádek: Redefining boundaries: relativistic computational tools for complex 2D materials.

**- 09I01-03-V02** - Podpora prípravy projektov v Horizonte Európa - 1x (kumulatívna žiadosť za dva projekty)
Miroslav Boča: Podpora prípravy projektov v programe Horizont Európa
**- 09I03-03-V03 -** Veľké projekty pre excelentných výskumníkov - 1x
Peter Tatarko: Nová generácia termoelektrických materiálov pre udržateľnú energiu
**- 09I03-03-V06 -** Kapitálový booster pre schémy na podporu výskumu a vývoja - 1x
Stanislav Komorovský, **APVV projekt vo VV 2022:** Vývoj pokročilých metód určených na presnú predpoveď a analýzu röntgenových spektier molekúl s otvorenou obálkou
**- 09I04-03-V02 -** Podpora výskumných projektov zameraných na dekarbonizáciu ekonomiky v TRL úrovniach 1-3 - 1x
**Hlavný riešiteľ UACH SAV:** Miroslav Boča, **Názov projektu:** Kvapalný rotor na báze roztavených solí pre nabíjanie batériových systémov, **Partneri:** FCHPT, Fyzikálny ústav, Prefa Alfa, s.r.o.
**- 09I02-03-V02** - „Matching" granty ku zdrojom získaným od súkromného sektora v rámci výskumnej spolupráce - 1x

**ÚACH SAV, v.v.i. ako partner:**
**- 09I04-03-V02** - Podpora výskumných projektov zameraných na dekarbonizáciu ekonomiky v TRL úrovniach 1-3 - 1x
**- 09I05-03-V02 -** Podpora výskumných projektov zameraných na digitalizáciu ekonomiky v TRL úrovniach 1-3 - 2x
Advanced Modelling of Light-Matter Interactions on Near-Term ExaScale Supercomputers, koordinátor projektu: Univerzita Komenského v Bratislave, partneri: ÚACH SAV, v.v.i. (S. Komorovský), Národné

superpočítačové centrum, z. z. p. o.

Cériom dopovaná usmernene solidifikovaná eutektická keramika YAG($Y_3Al_5O_{12}$)/$Al_2O_3$ pre senzory a fosfory pripravená horizontálne usmernenou kryštalizáciou, koordinátor projektu: UNIZA, Ing. Kajan, Partneri: Žilinská univerzita v Žiline, AT Crystals, s. r. o., Žilinská univerzita v Žiline, Ústav anorganickej chémie SAV, v. v. i. (Dušan Galusek).
**- 09I02-03-V01** - Transformačné a inovačné konzorciá - 1x
Konzorcium pre transformáciu a inováciu sklokeramiky (GlaCerTic), koordinátor projektu: TnU AD Trenčín

# 3. Medzinárodná vedecká spolupráca

## 3.1. Medzinárodné vedecké podujatia

### 3.1.1. Medzinárodné vedecké podujatia, ktoré organizácia SAV organizovala v roku 2023 alebo sa na ich organizácii podieľala, s vyhodnotením vedeckého a spoločenského prínosu podujatia

XVth Workshop on Modern Methods in Quantum Chemistry, Mariapfarr, Rakúsko, 40 účastníkov, 26.02.-03.03.2023
Účastníci z Nemecka, Rakúska, Česka, Dánska, Fínska, Slovenska, 26 prednášok, 7 postrov.

ENGINEERING CERAMICS 2023 - Ceramics for circular economy, Smolenice, Slovensko, 50 účastníkov, 07.05.-11.05.2023
Medzinárodná konferencia, ktorá sa koná každé 4 roky. Na konferencií zaznelo 38 prednášok, z toho 24 vyzvaných prednášok a bolo prezentovaných 9 postrov. Účastníci konferencie boli zo 14 krajín (napr. Južná Kórea, USA, Veľká Británia, Japonsko, Nemecko, Taliansko, India, Francúzsko a iné).

### 3.1.2. Medzinárodné vedecké podujatia, ktoré usporiada organizácia SAV v roku 2024 (anglický a slovenský názov podujatia, miesto a termín konania, meno, telefónne číslo a e-mail zodpovedného pracovníka)

### 3.1.3. Počet pracovníkov v programových a organizačných výboroch medzinárodných konferencií

Tabuľka 3a Programové a organizačné výbory medzinárodných konferencií

| Meno pracovníka | Programový | Organizačný | Programový i organizačný |
|---|---|---|---|
| Boča Miroslav | 1 | 0 | 0 |
| Hanzel Ondrej | 0 | 1 | 0 |
| Komorovský Stanislav | 0 | 0 | 1 |
| Najafzadehkhoee Aliasghar | 0 | 1 | 0 |
| Tatarko Peter | 2 | 0 | 0 |
| Tatarková Monika | 1 | 0 | 0 |
| **Spolu** | 4 | 2 | 1 |

## 3.2. Členstvo a funkcie v medzinárodných orgánoch

### 3.2.1. Členstvo a funkcie v medzinárodných vedeckých spoločnostiach, úniách a národných komitétoch SR

doc. Ing. Miroslav Boča, DrSc.
European Technology Platform for Advanced Engineering Materials and Technologies (funkcia: člen správnej rady EuMat)

Mgr. Peter Boháč, PhD.
AIPEA - International Association for the study of Clays (funkcia: člen)

prof. RNDr. Juraj Bujdák, DrSc.
AIPEA - International Association for the study of Clays (funkcia: člen)

prof. Ing. Dušan Galusek, DrSc.
American Ceramic Society (funkcia: člen)
Ceramic in Modern Technologies (funkcia: člen)
European Ceramic Society (funkcia: fellow)
European Society for Bioresorbable Implants (funkcia: zakladajúci člen)
European Society on Glass Science and Technology (funkcia: člen)

International Commission on Glass (funkcia: zástupca SR v ICG council)

Ing. Ondrej Hanzel, PhD.
European Ceramic Society (funkcia: člen)

doc. Ing. Mária Chromčíková, PhD.
Česká sklárska spoločnosť (funkcia: člen)
TC03 (funkcia: člen)

Mgr. Ľuboš Jankovič, PhD.
AIPEA - International Association for the study of Clays (funkcia: člen)

doc. Mgr. Anna Kityk, PhD.
International Society of Electrochemistry (funkcia: člen)
Royal Society of Chemistry (funkcia: člen)

Ing. Michal Korenko, PhD.
International Union of Pure and Applied Chemistry (IUPAC) (funkcia: National Representative (NR) of Division I)

Mgr. Valéria Kureková, PhD.
AIPEA - International Association for the study of Clays (funkcia: člen)

doc. Ing. Zoltán Lenčéš, PhD.
American Ceramic Society (funkcia: člen)
Ceramic Society of Japan (funkcia: člen)
European Ceramic Society (funkcia: člen výboru)
International Ceramic Federation (funkcia: člen)
Materials Research Society (funkcia: člen)

prof. Ing. Marek Liška, DrSc., Dr.h.c.
Česká sklárska spoločnosť (funkcia: člen výboru, čestný člen)
ICG TC03 (funkcia: člen)
Society of Glass Technology (funkcia: čestný člen - FSGT)

RNDr. Jana Madejová, DrSc.
AIPEA - International Association for the study of Clays (funkcia: člen výboru)
The Clay Minerals Society (funkcia: člen)

Dr. Vladimír Malkin, DrSc.
WATOC - World Association of Theoretical and Computational Chemists (funkcia: člen)

Oksana Matselko, PhD.
European Crystallographic Association (funkcia: člen)

MSc. Daniel Moreno, PhD.
AIPEA - International Association for the study of Clays (funkcia: člen)

Dr. Aliasghar Najafzadehkhoee, Ph.D.
European Ceramic Society (ECerS) (funkcia: Member)

Ing. Helena Pálková, PhD.
AIPEA - International Association for the study of Clays (funkcia: člen)

Mgr. Marek Pribus, PhD.
AIPEA - International Association for the study of Clays (funkcia: člen)

Ing. Anna Prnová, PhD.
Slovak Fulbright Alumni Association (funkcia: člen)

Ing. Eva Scholtzová, CSc.
AIPEA - International Association for the study of Clays (funkcia: člen)

Ing. Michal Slaný, PhD.
AIPEA - International Association for the study of Clays (funkcia: člen)

prof. RNDr. Pavol Šajgalík, DrSc.
American Ceramic Society (funkcia: člen)
Ceramic Society of Japan (funkcia: člen)
Council of the European Ceramic Society (funkcia: člen)
European Ceramic Society (funkcia: člen predstavenstva)
International Ceramic Federation (funkcia: člen predstavenstva)
Materials Research Society (funkcia: člen)
Permanent Executive Committee ECerS (funkcia: volený člen)
World Academy of Ceramics (funkcia: volený člen)

Mgr. Tímea Šimonová, PhD.
AIPEA - International Association for the study of Clays (funkcia: člen)

Ing. Peter Škorňa, PhD.
AIPEA - International Association for the study of Clays (funkcia: člen)

### 3.3. Účasť expertov na hodnotení medzinárodných projektov (EÚ RP, ESF a iných)

Tabuľka 3b Experti hodnotiaci medzinárodné projekty

| **Meno pracovníka** | **Typ programu/projektu/výzvy** | **Počet hodnotených projektov** |
|---|---|---|
| Pavlík Viliam | APVV SK-PL-23 | 1 |
| Tatarko Peter | HORIZON-MSCA-2023-PF-EF | 6 |
| | INTER-EXCELLENCE ČR | 1 |

### 3.4. Najvýznamnejšie prínosy MVTS ústavu vyplývajúce z mobility a riešenia medzinárodných projektov a iné informácie k medzinárodnej vedeckej spolupráci

Ako je uvedené v Tabuľke 2c, v roku 2023 ústav sa zapojil do COST projektu **European Materials Acceleration Center for Energy** so začiatkom riešenia 10/2023. Koordinátor projektu za ústav, Peter Tatarko sa zúčastnil úvodného stretnutia v Belgicku. V budúcnosti je možnosť zapojenia sa aj ďalších vedeckých pracovníkov, ktorí sa venujú súvisiacim problematikám zahrnutým v projekte.
V rámci bežiaceho projektu ATOMDEC, ktorý koordinuje E. Scholtzová náš ústav navštívila M. Michalská z partnerskej inštitúcie VSB - University, Ostrava, Česká republika, ktorá odprezentovala svoje výsledky počas prednásky "Application of nanomaterials in Li-ion batteries, supercapacitors and photocatalysis" (18.09.2023).
Na ústave absolvovali výskumné pobyty Dr. Dawid Kozień, Department of Ceramics and Refractories, AGH University of Science and Technology, Kraków, Poľsko a Emilija Nidžović, Vinča Institute of Nuclear Sciences, University of Belgrade, Belehrad, Srbsko, Európskej keramickej spoločnosti JECS Trust. Granty na výskumné pobyty získali aj naši pracovníci P. Petrisková a N. Hosseini a A. Najafzadehkhoee, čo im umožnilo absolvovať niekoľkomesačné pobyty na inštitúciách v zahraničí (Taliansko, Francúzsko) a rozvíjať vedecké tematiky. Na ústave sú momentálne riešené dva projekty SASPRO, v rámci projektov sa aplikanti snažia rozvíjať nové spolupráce, prípadne udržiavajú spolupráce s ich predchádzajúceho pôsobenia. Obidvaja absolvovali pobyty v Nemecku. Výsledky získané v čase pobytov, boli alebo budú zahrnuté v spoločných

publikáciách.

**Marián MATEJDES**

- Univerzita Bayreuth, Bayreuth, Nemecko, absolvoval v dňoch 04-12/04/2023 služobnú zahraničnú cestu za účelom pokračovania v spolupráci a vykonania experimentov pomocou konfokálneho mikroskopu PicoQuant MT200. Prístupom k danému zariadeniu sa získali experimentálne výsledky časovo rozlíšenej 2D/3D fluorescenčnej anizotropie, ktorá ponúka možnosť štúdia molekulárnej orientácie a mobility fluorofórov enkapsulovaných v medzivrství fluorohektoritu, ako aj procesov, ktoré ich ovplyvňujú. Dané merania sú obzvlášť dôležité pri interpretácii mobility/imobility fluorofórov, ktorá môže ovplyvniť účinnosť prenosu energie. Takéto merania anizotropie sú informatívnejšie, pretože merania v steady-state režime uvádzajú iba priemerné hodnoty času, bez priameho zohľadnenia dynamických procesov. Pracovná cesta sa uskutočnila v rámci projektu SASPRO2.

**Eva SKOURA**

- AGH University of Science and Technology, Faculty of Mechanical Engineering and Robotics, Krakow, Poľsko, 13-17.03.2023, pobyt sa uskutočnil v rámci PROM - International scholarship exchange of doctoral candidates and academic staff projektu Polish National Agency for Academic Exchange, Európskeho sociálneho fondu a štrukturálnych fondov EÚ. Práca sa zamerala na sledovanie mechanických vlastností fotoaktívnych materiálov na báze saponitu. Počas pobytu si doktorandka osvojila novú metodiku a spolu s kolegami z hosťovskej inštitúcie vypracovali postup v nastavení podmienok merania mechanických vlastností pre vzorky vo forme polymérnych diskov, na ktorých bol nanesený film organicky modifikovaného vrstevnatého silikátu. Metodika nie je rozpracovaná na ÚACH.

**Eva SCHOLTZOVÁ**

- University of Szeged, Maďarsko, 19.9.-24.9.2023, návšteva partnera v rámci medzinárodného projektu AtomDec za účelom účasti na mikrosympóziu „Carbon Friday" s prednáškou. Diskusia získaných výsledkov a spoločná príprava prezentácie na konferencii CESEP v Budapesti. Maďarsko. Návrh ďalšieho postupu pri riešení úloh projektu.
- VŠB Ostrava, Česko, 21.06 - 23.06.2023, návšteva partnerského pracoviska v rámci medzinárodného projektu AtomDec za účelom diskusie získaných výsledkov a sumarizácie spoločnej publikácie.

**<u>Dlhodobé pobyty tri a viac mesiacov</u>:**

**Martin BARLOG**

- pracovný pobyt, Univerzita Bayreuth, Fakulta anorganickej chémie I, Oddelenie polymérov a koloidnej chémie, Bayreuth, Nemecko, 05.10.2023 - 05.04.2024, práca zameraná na prípravu materiálu za účelom selektívnej adsorpcie jednotlivých plynov z atmosféry.

**Michal KORENKO**

- CEMHTI - Conditions Extrêmes et Matériaux: Haute Température et Irradiation, CNRS - Centre National de la Recherche Scientifique, Orléans, Francúzsko, 01.09. 2022 - 31. 08. 2023, štipendijný pobyt v rámci schémy LE STUDIUM RESEARCH PROFESSOR od Loire Valley Institute for Advanced Studies, ktorá poskytuje rôzne štipendiá vedcom pre ústavy a univerzity v regióne Centre-Val de Loire vo Francúzsku, výskum v rámci pobytu je zameraný na syntézu a charakterizáciu funkčných materiálov na báze oxo-fluoro-hlinitanov pre elektronické/elektrochemické a fotonické aplikácie pomocou aerodynamickej levitačnej techniky (ADL) z tavenín.

**Patrícia PETRISKOVÁ**

- 01.11.2022 - 30.04.2023 – Erasmus + absolventská stáž vo Francúzsku, Institut de Chimie de Clermont-Ferrand - Université Clermont Auvergne projekt s názvom: „Activation of radical precursors using recycled magnetite for water treatment“
- 01.09. - 30.11.2023 – JecsTrust grant vo Francúzsku, Institut de Chimie de Clermont-Ferrand - Université Clermont Auvergne projekt s názvom: „MgAlON ceramics doped by lanthanides as innovative supports for photocatalytic layers."

**Naser HOSSEINI**

- Institute of Condensed Matter Chemistry and Technologies for Energy – ICMATE, National Research

Council – CNR, Janov, Taliansko, 23.03. – 23.06.2023. Cieľom trojmesačného pobytu bolo štúdium zmáčavosti rôznych zliatin na povrchoch vysokoentropickej keramiky. Pracovná cesta sa uskutočnila s finančnou podporou organizácie European Ceramic Society – JECS Trust.

**Prednášky zahraničných hostí na ÚACH SAV, v.v.i.**

Monika Michalska (VSB - University, Ostrava, Česká republika)
Application of nanomaterials in Li-ion batteries, supercapacitors and photocatalysis (18.09.2023)

*Prehľad údajov o medzinárodnej mobilite pracovníkov organizácie je uvedený v Prílohe A-5.*
*Prehľad a údaje o medzinárodných projektoch sú uvedené v kapitole 2 a Prílohe A-2.*

# 4. Aplikácia výsledkov výskumu v praxi

## 4.1. Výsledky výskumu organizácie aplikované v technologickej a všeobecnej spoločenskej praxi

## 4.2. Kontraktový – zmluvný výskum (vrátane zahraničných kontraktov)

Názov/účel kontraktového výskumu: Dissolution rate of different aluminas (SOW 4 under contract No: CW2142413)
Zadávateľ výskumného kontraktu: Rio Tinto Aluminium Pechiney, Francúzsko
Začiatok spolupráce: 2021
Ukončenie spolupráce: 2024
Finančný prínos pre organizáciu (€): 27000

## 4.3. Iné formy aplikácie výsledkov výskumu a využitia odbornosti

# 5. Doktorandské štúdium a pedagogická činnosť

## 5.1. Údaje o doktorandskom štúdiu

Tabuľka 5a Počet doktorandov v roku 2023

| **Forma** | **Počet k 31.12.2023** | | | | **Počet doktorandov po doktorandskej skúške** | | **Počet ukončených doktorantúr v r. 2023** | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | **Ukončenie z dôvodov** | | | | | |
| | celkový počet | | z toho novoprijatí | | | | ukončenie úspešnou obhajobou | | predčasné ukončenie | | neúspešné ukončenie | |
| | M | Ž | M | Ž | M | Ž | M | Ž | M | Ž | M | Ž |
| **Denná zo zdrojov SAV** | 4 | 7 | 0 | 2 | 6 | 5 | 2 | 1 | 0 | 0 | 0 | 0 |
| **Denná z iných zdrojov** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Externá** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Spolu** | 4 | 7 | 0 | 2 | 6 | 5 | 2 | 1 | 0 | 0 | 0 | 0 |
| **Z toho zahraničných** | 3 | 4 | 0 | 1 | 5 | 4 | 2 | 1 | 0 | 0 | 0 | 0 |
| **Súhrn** | 11 | | 2 | | 11 | | 3 | | 0 | | 0 | |

*Uvádzajte len doktorandov organizácie ako externej vzdelávacej inštitúcie.*
*Riadok „Spolu“ je súčtom troch riadkov nad ním. Každá bunka v riadku „Súhrn“ vyjadruje celkový počet doktorandov (mužov a žien spolu), čiže je súčtom príslušných dvoch buniek z riadku „Spolu“.V stĺpci „Počet doktorandov po doktorandskej skúške“ sa uvádza počet doktorandov, ktorí počas roku 2023 boli aspoň 1 deň doktorandami po doktorandskej skúške. Sú číselne zahrnutí aj v predchádzajúcich stĺpcoch.*
*Pod predčasným ukončením rozumieme ukončenie bez obhajoby dizertačnej práce pričom doktorand neabsolvoval celú štandardnú dĺžku štúdia. Pod neúspešným ukončením rozumieme ukončenie bez úspešnej obhajoby dizertačnej práce, pričom študent absolvoval celú štandardnú dĺžku štúdia.*

## 5.2. Zmena formy doktorandského štúdia

Tabuľka 5b Počty preradení z dennej formy na externú a z externej na dennú

| **Pôvodná forma** | **Denná z prostriedkov SAV** | **Denná z prostriedkov SAV** | **Denná z iných zdrojov** | **Denná z iných zdrojov** | **Externá** | **Externá** |
|---|---|---|---|---|---|---|
| **Nová forma** | **Denná z iných zdrojov** | **Externá** | **Denná z prostriedkov SAV** | **Externá** | **Denná z prostriedkov SAV** | **Denná z iných zdrojov** |
| **Počet** | 0 | 0 | 0 | 0 | 0 | 0 |

## 5.3. Zoznam doktorandov, ktorí ukončili doktorandské štúdium úspešnou obhajobou

Tabuľka 5c Menný zoznam ukončených doktorandov v roku 2023 úspešnou obhajobou

| **Meno doktoranda** | **Forma DŠ** | **Mesiac, rok nástupu na DŠ** | **Mesiac, rok obhajoby** | **Číslo a názov študijného odboru** | **Meno a organizácia školiteľa** | **Fakulta udeľujúca vedeckú hodnosť** |
|---|---|---|---|---|---|---|
| MSc. Ramu Ambati | interné štúdium hradené z | 9 / 2019 | 10 / 2023 | 1420 chémia | doc. Ing. Miroslav Boča DrSc., Ústav anorganickej | Prírodovedecká fakulta UK |

| | | | | | | |
|---|---|---|---|---|---|---|
| | prostriedkov SAV | | | | chémie SAV, v. v. i. | |
| Florian Andreas Lemken | interné štúdium hradené z prostriedkov SAV | 9 / 2019 | 8 / 2023 | 1160 fyzika | Dr. Oľga Malkin DrSc., Ústav anorganickej chémie SAV, v. v. i. | Prírodovedecká fakulta UK |
| Eva Skoura | interné štúdium hradené z prostriedkov SAV | 9 / 2019 | 8 / 2023 | 1420 chémia | prof. RNDr. Juraj Bujdák DrSc., Ústav anorganickej chémie SAV, v. v. i. | Prírodovedecká fakulta UK |

**5.4. Zoznam doktorandov, ktorí ukončili doktorandské štúdium úspešnou obhajobou v nadštandardnej dĺžke štúdia**

Tabuľka 5d Menný zoznam ukončených doktorandov v roku 2023 úspešnou obhajobou v nadštandardnej dĺžke štúdia

| **Meno doktoranda** | **Forma DŠ** | **Mesiac, rok nástupu na DŠ** | **Mesiac, rok obhajoby** | **Číslo a názov študijného odboru** | **Meno a organizácia školiteľa** | **Fakulta udeľujúca vedeckú hodnosť** |
|---|---|---|---|---|---|---|

**5.5. Uplatnenie absolventov doktorandského štúdia**

Tabuľka 5e Prehľad uplatnenia absolventov doktorandského štúdia

| **Počet absolventov PhD. štúdia v roku 2023 (obhajoba leto 2023)** | **z toho koľkí sa zamestnali vo výskume (SAV, univerzity, rezortné výskumné ústavy)** | **z toho koľkí sa zamestnali v praxi mimo výskum, kde využívajú svoju kvalifikáciu** | **z toho koľkí sa zamestnali v praxi, kde nevyužívajú svoju kvalifikáciu** | **z toho koľkí boli nejaký čas nezamestnaní** |
|---|---|---|---|---|
| 2 | 1 | 1 | 0 | 0 |

*Zoznam interných a externých doktorandov je uvedený v prílohe A-1.*

### 5.6. Medzinárodné doktorandské štúdium

Tabuľka 5f Počet študentov v medzinárodných programoch doktorandského štúdia

| Cotutelle | Co-direction | Iné | Zahraniční doktorandi štátne občianstvo/počet |
|---|---|---|---|
| 0 | 0 | 0 | IND/3, DEU/1, ECU/1, GRC/1, IRN/1, PAK/1, RUS/1, TUR/1 |

*Zahraniční doktorandi sú doktorandi v dennej alebo externej forme štúdia, ktorí sú občanmi iných krajín. Doktorandi školení v rámci Cotutelle alebo Co-direction sa do posledného stĺpca nezapočítavajú.*

### 5.7. Zoznam študijných odborov, na ktoré má ústav uzatvorenú rámcovú dohodu, s uvedením VŠ

Tabuľka 5g Zoznam študijných odborov, na ktoré má ústav uzatvorenú rámcovú dohodu, s uvedením univerzity/vysokej školy a fakulty, kde sa doktorandský študijný program uskutočňuje

| Názov študijného odboru (ŠO) | Číslo ŠO | Názov doktorandského študijného programu | Doktorandské štúdium uskutočňované na (univerzita/vysoká škola a fakulta) |
|---|---|---|---|
| fyzika | 1160 | chemická fyzika | Prírodovedecká fakulta UK |
| chémia | 1420 | anorganická chémia | Prírodovedecká fakulta UK, Fakulta chemickej a potravinárskej technológie STU |
| chémia | 1420 | fyzikálna chémia | Prírodovedecká fakulta UK, Fakulta chemickej a potravinárskej technológie STU |
| chémia | 1420 | teoretická a počítačová chémia | Prírodovedecká fakulta UK |
| chemické inžinierstvo a technológie | 2820 | anorganická technológia a materiály | Fakulta chemickej a potravinárskej technológie STU |
| chemické inžinierstvo a technológie | 2820 | anorganická technológia a nekovové materiály | Trenčianska univerzita Alexandra Dubčeka v Trenčíne |

*Názov a číslo študijného odboru vyplňte/vyberte podľa aktuálne platného zoznamu študijných odborov https://www.portalvs.sk/sk/studijne-odbory?from=menu1. Názov doktorandského študijného programu v stĺpci 3 je potrebné vložiť ako voľný text.*
*Do 31. 8. 2023 študujú študenti doktorandského štúdia zaradení do študijných programov podľa zoznamu MŠVVaŠ, platného do 1. 9. 2019. Pre týchto študentov je potrebné napísať názov programu ako voľný text do stĺpca 3 a nevypĺňovať stĺpce 1 a 2.*

Tabuľka 5h Účasť na pedagogickom procese

| Menný prehľad pracovníkov, ktorí boli menovaní do odborových komisií pre doktorandské štúdium | Menný prehľad pracovníkov, ktorí pôsobili ako členovia vedeckých rád univerzít, správnych rád univerzít a fakúlt | Menný prehľad pracovníkov, ktorí získali vyššiu vedeckú, pedagogickú hodnosť alebo vyšší kvalifikačný stupeň |
|---|---|---|
| doc. Ing. Miroslav Boča, DrSc. (chémia) | doc. Ing. Miroslav Boča, DrSc. (Fakulta chemickej a potravinárskej technológie STU) | Mgr. Peter Boháč, PhD. (IIa) |
| doc. Ing. Miroslav Boča, DrSc. (chemické inžinierstvo a technológie) | doc. Ing. Miroslav Boča, DrSc. (Trenčianska univerzita Alexandra Dubčeka v Trenčíne) | Ing. Michal Slaný, PhD. (IIa) |
| doc. Ing. Miroslav Boča, DrSc. (odbor v zahraničí) | prof. RNDr. Juraj Bujdák, DrSc. (Prírodovedecká fakulta UK) | |
| prof. RNDr. Juraj Bujdák, DrSc. (anorganická chémia) | prof. Ing. Dušan Galusek, DrSc. (Fakulta špeciálnej techniky TnUAD) | |

| | | |
|---|---|---|
| prof. RNDr. Juraj Bujdák, DrSc. (fyzikálna chémia) | prof. Ing. Dušan Galusek, DrSc. (Fakulta zdravotníctva TnUAD) | |
| prof. Ing. Dušan Galusek, DrSc. (anorganická technológia a materiály) | prof. Ing. Dušan Galusek, DrSc. (Trenčianska univerzita Alexandra Dubčeka v Trenčíne) | |
| prof. Ing. Dušan Galusek, DrSc. (fyzikálna chémia) | prof. Ing. Marek Liška, DrSc., Dr.h.c. (Fakulta chemické technologie VŠCHT, Praha, ČR) | |
| prof. Ing. Dušan Galusek, DrSc. (materiály) | prof. Ing. Marek Liška, DrSc., Dr.h.c. (Trenčianska univerzita Alexandra Dubčeka v Trenčíne) | |
| doc. Ing. Miroslav Hnatko, PhD. (anorganické technológie a nekovové materiály) | RNDr. Jana Madejová, DrSc. (Prírodovedecká fakulta UK) | |
| doc. Ing. Miroslav Hnatko, PhD. (anorganická technológia a materiály) | prof. RNDr. Pavol Šajgalík, DrSc. (Fakulta metalurgie a materiálového inženírství, Vysoká škola báňská TU) | |
| doc. Ing. Mária Chromčíková, PhD. (anorganická technológia a materiály) | prof. RNDr. Pavol Šajgalík, DrSc. (Hutnícka fakulta TUKE) | |
| doc. Ing. Zoltán Lenčéš, PhD. (anorganická technológia a materiály) | prof. RNDr. Pavol Šajgalík, DrSc. (Slovenská technická univerzita v Bratislave) | |
| doc. Ing. Zoltán Lenčéš, PhD. (anorganická chémia) | prof. RNDr. Pavol Šajgalík, DrSc. (Trenčianska univerzita Alexandra Dubčeka v Trenčíne) | |
| doc. Ing. Zoltán Lenčéš, PhD. (odbor v zahraničí) | prof. RNDr. Pavol Šajgalík, DrSc. (Univerzita Komenského v Bratislave) | |
| prof. Ing. Marek Liška, DrSc., Dr.h.c. (anorganická technológia a materiály) | prof. RNDr. Pavol Šajgalík, DrSc. (Univerzita Pavla Jozefa Šafárika v Košiciach) | |
| prof. Ing. Marek Liška, DrSc., Dr.h.c. (fyzika kondenzovaných látok a akustika) | prof. RNDr. Pavol Šajgalík, DrSc. (Univerzita sv. Cyrila a Metoda v Trnave) | |
| RNDr. Jana Madejová, DrSc. (anorganická technológia a materiály) | prof. RNDr. Pavol Šajgalík, DrSc. (Vysoké učení technické, Brno) | |
| Dr. Oľga Malkin, DrSc. (teoretická a počítačová chémia) | | |
| Dr. Vladimír Malkin, DrSc. (chemická fyzika) | | |
| Dr. Vladimír Malkin, DrSc. (teoretická a počítačová chémia) | | |

### 5.8. Údaje o pedagogickej činnosti

Tabuľka 5i Prednášky a cvičenia vedené v roku 2023

| PEDAGOGICKÁ ČINNOSŤ | Prednášky | | Cvičenia a semináre | |
|---|---|---|---|---|
| | doma | v zahraničí | doma | v zahraničí |
| **Počet prednášateľov alebo vedúcich cvičení** | 7 | 0 | 8 | 0 |
| **Celkový počet hodín v r. 2023** | 143 | 0 | 214 | 0 |

*Prehľad prednášateľov predmetov a vedúcich cvičení, s uvedením názvu predmetu, úväzku, katedry, fakulty, univerzity/vysokej školy je uvedený v prílohe A-4.*

Tabuľka 5j Aktivity pracovníkov na VŠ

| | | |
|---|---|---|
| 1. | **Počet pracovníkov, ktorí pôsobili ako vedúci alebo konzultanti diplomových a bakalárskych prác** | 3 |
| 2. | **Počet vedených alebo konzultovaných diplomových a bakalárskych prác** | 4 |
| 3. | **Počet pracovníkov, ktorí pôsobili ako školitelia doktorandov (PhD.)** | 14 |
| 4. | **Počet školených doktorandov (aj pre iné inštitúcie)** | 21 |
| 5. | **Počet oponovaných dizertačných a habilitačných prác** | 11 |
| 6. | **Počet pracovníkov, ktorí oponovali dizertačné a habilitačné práce** | 7 |
| 7. | **Počet pracovníkov, ktorí pôsobili ako členovia komisií pre obhajoby DrSc. prác** | 0 |
| 8. | **Počet pracovníkov, ktorí pôsobili ako členovia komisií pre obhajoby PhD. prác** | 3 |
| 9. | **Počet pracovníkov, ktorí pôsobili ako členovia komisií, resp. oponenti v inauguračnom alebo habilitačnom konaní na vysokých školách** | 2 |

### 5.9. Iné dôležité informácie k pedagogickej činnosti

Ústav anorganickej chémie SAV, v.v.i. sa začiatkom roka 2023 ako každoročne zapojil do pedagogického procesu vypísaním PhD. tém ako externej vzdelávacej inštitúcie dvoch univerzít - PriF UK a FCHPT STU. Celkovo bolo vypísaných 7 tém v 4 študijných programoch (anorganická chémia, fyzikálna chémia a teoretická a počítačová chémia v spolupráci s PríF UK a anorganická technológia a materiály v spolupráci s FCHPT STU) ktoré boli zverejnené prostredníctvom AIS na píslušných fakultách a webovej stránke SAV. ÚACH SAV, v.v.i. má za posledné roky vypracovaný a úspešne aplikovaný vlastný systém zverejňovania PhD. pozícií pre získanie kvalitných študentov, a okrem webovej stránky ústavu, ich publikovalo aj na ďalších dvoch medzinárodných portáloch. V stanovenom termíne si prihlášky podali piati uchádzači, ktorí sa zároveň zúčastnili aj prijímacích pohovorov. Štyria uchádzači splnili podmienky, ale do prvého ročníka boli nakoniec zapísaní dvaja študenti; po jednom v programe Fyzikálna chémia na PríF UK a v programe Anorganická technológia a materiály na FCHPT STU. Zmenený spôsob prideľovania termínov na slovenskom zastupiteľstve v Teheráne neumožnil dvom študentom začať štúdium v septembri 2023, ale vďaka intenzívnej snahe predsedníctva SAV sa očakáva nástup jednej študentky v letnom semestri.
Študenti doktorandského štúdia a mladí vedeckí pracovníci do 35 rokov sa zapojili do Súťaže mladých pracovníkov do 35 rokov na ÚACH SAV, v.v.i. Súťaž sa uskutočnila dňa 23.10.2023 za účasti 14 študentov doktorandského štúdia z ÚACH SAV, v.v.i. Bratislava a TnUAD Trenčín. Potvrdzuje sa trend z minulých rokov, kedy je úroveň súťažných príspevkov vynikajúca, čo ocenili členovia komisie, ako i ostatní zamestnanci ÚACH SAV, v.v.i., ktorí sa zúčastnili prednášok. Na ocenených miestach sa umiestnili:

1. Alper Güneren
2. Sanam Bashir
3. Debora Mišenková

Doktorandi ÚACH sa uchádzajú aj o projekty v rámci výzvy DOKTOGRANT, v roku 2023 sa Inga Zhukova stala úspešnou uchádzačkou tohoto projektu pre rok 2024.

# 6. Zmluvná spolupráca s univerzitami/vysokými školami a inými subjektmi vedy a výskumu

*Pozn.: Uvádzajte formy spolupráce a aktivity, ktoré nie sú uvedené v kapitolách 2, 3, 4, 5.*

## 6.1. Spoločné pracoviská organizácie

### 6.1.1. Spolupráca s univerzitami/VŠ (fakultami)

**Názov univerzity/vysokej školy a fakulty:** Fakulta chemickej a potravinárskej technológie STU
**Oblasť spolupráce:** vedecká spolupráca, účasť na PhD. výuke
**Sídlo spoločného pracoviska (ak je vytvorené):**
**Začiatok spolupráce:** 1990
**Zhodnotenie:** Ústav je zapojený do vzdelávania na III. stupni vysokoškolského štúdia v študijných programoch „Anorganická chémia", „Fyzikálna chémia" a „Anorganická technológia a materiály". Pracovníci ÚACh viedli na FChPT v roku 2023 dvoch doktorandov. Doc. Ing. Miroslav Boča, DrSc. je navyše členom odborovej komisie pre študijný program Anorganická technológia a materiály a externým členom VR FCHPT STU a od 1.4.2022-31.12.2026 je členom Rady študijných programov Chemickej sekcie. Ing. František šimko, PhD. je externým členom Pracovnej skupiny Rady pre vnútorný systém zabezpečovania kvality na STU.

**Názov univerzity/vysokej školy a fakulty:** Montanuniversitaet Leoben, Rakúsko
**Oblasť spolupráce:** vedecká spolupráca, výchova doktorandov
**Sídlo spoločného pracoviska (ak je vytvorené):**
**Začiatok spolupráce:** 2008
**Zhodnotenie:** Dlhoročná spolupráca v roku 2023 vyústila do ďalšej spoločnej publikácie. Jeden vedecký pracovník absolvoval výskumný pobyt na partnerskom pracovisku.

**Názov univerzity/vysokej školy a fakulty:** Prírodovedecká fakulta UK
**Oblasť spolupráce:** vedecká spolupráca, účasť na Bc., Mgr. a PhD. výuke
**Sídlo spoločného pracoviska (ak je vytvorené):**
**Začiatok spolupráce:** 1990
**Zhodnotenie:** V spolupráci s touto fakultou je ústav zapojený do vzdelávania na III. stupni vysokoškolského štúdia v študijných programoch „Anorganická chémia", „Fyzikálna chémia" a „Chemická fyzika". V roku 2021 bol podpísaný dodatok k rámcovej zmluve o spolupráci na doktorandskom štúdiu, ktorého obsahom bolo rozšírenie študijných programov, na ktorých sa ÚACH SAV, v.v.i. môže podieľať o študijných program "Teoretická a počítačová chémia". Spoločne sa riešia projekty VEGA a APVV. prof. RNDr. J. Bujdák, DrSc. má hlavný úväzok na fakulte a čiastkový na ÚACh SAV, v.v.i.. Prof. RNDr. J. Bujdák, DrSc. je interným členom VR ústavu a RNDr. Jana Madejová, DrSc. externým členom VR PriF UK. Doc. Ing. Miroslav Boča, DrSc je členom Rady študijných programov Chemickej sekcie PRIFUK-UK (od 1.1.2022-1.1.2027). Pracovníci ÚACh viedli na PriF UK v priebehu roka 2023 dvanásť doktorandov, pričom traja z nich v roku 2023 štúdium úspešne ukončili obhajobou svojej práce.

**Názov univerzity/vysokej školy a fakulty:** Přírodovědecká fakulta Univerzity Palackého, Olomouc, Česká republika
**Oblasť spolupráce:** Účasť na výuke
**Sídlo spoločného pracoviska (ak je vytvorené):**
**Začiatok spolupráce:** 2022
**Zhodnotenie:** Doc. Ing. M. Boča je členom odborovej komisie študijného programu P1417 - Chemie, študijného odboru Anorganická chémia, ako aj odborovej rady doktorandského študijného programu P0531D130029 Anorganická chémia.

**Názov univerzity/vysokej školy a fakulty:** Tohoku University, Sendai, Japonsko
**Oblasť spolupráce:** vedecká spolupráca
**Sídlo spoločného pracoviska (ak je vytvorené):**
**Začiatok spolupráce:** 2021
**Zhodnotenie:** vedecká spolupráca Tohoku University a ÚACH v rámci 2. spoločnej výzvy Japan-V4 a

projektu AtomDeC, ktorého zodpovednou riešiteľkou za Slovensko je Ing. Eva Scholtzová, CSc.

**Názov univerzity/vysokej školy a fakulty:** Trenčianska univerzita Alexandra Dubčeka v Trenčíne
**Oblasť spolupráce:** vedecká spolupráca, účasť na výchove doktorandov
**Sídlo spoločného pracoviska (ak je vytvorené):** Centrum kompetencie pre výskum skla Vitrum Laugaricio v Trenčíne
**Začiatok spolupráce:** 1997
**Zhodnotenie:** Okrem spoločného pracoviska s TnU AD (Centrum kompetencie skla Vitrum Laugaritio) rieši ÚACh SAV, v.v.i. v spolupráci s touto univerzitou spoločné projektyVEGA a APVV. Prof. Ing. D. Galusek, DrSc. prorektor pre vedu, výskum a medzinárodné vzťahy TnU AD je aj členom Vedeckej rady TnU AD a dvoch jej fakúlt (Fakulty zdravotníctva a Fakulty špeciálnej techniky). Pracovníci centra, zamestnanci ÚACh, sa podieľajú na pedagogickej činnosti v rámci doktorandského štúdia v odbore "Anorganická technológia". Od roku 2019 má ÚACh SAV, v.v.i. s TnU AD rámcovú dohodu o spolupráci pri uskutočňovaní doktorandského študijného programu v odbore 5.2.19 Anorganická technológia a materiály, ktorý je od roku 2021 modifikovaný na Anorganická technológia a nekovové materiály. Viacerí pracovníci UACh SAV majú školiace práva na TnUAD a vedú na nej doktorandov v študijnom programe Anorganické technológie a materiály. V roku 2023, v rámci výziev APVV boli podané dva projekty, na ktorých je útav partnerom, ako aj projekty v rámci Plánu obnovy SR.

**Názov univerzity/vysokej školy a fakulty:** Ukrainian State University of Chemical Technology, Dnipro, Ukraine
**Oblasť spolupráce:** vedecká spolupráca
**Sídlo spoločného pracoviska (ak je vytvorené):**
**Začiatok spolupráce:** 2018
**Zhodnotenie:** V roku 2023 sa v rámci spolupráce rozpracovali nové vedecké tematiky v aktuálnych vedných smeroch.

**Názov univerzity/vysokej školy a fakulty:** University of Ghent, Belgicko
**Oblasť spolupráce:** príprava keramických a sklokeramických materiálov v systémoch Al2O3-La2O3, Al2O3-La2O3-ZrO2, Al2O3-Y2O3
**Sídlo spoločného pracoviska (ak je vytvorené):**
**Začiatok spolupráce:** 2010
**Zhodnotenie:** Vedecká spolupráca pri príprave amorfných a polykryštalických materiálov sol-gel metódami v systémoch Al2O3-RE2O3, Al2O3-RE2O3-ZrO2. Skúmanie vlastností pripravených materiálov a spoločné publikácie.Vedecká spolupráca pri príprave amorfných a polykryštalických materiálov sol-gel metódami v systémoch Al2O3-RE2O3, Al2O3-RE2O3-ZrO2m Al2O3-Y2O3.

**Názov univerzity/vysokej školy a fakulty:** University of Szeged, Faculty of Science and Informatics, Szeged, Hungary
**Oblasť spolupráce:** vedecká spolupráca
**Sídlo spoločného pracoviska (ak je vytvorené):**
**Začiatok spolupráce:** 2021
**Zhodnotenie:** vedecká spolupráca University of Szeged a ÚACH v rámci 2. spoločnej výzvy V4-Japan a projektu AtomDeC, ktorého zodpovednou riešiteľkou za Slovensko je Ing. Eva Scholtzová, CSc.

**Názov univerzity/vysokej školy a fakulty:** Vysoká škola báňská - TU Ostrava, Česká republika
**Oblasť spolupráce:** vedecká spolupráca, výchova doktorandov
**Sídlo spoločného pracoviska (ak je vytvorené):**
**Začiatok spolupráce:** 2010
**Zhodnotenie:** Spolupráca VŠB a ÚACH je zameraná na výchovu mladých pracovníkov. Prof. RNDr. P. Šajgalík, DrSc. je členom Vedeckej rady FMMI VŠB; doc. Ing. Z. Lenčéš, PhD. je členom odborovej rady doktorandského študijného programu Materiálové vědy a inženýrství. V roku 2021 sa spolupráca rozšírila aj na projekty, keďže v rámci 2. spoločnej výzvy Japan-V4 sa obidve inštitúcie spolupodieľajú na riešení projektu AtomDeC, ktorého zodpovednou riešiteľkou za Slovensko je Ing. Eva Scholtzová, CSc

*Pozn.: uvádzajte len tie spolupráce, na ktoré má organizácia zmluvu resp. memorandum o zriadení spoločného pracoviska, resp. o vzájomnej spolupráci v konkrétnej oblasti výskumu*

### 6.1.2. Spoločné pracoviská s inými organizáciami SAV

**Názov organizácie:** Ústav vied o Zemi SAV, v. v. i.
**Oblasť spolupráce:** vedecká spolupráca
**Sídlo spoločného pracoviska (ak je vytvorené):** Banská Bystrica
**Začiatok spolupráce:** 2018
**Zhodnotenie:** Medzi ústavom a ÚVZ SAV je uzatvorená zmluva o spolupráci na dobu neurčitú, keďže sa aj v budúcnosti predpokladá podávanie spoločných projektov.

*Pozn.: uvádzajte len tie spolupráce, na ktoré má organizácia zmluvu resp. memorandum o zriadení spoločného pracoviska, resp. o vzájomnej spolupráci v konkrétnej oblasti výskumu*

### 6.2. Spoločné pracoviská organizácie s inými inštitúciami mimo SAV a VŠ

*Pozn.: uvádzajte len tie spolupráce, na ktoré má organizácia zmluvu resp. memorandum o zriadení spoločného pracoviska, resp. o vzájomnej spolupráci v konkrétnej oblasti výskumu*

### 6.3. Spoločné projekty s univerzitami a ostatnými inštitúciami mimo SAV

**Názov projektu:** Bentonit: strategická surovina Slovenska - inovatívne hodnotenie zdrojov a ich kvality pre jej efektívne využívanie
**Agentúra:** APVV
**číslo projektu:** APVV-20-0175
**Spolupracujúce inštitúcie:** PríF UK Bratislava, ÚACH SAV, v.v.i., Ústav vied o zemi, v.v.i, SAV, Stavebná fakulta STU Bratislava
**Koordinátor projektu:** PríF UK Bratislava (P. Uhlík)
**Začiatok spolupráce:** 2021
**Koniec spolupráce:** 2025

**Názov projektu:** Fotofunkčné hybridné materiály organických luminofórov a nanočastíc vrstevnatých silikáto
**Agentúra:** APVV
**číslo projektu:** APVV-22-0150
**Spolupracujúce inštitúcie:** PriF UK, ÚACH SAV, v.v.i.
**Koordinátor projektu:** Katedra fyzikálnej chémie, PriF UK (J. Bujdák)
**Začiatok spolupráce:** 2023
**Koniec spolupráce:** 2027

**Názov projektu:** Povrchy polymérov modifikované vrstevnatými nanočasticami a fotoaktívnymi farbivami
**Agentúra:** APVV
**číslo projektu:** APVV-18-0075
**Spolupracujúce inštitúcie:** PriF UK, ÚACH SAV, v.v.i.
**Koordinátor projektu:** Katedra fyzikálnej chémie, PriF UK (J. Bujdák)
**Začiatok spolupráce:** 2019
**Koniec spolupráce:** 2023

**Názov projektu:** Smerom k nanotechnológiám využívajúcim bioaktívne častice/molekuly v boji proti mikrobiálnym biofilmom
**Agentúra:** APVV
**číslo projektu:** APVV-21-0302
**Spolupracujúce inštitúcie:** PríF UK, ÚACH SAV, v.v.i.
**Koordinátor projektu:** Katedra mikrobiológie PríF UK (H. Bujdáková)
**Začiatok spolupráce:** 2022
**Koniec spolupráce:** 2026

**Názov projektu:** Pokročilé materiály s eutektickou mikroštruktúrou pre vysokoteplotné funkčné aplikác
**Agentúra:** APVV

**číslo projektu:** APVV-19-0010
**Spolupracujúce inštitúcie:** TnU AD, ÚACH SAV, v.v.i.
**Koordinátor projektu:** TnU AD
**Začiatok spolupráce:** 2021
**Koniec spolupráce:** 2024

**Názov projektu:** Vývoj pokročilých metód určených na presnú predpoveď a analýzu röntgenových spektier molekúl s otvorenou obálkou
**Agentúra:** APVV
**číslo projektu:** APVV-22-0488
**Spolupracujúce inštitúcie:** ÚACH SAV, v.v.i., PriF UK,
**Koordinátor projektu:** ÚACH SAV, v.v.i. (S. Komorovský)
**Začiatok spolupráce:** 2023
**Koniec spolupráce:** 2027

**Názov projektu:** Atómová koncepcia materiálov na báze uhlíka pre novú normálnu spoloč
**Agentúra:** SAV, Višegrádsky Fond
**číslo projektu:** V4-Japan Joint Research Program
**Spolupracujúce inštitúcie:** ÚACH SAV, v.v.i., University of Sendai (JPN), VŠB Ostrava (CZ), The University of British Columbia (CAN), Faculty of Science and Informatics University of Szeged (HU), Institute of Fundamental Technological Research PAS Warsaw (PL)
**Koordinátor projektu:** Advanced Institute for Materials Research (AIMR) Tohoku University Sendai, Japonsko
**Začiatok spolupráce:** 2021
**Koniec spolupráce:** 2024

**Názov projektu:** Vývoj nových metód spájania vysoko-entropických keramických materiálov
**Agentúra:** APVV
**číslo projektu:** APVV-SK-CZ-RD-21-0089
**Spolupracujúce inštitúcie:** ÚACH SAV, v.v.i., Ústav fyziky materiálů AV ČR Brno
**Koordinátor projektu:** ÚACH SAV, v.v.i. (P. Tatarko)
**Začiatok spolupráce:** 2022
**Koniec spolupráce:** 2025

**Názov projektu:** Vplyv radiačnej záťaže na sklovláknitú izoláciu z hľadiska recirkulácie chladiva v havarijných podmienkach jadrových elektrární s tlakovodnými reaktormi
**Agentúra:** APVV
**číslo projektu:** APVV-22-0004
**Spolupracujúce inštitúcie:** VÚEZ, ÚACH SAV, v.v.i.
**Koordinátor projektu:** VÚEZ
**Začiatok spolupráce:** 2023
**Koniec spolupráce:** 2027

*Pozn.: uviesť konkrétne spoločné aj bilaterálne projekty na základe platnej zmluvy o spolupráci*

### 6.4. Iné typy spoločných aktivít s inštitúciami mimo SAV

V roku 2023 podpísal ÚACH SAV, v.v.i., memorandum o vedeckej spolupráci s jedným z ústavov Čínskej akadémie vied, konkrétne so Shanghai Institute of Apllied Physics (SINAP), v súvislosti so zapojením spoločného projektu do výzvy „2024 Cooperative Research Project“, ktorá bola na jeseň roku 2023 čínskou stranou kladne vyhodnotená a v nasledovnom roku bude projekt finančne podporený.

# 7. Vedecko-organizačné a popularizačné aktivity

## 7.1. Vedecko-popularizačná činnosť

Tabuľka 7a Súhrnné počty vedecko-popularizačných činností organizácie SAV

| Typ | Počet | Typ | Počet | Typ | Počet |
|---|---|---|---|---|---|
| prednášky/besedy | 5 | tlač | 1 | TV | 0 |
| rozhlas | 0 | internet | 1 | exkurzie | 1 |
| publikácie | 0 | multimediálne nosiče | 1 | dokumentárne filmy | 0 |
| iné | 0 | | | | |

## 7.2. Vedecko-organizačná činnosť

Tabuľka 7b Vedecko-organizačná činnosť

| Názov podujatia | Domáca/ medzinárodná | Miesto | Dátum konania | Počet účastníkov |
|---|---|---|---|---|
| XVth Workshop on Modern Methods in Quantum Chemistry | medzinárodná | Mariapfarr, Rakúsko | 26.2.-3.3.2023 | 40 |
| ENGINEERING CERAMICS 2023 - Ceramics for circular economy | medzinárodná | Smolenice, Slovensko | 7.5.-11.5.2023 | 50 |

## 7.3. Účasť na výstavách

**Názov výstavy**: Víkend so SAV
Miesto konania: Námestie M.R. Štefánika pri OC Eurovea
Dátum: 23.6.2023
Zhodnotenie účasti: Prezentácia výskumu a výsledkov oddelenia keramiky, oddelenia hydrosilikátov a oddelenia taveninových sústav (V. Silliková, V. Planetová, P. Boháč, M. Hičák, V. Pavlík, F. Lemken). Stánok: Anorganické materiály 21. storočia

**Názov výstavy**: Európska noc Výskumníkov 2023
Miesto konania: Stará tržnica, Bratislava
Dátum: 30.9.2023
Zhodnotenie účasti: Webstránka: https://www.nocvyskumnikov.sk/ Prezentácia výskumu a výsledkov výskumu na najväčšom festivale vedy na Slovensku. Podujatia sa zúčastnili kolegovia z oddelenia keramiky, oddelenia hydrosilikátov a oddelenia taveninových sústav (V. Sillikova, P. Boháč, V. Planetová, G. Taveri, D. Moreno, G. de La Torre Olvera, I. Zhukova, M. Hičák). Stánok: Anorganické materiály 21. storočia

## 7.4. Účasť v programových a organizačných výboroch národných konferencií

Tabuľka 7c Programové a organizačné výbory národných konferencií

| Meno pracovníka | Programový | Organizačný | Programový i organizačný |
|---|---|---|---|
| Bujdák Juraj | 0 | 0 | 1 |
| Kureková Valéria | 1 | 0 | 0 |
| Pálková Helena | 0 | 0 | 1 |
| **Spolu** | 1 | 0 | 2 |

## 7.5. Členstvo v redakčných radách časopisov

doc. Ing. Miroslav Boča, DrSc.
Chemical Papers (funkcia: Editorial Advisory Board od 9/2013 )

prof. RNDr. Juraj Bujdák, DrSc.
Applied Clay Science (funkcia: associate editor)
Chemistry Africa (Springer) (funkcia: associate editor)

prof. Ing. Dušan Galusek, DrSc.
Ceramics-Silikáty (funkcia: člen)
International Journal of Applied Ceramic Technology (funkcia: associate editor)
Journal of the European Ceramic Society (funkcia: editor)
New Journal of Glass and Ceramics (funkcia: člen)

doc. Ing. Zoltán Lenčéš, PhD.
International Journal of Applied Ceramic Technology (funkcia: člen)
Journal of the Ceramic Society of Japan (funkcia: guest editor)
Journal of the European Ceramic Society (funkcia: guest editor)

prof. Ing. Marek Liška, DrSc., Dr.h.c.
Ceramics - Silikáty (funkcia: člen)
European Journal of Glass Science and Technology (funkcia: regional editor)
International Journal of Applied Glass Science (funkcia: člen)
Sklář a keramik (funkcia: člen)

RNDr. Jana Madejová, DrSc.
Clays and Clay Minerals (funkcia: associate editor)

Ing. Michal Slaný, PhD.
Minerals (funkcia: Guest editor)

prof. RNDr. Pavol Šajgalík, DrSc.
Ceramics-Silikáty (funkcia: člen)
Journal of Asian Ceramic Society (funkcia: spolueditor)
Journal of Ceramic Science and Technology (funkcia: člen)
Keramický Zpravodaj (funkcia: člen)
Processing and Application of Ceramics (funkcia: člen)

Ing. Peter Tatarko, PhD.
International Journal of Applied Ceramic Technology (funkcia: associate editor)
Materials (funkcia: editorial board member)

### 7.6. Činnosť v domácich vedeckých spoločnostiach

Ing. Martin Barlog, PhD.
Slovenská ílová spoločnosť (funkcia: člen)

doc. Ing. Miroslav Boča, DrSc.
Humboldtov klub v SR (funkcia: člen)
Slovenská chemická spoločnosť (funkcia: člen)

Mgr. Peter Boháč, PhD.
Slovenská ílová spoločnosť (funkcia: člen výboru)

prof. RNDr. Juraj Bujdák, DrSc.
Slovenská chemická spoločnosť (funkcia: člen)
Slovenská ílová spoločnosť (funkcia: člen výboru)

Mgr. Roman Bystrický, PhD.
Slovenská silikátová vedecko-technická spoločnosť (funkcia: člen)

prof. Ing. Dušan Galusek, DrSc.
Humboldtov klub v SR (funkcia: člen)
Slovenská silikátová vedecko-technická spoločnosť (funkcia: podpredseda)
Slovenská sklárska spoločnosť (funkcia: predseda (od 11/2021))

Ing. Ondrej Hanzel, PhD.
Slovenská silikátová vedecko-technická spoločnosť (funkcia: člen)

doc. Ing. Miroslav Hnatko, PhD.
Slovenská batériová aliancia SBaA (funkcia: člen valného zhromaždenia)
Slovenská chemická spoločnosť (funkcia: člen)
Slovenská silikátová vedecko-technická spoločnosť (funkcia: člen)

doc. Ing. Mária Chromčíková, PhD.
Slovenská akreditačná spoločnosť pre vysoké školy (funkcia: člen)
Slovenská silikátová vedecko-technická spoločnosť (funkcia: člen)
Slovenská sklárska spoločnosť (funkcia: člen)

Mgr. Ľuboš Jankovič, PhD.
Slovenská ílová spoločnosť (funkcia: člen)

Ing. Michal Korenko, PhD.
Slovenská chemická spoločnosť (funkcia: člen)
Slovenská nukleárna spoločnosť (funkcia: člen)
Slovenská silikátová vedecko-technická spoločnosť (funkcia: člen)
Slovenská spoločnosť pre povrchové úpravy (funkcia: člen)

Ing. Blanka Kubíková, PhD.
Slovenská chemická spoločnosť (funkcia: člen)

Mgr. Valéria Kureková, PhD.
Slovenská chemická spoločnosť (funkcia: člen)
Slovenská ílová spoločnosť (funkcia: člen)

doc. Ing. Zoltán Lenčéš, PhD.
Humboldtov klub v SR (funkcia: člen)
Slovenská silikátová vedecko-technická spoločnosť (funkcia: člen výboru)

prof. Ing. Marek Liška, DrSc., Dr.h.c.
Slovenská chemická spoločnosť (funkcia: člen)
Slovenská sklárska spoločnosť (funkcia: člen)

RNDr. Jana Madejová, DrSc.
Slovenská chemická spoločnosť (funkcia: člen)
Slovenská ílová spoločnosť (funkcia: člen)
Učená spoločnosť SAV (funkcia: člen)

Dr. Vladimír Malkin, DrSc.
Humboldtov klub v SR (funkcia: člen)

Mgr. Marián Matejdes, PhD.
Slovenská chemická spoločnosť (funkcia: člen)
Slovenská ílová spoločnosť (funkcia: člen)

Ing. Monika Michálková, PhD.
Slovenská silikátová vedecko-technická spoločnosť (funkcia: člen)

Slovenská sklárska spoločnosť (funkcia: členka predstavenstva, tajomníčka od 22.10.2021)

Ing. Jarmila Mlynáriková, PhD.
Slovenská chemická spoločnosť (funkcia: člen)

MSc. Daniel Moreno, PhD.
Slovenská ílová spoločnosť (funkcia: člen)

Dr. Aliasghar Najafzadehkhoee, Ph.D.
Slovak Glass Society (funkcia: Member)
Slovak Silicate Society (SSiS) (funkcia: Member)

Ing. Zuzana Netriová, PhD.
Slovenská chemická spoločnosť (funkcia: člen)

Ing. Helena Pálková, PhD.
Slovenská ílová spoločnosť (funkcia: podpredseda)

Ing. Viliam Pavlík, PhD.
Slovenská chemická spoločnosť (funkcia: člen)
Slovenská nukleárna spoločnosť (funkcia: člen)

Mgr. Marek Pribus, PhD.
Slovenská chemická spoločnosť (funkcia: člen)
Slovenská ílová spoločnosť (funkcia: člen)

Ing. Anna Prnová, PhD.
Slovenská silikátová vedecko-technická spoločnosť (funkcia: člen)
Slovenská sklárska spoločnosť (funkcia: člen)

Ing. Eva Scholtzová, CSc.
Slovenská chemická spoločnosť (funkcia: člen)
Slovenská ílová spoločnosť (funkcia: člen)

RNDr. Veronika Silliková, PhD.
Slovenská chemická spoločnosť (funkcia: člen)

Ing. Michal Slaný, PhD.
Slovenská chemická spoločnosť (funkcia: člen)
Slovenská ílová spoločnosť (funkcia: člen)

prof. RNDr. Pavol Šajgalík, DrSc.
Humboldtov klub v SR (funkcia: člen)
Slovenská chemická spoločnosť (funkcia: člen)
Slovenská silikátová vedecko-technická spoločnosť (funkcia: predseda)
Slovenská sklárska spoločnosť (funkcia: člen predstavenstva)
Učená spoločnosť SAV (funkcia: člen)

Ing. František Šimko, PhD.
Slovenská chemická spoločnosť (funkcia: člen)

Mgr. Tímea Šimonová, PhD.
Slovenská ílová spoločnosť (funkcia: člen)

Ing. Peter Škorňa, PhD.
Slovenská ílová spoločnosť (funkcia: člen)

Mgr. Peter Švančárek, PhD.
Slovenská sklárska spoločnosť (funkcia: člen)

Mgr. Monika Tatarková, PhD.
Slovenská silikátová vedecko-technická spoločnosť (funkcia: člen)

Ing. Zuzana Vasková, PhD.
Slovenská chemická spoločnosť (funkcia: člen)

### 7.7. Iné dôležité informácie o vedecko-organizačných a popularizačných aktivitách

V roku 2023 ústav oslavoval 70 výročie od jeho založenia. Pri tejto príležitosti bol zorganizovaný slávnostný seminár "Workshop on the occasion of the 70$^{th}$ anniversary of the Institute of Inorganic Chemistry SAS: Design of advanced inorganic materials". Vedecké príspevky boli publikované v knihe abstraktov (ISBN 978-80-973578-7-0). Na workshop boli pozvaní hostia z rôznych ústavov SAV ako aj z univerzít, s ktorými ústav udržuje dlhodobú spoluprácu, ako aj bývalí zamestnanci.

**Názov:** Deň otvorených dverí na ÚACh SAV, v.v.i.
**Miesto konania:** Dúbravská cesta 9, Bratislava
**Dátum:** 07.11.2023
Deň otvorených dverí, ktorý je organizovaný v rámci Týždňa vedy a techniky na Slovensku mladými vedeckými pracovníkmi je prezentáciou výsledkov výskumu na ÚACH SAV, v.v.i. Pozvaní boli študenti základných aj stredných škôl zo Slovenska. Súčsťou programu bola prehliadka vybraných laboratórií ústavu, v ktorých vedeckí pracovníci prostredníctvom modelových experimentov návštevníkom priblížili svoju každodennú prácu a informovali o praktickom využití zariadení. Tým najviac zvedavým názorne ukázali ich využitie aj nad rámec demonštračných experimentov. Dňa otvorených dverí sa zúčastnilo približne 30 študentov mimobratislavských škôl (Pezinok). Podujatie zabezpečili: Silliková V., Boháč P., Hanzel O., Pavlík V., Hičák M., Slaný M., Mlynáriková J., Jurová A., Pribus M. Planetová V.

**Názov:** Medzinárodný deň detí
**Miesto konania:** Dúbravská cesta 9, Bratislava
**Dátum:** 01.06.2023
**Zhodnotenie účasti**: Žiaci zo Základnej školy Jeséniova v Bratislave oslávili Medzinárodný deň detí na ÚACH SAV, v.v.i. Najskôr bola pripravená krátka prednáška o výskumnom zameraní ústavu, následne sa im ukázal elektrónový mikroskop naživo v laboratóriu. Program doplnili rôzne zábavné experimenty a pokusy. Program zabezpečili: Boháč P., Planetová V., Pribus M., Jurová A.

# 8. Aktivity pre Národnú radu SR, vládu SR, ústredné orgány štátnej správy SR a iné inštitúcie

## 8.1. Členstvo v poradných zboroch vlády SR, Národnej rady SR, ministerstiev SR, orgánoch EÚ, EP, NATO a pod.

Tabuľka 8a Členstvo v poradných zboroch Národnej rady SR, vlády SR, ministerstiev SR, orgánoch EÚ, EP, NATO a pod.

| **Meno pracovníka** | **Názov orgánu** | **Funkcia** |
|---|---|---|
| doc. Ing. Miroslav Boča, DrSc. | Komisia pre obhajoby doktorských dizertačných prác v odbore anorganická chémia - 01402 | predseda |
| prof. Ing. Dušan Galusek, DrSc. | Slovenská komisia pre vedecké hodnosti | člen |
| | Ad hoc komisia pre obhajoby doktorskych dizertačných prác v odbore Anorganická technológia a materiály | predseda |
| doc. Ing. Zoltán Lenčéš, PhD. | Sektorová rada inovácií, Národná sústava povolaní | člen |
| prof. RNDr. Pavol Šajgalík, DrSc. | Komisia ministra školstva pre udeľovanie Ceny ministra školstva | člen |
| | Komisia MŠ pre prioritné oblasti aplikovaného výskumu a experimentálneho vývoja v SR - materiálový výskum a nanotechnológie | člen pracovnej skupiny |
| | Slovenská komisia pre vedecké hodnosti (SKVH) | podpredseda |
| | Pandemická komisia MZ SR | člen |
| | Technologická agentúra SR | člen |
| | Výskumná agentúra SR | člen |
| | Rada predsedov pracovných skupín pre prioritné oblasti aplikovaného výskumu a experimentálneho vývoja | predseda |
| | Rada vlády pre vedu, techniku a inovácie | podpredseda |

## 8.2. Expertízna činnosť a iné služby pre štátnu správu a samosprávy

## 8.3. Členstvo v radách štátnych programov a podprogramov ŠPVV a ŠO

Tabuľka 8b Členstvo v radách štátnych programov a podprogramov ŠPVV a ŠO

| **Meno pracovníka** | **Názov orgánu** | **Funkcia** |
|---|---|---|

## 8.4. Prehľad aktuálnych spoločenských problémov, ktoré riešilo pracovisko v spolupráci s Kanceláriou prezidenta SR, s vládnymi a parlamentnými orgánmi alebo pre ich potrebu

# 9. Aktivity v orgánoch SAV

## 9.1. Členstvo vo Výbore Snemu SAV

## 9.2. Členstvo v Predsedníctve SAV a vo Vedeckej rade SAV

prof. RNDr. Pavol Šajgalík, DrSc.

- Predseda SAV
- predseda VR SAV

## 9.3. Členstvo v komisiách SAV

doc. Ing. Miroslav Boča, DrSc.

- Komisia pre posudzovanie vedeckej kvalifikácie (člen)
- Komisia SAV pre informačné a komunikačné technológie (člen)
- Komisia SAV pre vyhodnocovanie medzinárodných projektov (člen)

## 9.4. Členstvo v orgánoch VEGA

prof. Ing. Dušan Galusek, DrSc.
- Komisia VEGA č. 7 pre strojárstvo a príbuzné odbory informačných a komunikačných technológií a materiálové inžinierstvo (člen)

doc. Ing. Miroslav Hnatko, PhD.
- Komisia VEGA č. 7 pre strojárstvo a príbuzné odbory informačných a komunikačných technológií a materiálové inžinierstvo (člen)

Mgr. Stanislav Komorovský, PhD.
- Komisia VEGA č. 3 pre chemické vedy, chemické inžinierstvo a biotechnológie (člen)

Ing. Michal Korenko, PhD.
- Komisia VEGA č. 3 pre chemické vedy, chemické inžinierstvo a biotechnológie (člen komisie)

# 10. Starostlivosť o ľudské zdroje, rodovú rovnosť, pracovné a sociálne podmienky zamestnancov a uplatňovanie ich práv

## 10.1. Uplatňovanie princípov stratégie ľudských zdrojov HRS4R

Ústav sa zaviazal k dodržiavaniu stratégie Human Resources Strategy for Researchers (https://hrs4r.sav.sk/predstavenie-strategie-hrs4r/), ďalej HRS4R. Tento záväzok ústav deklaroval aj vložením loga na webstránku.
*Uveďte stručnú charakteristiku a hodnotenie aktivít v oblasti HRS4R.*

## 10.2. Informácie o aktivitách súvisiacich s uplatňovaním princípov rodovej rovnosti

ÚACH SAV, v.v.i. sa prihlásil k dokumentu Plán rodovej rovnosti SAV (Gender Equality Plan, PRR) vypracovaný riešiteľmi projektu ATHENA (Ústav výskumu sociálnej komunikácie SAV). Na ústave platia všetky pravidlá odmeňovania a prístupu k informáciám ako aj k možnostiam zastávať vedúce pozície (v kolektívnych orgánoch, v projektoch atď.) rovnako pre mužov aj ženy.
*Stručné hodnotenie stavu uplatňovania princípov rodovej rovnosti v organizácii, súvisiace aktivity a opatrenia, návrhy na aktualizáciu Plánu rodovej rovnosti SAV.*

### 10.2.1. Rodová skladba hlavných riešiteľov (vedúcich) projektov

*Prípadný stručný komentár ako úvod (nepovinný).*

Tabuľka 10a Rodová skladba hlavných riešiteľov domácich projektov

| ŠTRUKTÚRA PROJEKTOV | Organizácia SAV je nositeľom projektu | | | Organizácia SAV je zmluvným partnerom | | |
|---|---|---|---|---|---|---|
| | Počet | Hlavný riešiteľ | | Počet | Hlavný riešiteľ za organizáciu | |
| | | Muž | Žena | | Muž | Žena |
| **1. Projekty VEGA** | 10 | 5 | 5 | 2 | 1 | 1 |
| **2. Projekty APVV** | 6 | 4 | 2 | 9 | 5 | 4 |
| **3. Projekty EŠIF/OP ŠF, Plán obnovy EÚ** | 0 | 0 | 0 | 2 | 2 | 0 |
| **4. Projekty SASPRO, MoRePro, IMPULZ** | 2 | 1 | 1 | 0 | 0 | 0 |
| **5. Iné projekty (FM EHP, Vedecko-technické projekty, na objednávku rezortov a pod.)** | 3 | 1 | 2 | 0 | 0 | 0 |

Tabuľka 10b Rodová skladba hlavných riešiteľov medzinárodných projektov

| ŠTRUKTÚRA PROJEKTOV | Organizácia SAV je nositeľom projektu | | | Organizácia SAV je zmluvným partnerom | | |
|---|---|---|---|---|---|---|
| | Počet | Hlavný riešiteľ | | Počet | Hlavný riešiteľ za organizáciu | |
| | | Muž | Žena | | Muž | Žena |
| **1. Projekty Horizont 2020 a Horizont Európa** | 0 | 0 | 0 | 1 | 1 | 0 |
| **2. Projekty ERA.NET, ESA, JRP** | 2 | 2 | 0 | 0 | 0 | 0 |
| **3. Projekty COST** | 0 | 0 | 0 | 1 | 1 | 0 |
| **4. Projekty EUREKA, NATO, UNESCO, CERN, IAEA, IVF, ERDF a iné** | 0 | 0 | 0 | 1 | 0 | 1 |
| **5. Projekty v rámci medzivládnych dohôd** | 0 | 0 | 0 | 0 | 0 | 0 |
| **6. Bilaterálne projekty MAD, Mobility, Open Mobility** | 0 | 0 | 0 | 0 | 0 | 0 |
| **7. Bilaterálne projekty ostatné** | 2 | 2 | 0 | 0 | 0 | 0 |
| **8. Podpora MVTS z národných zdrojov (SAV, APVV a iné)** | 1 | 1 | 0 | 0 | 0 | 0 |
| **9. SAS-UPJŠ ERC Visiting Fellowship Grants** | 0 | 0 | 0 | 0 | 0 | 0 |
| **10. Iné projekty** | 0 | 0 | 0 | 0 | 0 | 0 |

### 10.2.2. Výskum zameraný na rodovú problematiku

*Uveďte stručné, základné informácie o projektoch orientovaných na rodovú problematiku, ak organizácia takýto výskum realizuje. Informácie o financovaní a výsledkoch takýchto projektov sa nachádzajú v kapitole 2 a v prílohe A-3.*

### 10.3. Informácie o pracovných a sociálnych podmienkach zamestnancov a uplatňovaní ich práv

ÚACH SAV v. v. i. sa riadi platnou legislatívnou úpravou ako aj odporúčaniami a inštrukciami z P SAV.
*Uveďte stručné, základné informácie k problematike.*

# 11. Organizačné a právne zmeny v organizácii

## 11.1. Informácie o vnútorných organizačných zmenách

*Uveďte stručné, základné informácie k problematike.*

## 11.2. Zmeny zakladacej listiny, vnútorných predpisov organizácie alebo zakladateľa

Dodatok č. 2 zo dňa 20.12.2023 k zakladacej listine Ústavu anorganickej chémie Slovenskej akadémie vied, verejnej výskumnej inštitúcie, č. 06169/2021 zo dňa 15. 11. 2021
*Uveďte stručné, základné informácie k problematike.*

# 12. Činnosť knižnično-informačného pracoviska organizácie

## 12.1. Knižničný fond

Tabuľka 12a Knižničný fond

| | | |
|---|---|---|
| **Knižničné jednotky spolu** | | 7642 |
| z toho | knihy a zviazané periodiká | 7642 |
| | audiovizuálne dokumenty | |
| | elektronické dokumenty (vrátane digitálnych) | |
| | mikroformy | |
| | iné špeciálne dokumenty - dizertácie, výskumné správy | |
| | Rukopisy, vzácne tlače | |
| Počet titulov dochádzajúcich periodík | | |
| z toho zahraničné periodiká | | |
| Ročný prírastok knižničných jednotiek | | |
| v tom | kúpou | 2 |
| | darom | |
| | výmenou | |
| | bezodplatným prevodom | |
| | náhradou | |
| Úbytky knižničných jednotiek | | |
| Knižničné jednotky spracované automatizovane | | |

*Výraz **„v tom“** označuje úplné (vyčerpávajúce) údaje, ktorých súčet sa musí rovnať údaju v riadku „spolu“, čiže nadradenému riadku.*
*Výraz **„z toho“** označuje neúplné (výberové) údaje, ktorých súčet sa nemusí rovnať údaju v riadku „spolu“.*

## 12.2. Výpožičky a služby

Tabuľka 12b Výpožičky a služby

| | | |
|---|---|---|
| **Výpožičky spolu (riadok 1)** | | |
| v tom z r. 1 | prezenčné výpožičky | |
| | absenčné výpožičky | |
| v tom z r. 1 | odborná literatúra pre dospelých | |
| | výpožičky periodík | |
| MVS iným knižniciam | | |
| MVS z iných knižníc | | |
| MMVS iným knižniciam | | |
| MMVS z iných knižníc | | |
| Počet vypracovaných bibliografií | | |
| Počet vypracovaných rešerší | | |

## 12.3. Používatelia

Tabuľka 12c Používatelia

| | |
|---|---|
| Registrovaní používatelia | |
| Návštevníci knižnice spolu (bez návštevníkov podujatí) | |

## 12.4. Iné údaje

Tabuľka 12d Iné údaje

| | |
|---|---|
| On-line katalóg knižnice na internete ( 1=áno, 0=nie) | |
| Náklady na nákup knižničného fondu v € | 110,92 |

## 12.5. Iné informácie o knižničnej činnosti

# 13. Nadácie a fondy pri organizácii

# 14. Realizácia Koncepcie dlhodobého rozvoja a Akčného plánu organizácie

Vedná politika ústavu reflektuje dlhodobé zámery a aktuálne trendy súvisiace so spoločenskou objednávkou na domácej a zahraničnej scéne. Je založená na inovatívnosti vedeckého smerovania, ambicióznosti vedeckých osobností, ako aj na autonómnosti vedúcich vedeckých tímov.

**14.1. Odporúčania z posledného pravidelného (akreditačného) hodnotenia organizácií SAV**
Uvádzame záverečné hodnotenie, ktoré sme dostali od hodnotiaceho panela.

*"This Institute has rather focussed research interests, studying dependence of properties of materials upon their microstructure and composition. This obstacle seems to support the development of main study trends in distinct Departments. Besides this general idea, it can be stated that the list of research topics is impressive and has significant potential for development, especially if the researchers participate in international research networks and follow the contemporary trends in methodology advancement. Certainly, the latter aspect needs investments that can come through extensive process of grant application activity, and from large contracts with industry. Therefore, the relatively modest level of grant applications as well as the contract works in general remains the main bottleneck of the development efficacy.*
*The publication output of the Institute has improved in last years, but not very much in terms of publications quality. Situation with patenting is still not good, and this area provides opportunity of significant improvement.*

*Comments and recommendations for further improvement and development of the institute*
*The present structure of the Institute seems to be rather optimal, Departments have experienced staff, and are equipped with necessary apparatus. Therefore, there seems to be no immediate need to proceed with some structural reforms.  It is more important to create strategy for development of solid research objectives, considering the international trends and achievements. For this process the help of the International Advisory Board members can be used. And moreover, it would be important to include the research staff of the institute. And finally, invite perhaps prominent persons form industry. This planning activity is not the privilege of the Institute leadership.*
*It would be useful to prepare and publish a full SWOT analysis, where all raised questions have some answer. Until now the publication of scientific papers has been considered as the main research output of the Institute. For evaluation of these publications a complicated classification system of publications has been created. Due to movement of the scientific publishing policy towards the Open Access publication model, it is timely to reorganize this evaluation system of publications and implement the elements of Plan S. Hopefully this will change the landscape of bibliometrics in coming decade.*
*At the same time, it is important to motivate scientists to submit patent applications, to valorise their research results. This can be done in cooperation with companies to cover accompanying expenses. Already understanding that this may be possible could lead to several important changes.*
*It is understandable that all these recommendations cannot be implemented by the Institute alone, without legal and financial support from the SAS.*
*Proposal of overall institute rating:   B"*

Poznámka: Treba však poznamenať, že hodnotiaci panel nemal k dispozícii nezávislý posudok.

**14.2. Hlavné body Akčného plánu organizácie a stav ich plnenia**

Základnými a dominantnými cieľmi, ktorým sú podriadené všetky aspekty chodu ústavu, sú odborný rast, medzinárodná integrácia a spoločenské uplatnenie/úžitok výsledkov výskumu. Napĺňanie uvedených cieľov si vyžaduje komplexný prienik aspektov, ako sú:

- aktívna účasť na domácich a zahraničných projektoch,
- aktívna publikačná činnosť v medzinárodných časopisoch a prezentácia výsledkov výskumu na medzinárodných vedeckých fórach,
- zachovanie vekovej a odbornej kontinuity,
- vytvorenie podmienok pre vzdelávanie a odborný rast nielen PhD študentov a mladých vedeckých pracovníkov, ale aj erudovaných vedeckých pracovníkov,

- aktívna účasť na vzdelávacom procese s dôrazom na druhý a tretí stupeň vysokoškolského vzdelania,
- technické zabezpečenie pre výskum,
- finančné zabezpečenie výskumu,
- personálna politika,
- zabezpečenie kontinuity v oblasti vedenia organizačných štruktúr ústavu, vytvorenie podmienok pre manažérsky rast pracovníkov,
- diseminácia a popularizácia objektov a výsledkov výskumu v odbornej a laickej spoločnosti,
- spolupráca a kooperácia s domácimi a zahraničnými akademickými, ako aj priemyselnými partnermi,
- zabezpečenie fungovania administratívnych požiadaviek.

**Projektové tímy**
Štruktúra ústavu v sebe inherentne zahŕňa flexibilné projektové tímy, ktoré sú vytvárané s ohľadom na objektové, resp. metodické možnosti a schopnosti jednotlivcov spájajúcich sa účelovo pri príprave a riešení projektov MŠ SR (štátne programy, projekty ŠF), VEGA, APVV, rámcových programov EÚ, NATO a v spolupráci s domácimi a zahraničnými partnermi z priemyslu. Táto flexibilná projektová štruktúra umožňuje pracovníkom resp. odborným skupinám podieľať sa na príprave vnútro-ústavných alebo aj mimo-ústavných vedeckých zoskupení, buď v rámci ústavu a SAV alebo aj mimo nich. Vedúci projektových tímov sú autonómni v rozhodovaní o spôsoboch riešenia projektu, ako aj v nakladaní s finančnými prostriedkami v súlade s projektovými cieľmi a zmluvami.

**Personálna politika**
V oblasti personálnej politiky sa ústavu dlhodobo darí udržať relatívne nízky priemerný vek zamestnancov pod 47 rokov. Podpora zamestnávania mladých vedeckých pracovníkov patrí medzi prioritné úlohy vedenia ústavu. Pre zvýšenie počtu a motivácie mladých absolventov doktorandského štúdia, aby neodchádzali z oblasti vedy do finančne lukratívnejších zamestnaní, boli prijaté nasledujúce zásady personálnej politiky:

- Získavanie najlepších študentov na doktorandské štúdium vo vedných odboroch, ktoré má ústav akreditované ako externá vzdelávacia inštitúcia.
- Získavanie zahraničných doktorandov prostredníctvom projektov Marie Curie Research Training Network alebo iných schém podpory zahraničných študentov (napr. DAAD), v ktorých je ústav zapojený.
- Vysielanie čerstvých absolventov doktorandského štúdia na dlhodobé (najmenej 3 mesiace) pobyty do zahraničia, aby sa zoznámili s najmodernejšou prístrojovou technikou, laboratórnymi postupmi a metódami práce vo vyspelých pracoviskách v Európe a vo svete (najčastejšie Japonsko a USA).
- Organizovanie medzinárodných podujatí doma, ako aj vysielanie mladých vedeckých pracovníkov a doktorandov na renomované konferencie v zahraničí s cieľom získať skúsenosti s prezentovaním vedeckých výsledkov.
- Pozývanie renomovaných odborníkov zo zahraničia na prednášky pre doktorandov a zamestnancov ústavu.

**Technická infraštruktúra**
Neoddeliteľnou súčasťou vednej politiky je aj rozvoj infraštruktúry. Ústav cielene buduje svoju infraštruktúru na rôznych úrovniach - cez laboratóriá na prípravu vzoriek až po laboratória na charakterizáciu pripravených materiálov. Vyžaduje si to dlhodobú aktivitu postupnej rekonštrukcie priestorov, ktorá je pre svoje špecifické požiadavky náročná ako finančne, tak aj časovo, pretože prebieha pri plnej prevádzke ostatných zariadení. Prístrojové vybavenie sleduje vzájomnú komplementaritu techník. Snahou je aj poskytovať voľné časové kapacity na merania pre partnerov na Slovensku, ako aj zapájanie ústavu prostredníctvom technickej infraštruktúry do medzinárodných zväzkov.

### 14.3. Aktualizácia Akčného plánu organizácie v roku 2023

Diskusie o akčnom pláne ústavu sú viacsmerným problémom. Je to dokument živý, ktorý si vyžaduje konkrétne zmeny v závislosti na okolnostiach (napr. zmeny v grantových agentúrach, legislatívne zmeny, prípadne zmeny a zámery zo strany P SAV). Na jednej strane je snaha napĺňať zadefinované ciele a ukazovatele zo strany manažmentu ústavu, na strane druhej sú impulzy zo strany vedeckých pracovníkov ako aj nevedeckých pracovníkov. V neposlednej rade je nutná aj interakcia smerom k P SAV.

# 15. Iné významné činnosti organizácie SAV

# 16. Poskytovanie informácií v súlade so zákonom o slobodnom prístupe k informáciám

*Uveďte informácie v súlade so zákonom č. 211/2000 Z.z. o slobodnom prístupe k informáciám.*

# 17. Problémy organizácie a podnety pre Predsedníctvo SAV k činnosti SAV

Zásadný problém, ktorý narastá niekoľko rokov bez náznakov akéhokoľvek zlepšenia, sú administratívne nároky na pracovníkov na všetkých úrovniach. Pre potreby naplnenia legislatívnych povinností ústavu v napríklad v oblasti verejného obstarávania je jeden plný úväzok pre administratívneho pracovníka málo, ale mzdové prostriedky ústavu neumožňujú rozšírenie administratívy bez zásahu do výskumných kapacít. Výsledkom je, že niektoré administratívne výkony vykonávajú aj vedeckí pracovníci, nad rámec alebo na úkor svojich odborných aktivít. Pre mnohé z týchto aktivít by sme privítali centralizovanejší a systematickejší prístup. Situácia sa však skomplikovala prechodom na verejno-výskumné inštitúcie. Rýchle zmeny v legislatíve (častokrát nekoncepčné), nedostatok financií na samotnú vedu, komplikovaná aktuálna celospoločenská situácia a nedostatok informácií spôsobuje zásadné komplikácie pri plánovaní akýchkoľvek aspektov základného, ako aj rozvojového fungovania organizácie. Preto je viac ako žiadúce výrazne zintenzívniť komunikáciu medzi ústavmi a rovnako aj smerom k P SAV s cieľom výmeny informácií, skúseností s riešením problémov, ako aj s cieľom hľadania perspektív pre ďalší rozvoj.

*Uveďte informácie a podnety v súlade s názvom kapitoly.*

# 18. Vyjadrenia vedeckej rady organizácie k výsledkom výskumnej činnosti za uplynulý rok

Vedecká rada ÚACH SAV v.v.i. na svojom zasadnutí 23.1.2024 hodnotila vedeckú aktivitu vedeckých oddelení ako aj výskumnej organizácie ako celku. K výsledkom výskumnej činnosti v roku 2023 prijala nasledujúce zhodnotenie výsledkov výskumnej činnosti:
Priemer publikácií zaradených v databázach CCC je 1,74 publikácie na jedného vedeckého pracovníka. Hoci publikačný priemer je nižší ako minulý rok (2,0) je možné publikačnú aktivitu považovať za uspokojivú. Pozitívom je lepšia vyrovnanosť v počte publikačných výstupov jednotlivých oddelení. Vysoká kvalita vedeckých výstupov je potvrdená publikovaním v renomovaných vedeckých časopisoch. V roku 2023 bolo 92% publikácií s afiliáciou ústavu zaradených do kvartilov Q1 a Q2.
Ústav je zapojený do riešenia projektov v rôznych projektových schémach. Počet riešených domácich projektov schémy VEGA je 12 (10 ako hlavný riešiteľ) a počet riešených APVV projektov je 15, z toho je v šiestich projektoch ÚACH hlavným riešiteľom projektov. Počet APVV projektov kde ústav vystupuje ako nositeľ projektu v posledných rokoch klesá, avšak je možné pozorovať zvýšenú aktivitu vedeckých pracovníkov pri podávaní projektov. V roku 2023 bolo podaných 10 projektov v rámci APVV, z ktorých je ústav v 5-tich návrhoch projektov hlavným riešiteľom. Vedecké témy riešených domácich projektov hodnotí VR ako primerané, dostatočne pokrývajúce celé spektrum vedeckých aktivít ústavu.
V rámci programu SASPRO realizujú svoje výskumné aktivity na ústave dvaja štipendisti, čo potvrdzuje atraktivitu organizácie pre vedeckú činnosť.
Ústav sa zapojil do mnohých z výziev Plánu obnovy, napr. bolo podaných 12 návrhov projektov v schéme Štipendiá pre excelentných výskumníkov a?výskumníčky R2-R4, jeden veľký projekt pre excelentných výskumníkov, dva projekty na Podporu výskumných projektov zameraných na dekarbonizáciu ekonomiky v TRL úrovniach 1-3, jeden projekt v schéme Podpora výskumných projektov zameraných na digitalizáciu ekonomiky v TRL úrovniach 1-3 a jeden projekt na vytvorenie Transformačného a Inovačného Konzorciá.
Rezervy v projektovej činnosti sú podľa VR v zapájaní sa, a hlavne v získavaní medzinárodných projektov programu EÚ. V roku 2023 bol ústav zapojený ako spoluriešiteľ do jedného projektu H 2020 a jedného COST projektu.
VR pozitívne hodnotí zapojenie ústavu do výchovy doktorandov. V roku 2023 bol celkový počet školených doktorandov 14, z ktorých traja v roku 2023 ukončili doktorandské štúdium úspešnou obhajobou. Dobrou praxou je zapájanie doktorandov do projektov riešených na ústave hneď po nástupe na doktorandské štúdium. Kvalita doktorandského štúdia a dosiahnuté vedecké výsledky sú na ročnej báze monitorované vedeckou radou.

Na základe vyššie uvedeného VR ÚACH SAV, v.v.i. konštatuje, že Ústav anorganickej chémie SAV v.v.i. je spôsobilý vykonávať výskumnú činnosť.
*Uvádzajte tu stručné rámcové hodnotenie výsledkov výskumnej činnosti schválené vedeckou radou organizácie a jej vyjadrenie k spôsobilosti organizácie vykonávať výskumnú činnosť.*

Schválila vedecká rada organizácie SAV dňa 23.1.2024

Mgr. Monika Tatarková, PhD.
*predsedníčka vedeckej rady*

**Výročnú správu o činnosti organizácie za rok 2023 vypracoval(i):**

doc. Ing. Zoltán Lenčéš, PhD., 02/59410408
Ing. Helena Pálková, PhD., 02/59410485

Bratislava, 16.2.2024

doc. Ing. Miroslav Boča, DrSc.
*riaditeľ organizácie*

# PRÍLOHY k časti A

## *Príloha A-1* - Zoznam zamestnancov a doktorandov organizácie k 31.12.2023

**Zoznam zamestnancov podľa štruktúry**

| | Meno s titulmi | Úväzok (v %) | Ročný prepočítaný úväzok |
|---|---|---|---|
| **Vedúci vedeckí pracovníci DrSc.** | | | |
| 1. | doc. Ing. Miroslav Boča, DrSc. | 100 | 1.00 |
| 2. | prof. RNDr. Juraj Bujdák, DrSc. | 50 | 0.50 |
| 3. | prof. Ing. Dušan Galusek, DrSc. | 55 | 0.55 |
| 4. | prof. Ing. Marek Liška, DrSc., Dr.h.c. | 50 | 0.50 |
| 5. | RNDr. Jana Madejová, DrSc. | 80 | 0.80 |
| 6. | Dr. Oľga Malkin, DrSc. | 100 | 1.00 |
| 7. | Dr. Vladimír Malkin, DrSc. | 100 | 1.00 |
| 8. | prof. RNDr. Pavol Šajgalík, DrSc. | 50 | 0.50 |
| **Samostatní vedeckí pracovníci** | | | |
| 1. | Mgr. Peter Boháč, PhD. | 100 | 1.00 |
| 2. | doc. Ing. Tomáš Bučko, PhD. | 25 | 0.25 |
| 3. | Ing. Ondrej Hanzel, PhD. | 100 | 1.00 |
| 4. | doc. Ing. Miroslav Hnatko, PhD. | 50 | 0.50 |
| 5. | doc. Ing. Mária Chromčíková, PhD. | 60 | 0.60 |
| 6. | Mgr. Ľuboš Jankovič, PhD. | 100 | 1.00 |
| 7. | doc. Mgr. Anna Kityk, PhD. | 100 | 0.70 |
| 8. | Mgr. Stanislav Komorovský, PhD. | 100 | 1.00 |
| 9. | Ing. Michal Korenko, PhD. | 100 | 0.33 |
| 10. | Ing. Blanka Kubíková, PhD. | 100 | 1.00 |
| 11. | doc. Ing. Zoltán Lenčéš, PhD. | 150 | 1.17 |
| 12. | Ing. Monika Michálková, PhD. | 75 | 0.75 |
| 13. | Ing. Jarmila Mlynáriková, PhD. | 100 | 1.00 |
| 14. | Ing. Helena Pálková, PhD. | 100 | 1.00 |
| 15. | Ing. Viliam Pavlík, PhD. | 100 | 1.00 |
| 16. | Ing. Anna Prnová, PhD. | 100 | 1.00 |
| 17. | Prangya Paramita Sahoo, PhD. | 100 | 0.50 |
| 18. | Ing. Eva Scholtzová, CSc. | 100 | 1.00 |
| 19. | Ing. Michal Slaný, PhD. | 100 | 1.00 |
| 20. | Ing. František Šimko, PhD. | 100 | 1.00 |
| 21. | Mgr. Peter Švančárek, PhD. | 100 | 1.00 |
| 22. | Ing. Peter Tatarko, PhD. | 100 | 1.00 |

| | | | |
|---|---|---|---|
| 23. | Mgr. Monika Tatarková, PhD. | 100 | 1.00 |
| 24. | Ing. Štefan Varga, CSc. | 25 | 0.25 |
| **Vedeckí pracovníci** | | | |
| 1. | James Richard Asher, PhD | 100 | 1.00 |
| 2. | Ing. Martin Barlog, PhD. | 100 | 0.75 |
| 3. | MSc. Hamid Hassani, PhD. | 100 | 0.33 |
| 4. | Ing. Michal Hičák, PhD. | 100 | 1.00 |
| 5. | Mgr. Valéria Kureková, PhD. | 100 | 1.00 |
| 6. | Mgr. Marián Matejdes, PhD. | 100 | 1.00 |
| 7. | Oksana Matselko, PhD. | 100 | 1.00 |
| 8. | MSc. Daniel Moreno, PhD. | 100 | 1.00 |
| 9. | Ing. Zuzana Netriová, PhD. | 125 | 1.25 |
| 10. | Mgr. Patrícia Petrisková, PhD. | 100 | 0.60 |
| 11. | Mgr. Marek Pribus, PhD. | 100 | 1.00 |
| 12. | RNDr. Veronika Silliková, PhD. | 100 | 1.00 |
| 13. | Mgr. Tímea Šimonová, PhD. | 50 | 0.17 |
| 14. | Ing. Peter Škorňa, PhD. | 100 | 1.00 |
| 15. | Ing. Gianmarco Taveri, PhD. | 100 | 0.50 |
| 16. | MSc. Hakan Ünsal, PhD. | 100 | 1.00 |
| 17. | Ing. Jana Valúchová, PhD. | 100 | 1.00 |
| 18. | Ing. Zuzana Vasková, PhD. | 100 | 1.00 |
| **Odborní pracovníci s VŠ vzdelaním (výskumní a vývojoví zamestnanci)** | | | |
| 1. | MSc. Alper Güneren | 25 | 0.15 |
| 2. | Ing. Eva Hadzimová | 100 | 1.00 |
| 3. | MSc. Naser Hosseini | 30 | 0.30 |
| 4. | Ing. Iveta Macková | 100 | 1.00 |
| 5. | Dr. Aliasghar Najafzadehkhoee, Ph.D. | 100 | 1.00 |
| 6. | Mgr. Marek Pribus, PhD. | 28 | 0.28 |
| 7. | Ing. Jozef Priščák | 100 | 1.00 |
| 8. | Mgr. Pavol Weiner | 100 | 1.00 |
| 9. | MSc. Inga Zhukova | 30 | 0.30 |
| **Odborní pracovníci s VŠ vzdelaním (ostatní zamestnanci)** | | | |
| 1. | Ing. Ingrid Hierwegová | 20 | 0.10 |
| 2. | Ing. Elena Krippelová | 100 | 1.00 |
| 3. | PhDr. Martina Pakanová | 100 | 1.00 |

| | | | |
|---|---|---|---|
| 4. | Ing. Helena Pálková, PhD. | 26 | 0.26 |
| 5. | Ing. Jaroslav Rusnák, PhD. | 33 | 0.33 |
| 6. | JUDr. Bc. Marica Slaná | 100 | 1.00 |
| **Odborní pracovníci ÚSV** | | | |
| 1. | Miroslav Baďura | 20 | 0.20 |
| 2. | Iveta Bouadjenak | 100 | 1.00 |
| 3. | Iveta Bouadjenak | 25 | 0.25 |
| 4. | Slavomír Daniš | 100 | 1.00 |
| 5. | Miriam Hnatková | 100 | 1.00 |
| 6. | Anna Jurová | 100 | 1.00 |
| 7. | Anna Kovárová | 100 | 1.00 |
| 8. | Mária Strempeková | 100 | 1.00 |
| 9. | Alexandra Tonkovičová | 60 | 0.95 |
| 10. | Denisa Žilinská | 100 | 1.00 |
| **Ostatní pracovníci** | | | |
| 1. | Anna Jurová | 30 | 0.30 |
| 2. | Ing. Iveta Macková | 20 | 0.20 |
| 3. | Terézia Pírová | 100 | 1.00 |
| 4. | Jana Šuliaková | 100 | 1.00 |

**Zoznam zamestnancov, ktorí odišli v priebehu roka**

| | Meno s titulmi | Dátum odchodu | Ročný prepočítaný úväzok |
|---|---|---|---|
| **Vedeckí pracovníci** | | | |
| 1. | Mgr. Roman Bystrický, PhD. | 30.6.2023 | 0.10 |
| 2. | doc. RNDr. Edmund Dobročka, CSc. | 30.9.2023 | 0.15 |
| **Odborní pracovníci ÚSV** | | | |
| 1. | Zdena Kapišinská | 31.1.2023 | 0.03 |
| 2. | Mgr. Pavol Weiner | 31.8.2023 | 0.13 |

**Zoznam doktorandov**

| | Meno s titulmi | Škola/fakulta | Študijný odbor |
|---|---|---|---|
| **Interní doktorandi hradení z prostriedkov SAV** | | | |
| 1. | MSc. Sanam Bashir | Prírodovedecká fakulta UK | 1420 chémia |
| 2. | Guido Manuel De La Torre Olvera | Prírodovedecká fakulta UK | 1420 chémia |
| 3. | MSc. Vinny George | Prírodovedecká fakulta UK | 1420 chémia |

| | | | |
|---|---|---|---|
| 4. | MSc. Alper Guneren | Prírodovedecká fakulta UK | 1420 chémia |
| 5. | Naser Hosseini | Prírodovedecká fakulta UK | 1420 chémia |
| 6. | MSc. Dhiya Krishnan | Prírodovedecká fakulta UK | 1420 chémia |
| 7. | Mgr. Jakub Michalík | Fakulta chemickej a potravinárskej technológie STU | 2820 chemické inžinierstvo a technológie |
| 8. | Mgr. Debora Mišenková | Prírodovedecká fakulta UK | 1160 fyzika |
| 9. | Mgr. Viktória Planetová | Prírodovedecká fakulta UK | 1420 chémia |
| 10. | Ing. Lucia Šedivá | Fakulta chemickej a potravinárskej technológie STU | 2820 chemické inžinierstvo a technológie |
| 11. | Inga Zhukova | Prírodovedecká fakulta UK | 1420 chémia |
| **Interní doktorandi hradení z iných zdrojov** | | | |
| *organizácia nemá interných doktorandov hradených z iných zdrojov* | | | |
| **Externí doktorandi** | | | |
| *organizácia nemá externých doktorandov* | | | |

**Zoznam zamestnancov prijatých do jedného roka od získania PhD.**

| | Meno s titulmi | Dátum obhajoby | Dátum prijatia | Úväzok (v %) |
|---|---|---|---|---|

**Zoznam emeritných vedeckých zamestnancov**

| | Meno s titulmi |
|---|---|

## *Príloha A-2* - Projekty riešené v organizácii

### Medzinárodné projekty

### Programy: COST

**1.) European Materials Acceleration Center for Energy** *(European Materials Acceleration Center for Energy)*

| | |
|---|---|
| **Zodpovedný riešiteľ:** | Peter Tatarko |
| **Trvanie projektu:** | 3.10.2023 / 2.10.2027 |
| **Evidenčné číslo projektu:** | A22123 |
| **Organizácia je koordinátorom projektu:** | nie |
| **Koordinátor:** | Ústav anorganickej chémie SAV, v. v. i. |
| **Počet spoluriešiteľských inštitúcií:** | 0 |
| **Čerpané financie:** | COST: 1053 € |

Dosiahnuté výsledky:

Cieľom projektu je vytvoriť novú systematickú a komplexnú schému výskumu, vývoja a inovácii pre zrýchlený vývoj bezpečných a udržateľných pokrokových materiálov a technológií pre energetiku, čím sa posilnia európske výskumné a inovačné kapacity. Projekt pri svojom štarte 03.10.2023 združoval 37 partnerov z 18 krajín a 2 priemyselných partnerov. Očakáva sa, že počet partnerov počas riešenia projektu sa bude zvyšovať. Cieľom je združiť odborníkov s najmodernejšími digitálnymi a materiálovými kompetenciami, a vytvoriť základy pre budúce centrum excelentnosti pre pokročilé funkčne materiály, ktoré pomôžu pri prechode k zjednotenej a silnejše EÚ. To sa dosiahne organizovaním spoločných workshopov, konferencií, seminárov, ale aj letných/zimných škôl pre študentov v rámci EÚ.

### Programy: Multilaterálne - iné

**2.) Atómová koncepcia materiálov na báze uhlíka pre novú normálnu spoločnosť** *(Atomic Design of Carbon-Based Materials for New Normal Society)*

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|---|---|
| **Zodpovedný riešiteľ:** | Eva Scholtzová |
| **Trvanie projektu:** | 1.11.2021 / 30.10.2024 |
| **Evidenčné číslo projektu:** | V4-Japan Joint Research Program |
| **Organizácia je koordinátorom projektu:** | nie |
| **Koordinátor:** | Advanced Institute for Materials Research (AIMR) Tohoku University Sendai |
| **Počet spoluriešiteľských inštitúcií:** | 5 - Kanada: 1, Česko: 1, Maďarsko: 1, Japonsko: 1, Poľsko: 1 |
| **Čerpané financie:** | SAV: 22299 € |

Dosiahnuté výsledky:

YU, Wei - YOSHII, Takeharu - AZIZ, Alex - TANG, Rui - PAN, Zheng-Ze - INOUE, Kazutoshi - KOTANI, Motoko - TANAKA, Hideki - SCHOLTZOVÁ, Eva - TUNEGA, Daniel - NISHINA, Yuta - NISHIOKA, Kiho - NAKANISHI, Shuji - ZHOU, Yi - TERASAKI, Osamu - NISHIHARA, Hirotomo. Edge-Site-Free and Topological-Defect-Rich Carbon Cathode for High-Performance Lithium-Oxygen Batteries. In Advanced Science, 2023, vol. 10, no. 16, art. no. 2300268-1-2300268-10. (2022: 15.1 - IF, Q1 - JCR, 4.086 - SJR, Q1 - SJR). ISSN 2198-3844. Dostupné na: https://doi.org/10.1002/advs.202300268 Typ: ADCA

MICHALSKA, Monika - PAVLOVSKY, Jiri - MATEJKA, Vlastimil - JAIN, Amrita - BOCHENEK, Kamil - ŠKORŇA, Peter - SCHOLTZOVÁ, Eva. A facile approach for fabricating g-C3N4-based materials as a metal free photocatalysts. In 9th International Conference on Carbon for Energy Storage and Environmental Protection: Book of abstracts. 1. vyd. - Budapest: Faculty of Chemical Technology and Biotechnology, Budapest University of Technology and Economics, 2023, p. 218. (9th International Conference on Carbon for Energy Storage and Environmental Protection : medzinárodná konferencia) Typ: GII

MICHALSKA, Monika** - PAVLOVSKY, Jiří - MATEJKA, Vlastimil - JAIN, Amrita - BOCHENEK, Kamil - SCHOLTZOVÁ, Eva - ŠKORŇA, Peter. Influence of temperature and atmosphere conditions on synthesis of g-C3N4 compounds – properties and photocatalytic applications. In 3rd Annual Meeting of AtomDeC (Atomic Design of Carbon Materials for New Normal Society) : Book of abstracts. - Warsaw, Poland: Institute of Fundamental Technological Research Polish Academy of Sciences (IPPT PAN), 2023, p. 13. ISBN 978-83-65550-41-5. (3rd Annual Meeting of AtomDeC (Atomic Design of Carbon Materials for New Normal Society) : medzinárodná konferencia) Typ: AFK

SCHOLTZOVÁ, Eva** - SZABÓ, Tamas. Adsorption of benzethonium chloride by graphene oxide surface – a combined theoretical and experimental study. In 9th International Conference on Carbon for Energy Storage and Environmental Protection: Book of abstracts. 1. vyd. - Budapest: Faculty of Chemical Technology and Biotechnology, Budapest University of Technology and Economics, 2023, p. 83, O-27. (9th International Conference on Carbon for Energy Storage and Environmental Protection: medzinárodná konferencia. 9th International Conference on Carbon for Energy Storage and Environmental Protection : medzinárodná konferencia) Typ: GII

ŠKORŇA, Peter** - MICHALSKA, Monika - SCHOLTZOVÁ, Eva. Thermal treatment of melamine precursor for preparing graphitic carbon nitride materials – theoretical study. In 3rd Annual Meeting of AtomDeC (Atomic Design of Carbon Materials for New Normal Society): Book of abstracts. - Warsaw, Poland: Institute of Fundamental Technological Research Polish Academy of Sciences (IPPT PAN), 2023, p. 23. ISBN 978-83-65550-41-5. (3rd Annual Meeting of AtomDeC (Atomic Design of Carbon Materials for New Normal Society) : medzinárodná konferencia) Typ: AFG

MORENO - RODRÍGUEZ, Daniel** - SCHOLTZOVÁ, Eva. A theoretical study of the corrugation of graphene oxide structure. In 3rd Annual Meeting of AtomDeC (Atomic Design of Carbon Materials for New Normal Society): Book of abstracts. - Warsaw, Poland: Institute of Fundamental Technological Research Polish Academy of Sciences (IPPT PAN), 2023, p. 29. ISBN 978-83-65550-41-5. (3rd Annual Meeting of AtomDeC (Atomic Design of Carbon Materials for New Normal Society) : medzinárodná konferencia) Typ: AFK

SCHOLTZOVÁ, Eva**. Adsorption properties of carbon-based materials studied by the DFT method. In 3rd Annual Meeting of AtomDeC (Atomic Design of Carbon Materials for New Normal Society): Book of abstracts. - Warsaw, Poland: Institute of Fundamental Technological Research Polish Academy of Sciences (IPPT PAN), 2023, p. 15. ISBN 978-83-65550-41-5. (3rd Annual Meeting of AtomDeC (Atomic Design of Carbon Materials for New Normal Society) : medzinárodná konferencia) Typ: AFG

SCHOLTZOVÁ, Eva** - SZABÓ, T. Graphene oxide as an effective sorbent material of benzethonium cation. In Design of Advanced Inorganic Materials - Workshop on the occasion of 70th anniversary of the institute of inorganic Chemistry SAS: Book of abstracts. - Bratislava, Slovakia: Institute of inorganic Chemistry Slovak academy of sciences, 2023, p. 34. ISBN 978-80-973578-7-0. (Design of Advanced Inorganic Materials - Workshop on the occasion of 70th anniversary of the institute of inorganic Chemistry SAS : vedecká konferencia) Typ: AFL

**Programy: Bilaterálne - iné**

**3.) New type of cesium fluoro-, oxo-, and oxo-fluoro-aluminate complexes: stability, dynamics and structural characterization** *(New type of cesium fluoro-, oxo-, and oxo-fluoro-aluminate complexes: stability, dynamics and structural characterization)*

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| **Zodpovedný riešiteľ:** | František Šimko |
| **Trvanie projektu:** | 1.9.2022 / 30.6.2024 |
| **Evidenčné číslo projektu:** | 101008500 |

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| **Organizácia je koordinátorom projektu:** | áno |
| **Koordinátor:** | Ústav anorganickej chémie SAV, v. v. i. |
| **Počet spoluriešiteľských inštitúcií:** | 1 - Francúzsko: 1 |
| **Čerpané financie:** | - |

<u>*Dosiahnuté výsledky:*</u>
V rámci meraní na CEMHTI CNRS v Orléans, vo Francúzsku sa uskutočnili 19F, 27Al a 133Cs MAS NMR merania systému CsF-Al2-O3. Namerali sa NMR spektrá novej fázy, a to oxofluórohlinitanu cézneho, Cs2Al2O3F2, pričom sa stanovila aj jeho štruktúra. Charakteristikou tejto kryštálovej štruktúry je prítomnosť vrstiev, zložených z jednotlivých (AlO3F) tetrédrov, zdieľajúcich navzájom spoločné rohy, v ktorých sú umiestnené atómy kyslíka, zatiaľ čo atómy fluóru oddeľujú jednotlivé vrstvy.
Výsledky boli publikované v článku:
ŠIMKO, František** - RAKHMATULLIN, Aydar - KING, Graham - ALLIX, Mathieu - BESSADA, Catherine - NETRIOVÁ, Zuzana - KRISHNAN, Dhiya - KORENKO, Michal**. Cesium Oxo-fluoro-aluminates in the CsF-Al2O3 System: Synthesis and Structural Characterization. In Inorganic Chemistry, 2023, vol. 62, iss. 38, pp. 15651?15663. (2022: 4.6 - IF, Q1 - JCR, 0.997 - SJR, Q1 - SJR). ISSN 0020-1669. Dostupné na: https://doi.org/10.1021/acs.inorgchem.3c02386

Výsledky prezentované na konferencii:
ŠIMKO, František** - RAKHMATULLIN, Aydar - KORENKO, Michal - ALLIX, Mathieu - NETRIOVÁ, Zuzana - MATSELKO, Oksana - SILLIKOVÁ, Veronika, Oxo-fluoro-aluminates: synthesis, stability and structure correlation, New inorganic functional oxides: synthesis, characterisation and simulations, Le studium Conference, 4.-6.10.2023, Orléans, France, P. 41.

**4.) Vývoj nových metód spájania vysoko-entropických keramických materiálov** *(Development of new joining methods for high entropy ceramics)*

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| **Zodpovedný riešiteľ:** | Peter Tatarko |
| **Trvanie projektu:** | 1.7.2022 / 30.6.2025 |
| **Evidenčné číslo projektu:** | APVV-SK-CZ-RD-21-0089 |
| **Organizácia je koordinátorom projektu:** | áno |
| **Koordinátor:** | Ústav anorganickej chémie SAV, v. v. i. |
| **Počet spoluriešiteľských inštitúcií:** | 1 - Česko: 1 |
| **Čerpané financie:** | - <br> Podpora medzinárodnej spolupráce z národných zdrojov: 40416 € |

<u>*Dosiahnuté výsledky:*</u>
V súlade s plánom projektu boli pripravené vysokoentropické zliatiny so zložením (Hf-Zr-Ta-Nb-Ti) a (Mo-W-Ta-Nb-V), ktoré pri riešení projektu budú používané ako spojovacie materiály pre vysokoentropické karbidy a boridy obsahujúce rovnaké prechodné kovy (pripravené v minulej etape riešenia projektu). Okrem prípravy vstupných materiálov boli realizované aj prvotné experimenty spájania materiálov. Vysokoentropické karbidy (Hf-Zr-Ta-Nb-Ti)C a (Mo-W-Ta-Nb-V)C boli priamo spájané (bez prítomnosti medzivrstvy) pri teplotách 1600°C – 1900°C využitím spájania za asistencie elektrického prúdu. Bezšvové spoje sa podarilo dosiahnuť pri teplotách od 1800°C. Zároveň bola realizovaná štúdia zmáčavosti povrchu vysokoentropických keramických materiálov roztavenými kovovými zliatinami, na báze Ni a Ag-Cu. Na základe výsledkov zmáčavosti boli vybrané najvhodnejšie zloženia zliatín (Ni-Ta a Ag-Cu-Ti), ktoré budú v ďalšom kroku použité na spájanie týchto vysokoentropických keramických materiálov.

Publikácie:
XU, Jie - TATARKO, Peter - CHEN, Lianghao - SHAN, Xu - HUANG, Qing - ZHOU, Xiaobing**. High-strength SiC joints fabricated at a low-temperature of 1400°C using a novel low activation filler of Praseodymium. In Journal of the American Ceramic Society, 2023, vol. 106, iss. 10, pp. 5679-5688. (2022: 3.9

- IF, Q1 - JCR, 0.852 - SJR, Q1 - SJR). ISSN 0002-7820. Dostupné na: https://doi.org/10.1111/jace.19229. Typ: ADCA

HOSSEINI, Naser** - VALENZA, Fabrizio - GAMBARO, S. - CHLUP, Zdeněk - KOVALČÍKOVÁ, Alexandra - DLOUHÝ, Ivo - TATARKO, Peter. Wettability and joining of (Mo-Nb-Ta-V-W)C high entropy carbide by NiTa eutectic alloys. In Processing and properties of advanced ceramics and glasses: Proceedings. Stará Lesná, 25.-27.10.2023. - Košice, Slovakia: Institute of Materials Research, SAS, 2023, p. 40-46. ISBN 978-80-89782-16-1. (APVV-21-0402: Vývoj nových keramických materiálov komplexného zloženia pre extrémne aplikácie. APVV-22-0493: Ultra-vysokoteplotné karbidy so zvýšenou oxidačnou odolnosťou. Processing and properties of advanced ceramics and glasses : vedecký seminár) Typ: AFD

ZHUKOVA, Inga** - TATARKOVÁ, Monika - KOMBAMUTHU, Vasanthakumar - KOVALČÍKOVÁ, Alexandra - CSANÁDI, Tamás - DUSZA, Ján - DLOUHÝ, Ivo - MATOVIČ, Branko - ZAGORAC, Dejan - TATARKO, Peter. Theoretical predictions and synthesis of (Ti-Zr-Hf-Nb-Ta)B2 structures with non-equimolar compositions. In Processing and properties of advanced ceramics and glasses: Proceedings. Stará Lesná, 25.-27.10.2023. - Košice, Slovakia: Institute of Materials Research, SAS, 2023, p. 114-119. ISBN 978-80-89782-16-1. (APVV-21-0402: Vývoj nových keramických materiálov komplexného zloženia pre extrémne aplikácie. Processing and properties of advanced ceramics and glasses : vedecký seminár) Typ: AFD

**Programy: Horizont 2020**

**5.) Sodík-iónové a sodík-kovové batérie novej generácie pre efektívne a udržateľné uskladnenie energie**
*(Sodium-Ion and sodium Metal Batteries for efficient and sustainable next-generation energy storage)*

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| **Zodpovedný riešiteľ:** | Zoltán Lenčéš |
| **Trvanie projektu:** | 1.1.2021 / 31.12.2024 |
| **Evidenčné číslo projektu:** | 963542 |
| **Organizácia je koordinátorom projektu:** | nie |
| **Koordinátor:** | Technische Universität Darmstadt |
| **Počet spoluriešiteľských inštitúcií:** | 14 - Nemecko: 2, Francúzsko: 3, Veľká Británia: 3, Holandsko: 1, Nórsko: 2, Švédsko: 2, Ukrajina: 1 |
| **Čerpané financie:** | SAV: 4928 €<br>EU: 47295 € |

Dosiahnuté výsledky:
Vysokoporézne amorfné keramické anódy na báze Si-O-C pre sodíkové batérie boli pripravené zosieťovaním a následnou dvojstupňovou pyrolýzou (900?C/3 h, 1200?C/1 h) polymérneho prekurzoru. S cieľom zvýšiť elektrickú a tepelnú vodivosť SiOC anódy boli vzorky pyrolyzované v atmosfére dusíka namiesto argónu. Syntetizované SiOC prášky boli mleté v planetovom mlyne za podmienok nízkoenergického (LEM) a vysokoenergického mletia (HEM) s cieľom zistiť vplyv morfológie práškov (tvar a veľkosť častíc) na elektrochemické vlastnosti SiOC anód. XPS a EDX analýzy práškov ukázali, že chemické zloženie práškov mletých za LEM a HEM podmienok je porovnateľné. SiOC anódy pripravené z vysokoenergicky mletých práškov vykazovali lepšie elektrochemické vlastnosti (nižšiu rezistivitu prenosu náboja a rýchlejšiu difúziu Na+ iónov). Tým sa podarilo dosiahnuť vyššiu celkovú špecifickú kapacitu pre HEM SiOC anódy. Dosiahnuté výsledky ukázali, že nižšia veľkosť častíc a vyšší merný povrch SiOC práškov má kladný vplyv na špecifickú kapacitu anódy. Z toho dôvodu boli pripravené aj SiOC aerogély z roztoku polymérneho prekurzoru a DVB spojiva v n-hexáne. Reakcie prebiehali v nerez tlakovej nádobe pri 180?C po dobu 24 hodín. Z aerogélov budú pripravené SiOC anódy a následne testované.

Publikačné výstupy:
GÜNEREN, Alper - LENČÉŠ, Zoltán, Silicon oxycarbide anodes for Na-ion batteries. Book of abstracts, XVIII Conference & Exhibition of the European Ceramic Society, July 2-6, 2023, Lyon, France.

**Programy: JRP**

**6.) Transformácia bioinertného na bioaktívne prostredníctvom povrchového inžinierstva** *(Transforming bioinert to bioactive through surface engineering)*

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| **Zodpovedný riešiteľ:** | Dušan Galusek |
| **Trvanie projektu:** | 1.1.2023 / 31.12.2025 |
| **Evidenčné číslo projektu:** | |
| **Organizácia je koordinátorom projektu:** | áno |
| **Koordinátor:** | Ústav anorganickej chémie SAV, v. v. i. |
| **Počet spoluriešiteľských inštitúcií:** | 2 - Taiwan: 2 |
| **Čerpané financie:** | SAV: 25000 € |

*Dosiahnuté výsledky:*
V prvom roku riešenia projektu sa metódou sól-gél pripravili mezoporézne bioaktívne sklá v systéme SiO2-CaO a dopovali saterapeutickými iónmi B a Co. Začal sa tiež proces optimalizácie nanášania bioaktívnych povlakov na ZrO2 substráty metódou dip coating. Začali sa tiež aktivity zamerané na opracovanie resp. modifikovanie povrchu implantátov pomocou atmosférickej plazmy. Skúmala sa aj možnosť aplikácie plazmového opracovania na už nanesené vrstvy bioaktívneho materiálu s možnosťou zlepšenia biologickej odozvy resp. následnú adhéziu ďalších vrstiev pri nanášaní multivrstiev. Jednou z možností ako zlepšiť účinnosť bioaktívnych povlakov je vytvorenie povlaku použitím rôznych komponentov resp. viacerých vrstiev. Za týmto účelom sa pomocou precipitačnej metódy pripravili nanočastice nHAP. Tieto sa dopovali Zn a Ce a skúmal sa ich účinok na morfológiu pripravených nanočastíc ako aj biologickú a antibakteriálnu odozvu.

**7.) Vývoj bioaktívneho funkčne gradientného nitridu kremičitého** *(Development of functionally graded silicon nitride with improved bioactivity)*

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| **Zodpovedný riešiteľ:** | Miroslav Hnatko |
| **Trvanie projektu:** | 1.1.2021 / 31.12.2023 |
| **Evidenčné číslo projektu:** | JRP SAV – TUBITAK 546676 |
| **Organizácia je koordinátorom projektu:** | áno |
| **Koordinátor:** | Ústav anorganickej chémie SAV, v. v. i. |
| **Počet spoluriešiteľských inštitúcií:** | 1 - Turecko: 1 |
| **Čerpané financie:** | SAV: 25000 € |

*Dosiahnuté výsledky:*
Hlavnou vedeckou aktivitou riešenia projektu bola modifikácia povrchov funkčne gradientných (FG) keramických materiálov na báze Si3N4, ktoré boli pripravené kombináciou techník odlievania pások a spekania v minulých etapách projektu. Boli študované 3 spôsoby modifikácie povrchu: kyslíkovo-acetylénovým plameňom, plazmovým leptaním, a chemickým leptaním. Takto upravené povrchy boli analyzované pomocou RTG a SEM, a následne boli študované ich biologické vlastnosti. Najnižšiu životaschopnosť buniek preukázali materiály, ktorých povrch bol upravený chemickým leptaním, ako následok odleptania bioaktívnych zložiek z hraníc zŕn Si3N4. Naopak najlepšiu životaschopnosť buniek, ako aj rast buniek vykázali materiály, ktorých povrch bol modifikovaný kyslíkovo-acetylénovým plameňom. To bolo prisúdené prítomnosťou bioaktívnych zložiek v povrchovej vrstve materiálov, ako aj samotným pórovitým charakterom vrstvy. Stanovenie najoptimálnejšieho spôsobu prípravy FG materiálov a ich následnej povrchovej modifikácie možno považovať za najdôležitejší výstup projektu. Získané skúsenosti s opracovaním vzoriek kyslíko-acetylénovým plameňom boli potom využité aj pre iné materiály, napr. pre ZrB2-SiC a vysokoentropickú keramiku, čo ďalej rozšírilo všeobecný prínos projektu v oblasti vývoja nových keramických materiálov.

Publikácie:
KITYK, Anna** - PAVLÍK, Viliam - HNATKO, Miroslav. Exploring deep eutectic solvents for the

electrochemical and chemical synthesis of photoand electrocatalysts for hydrogen evolution. In International Journal of Hydrogen Energy, 2023, vol. 48, iss. 100, pp. 39823-39853. (2022: 7.2 - IF, Q1 - JCR, 1.318 - SJR, Q1 - SJR). ISSN 0360-3199. Dostupné na: https://doi.org/10.1016/j.ijhydene.2023.07.158 Typ: ADCA

ÜNSAL, Hakan - FÜRDŐSOVÁ, Zuzana - CHLUP, Zdeněk - TATARKOVÁ, Monika - KOVALČÍKOVÁ, Alexandra - HIČÁK, Michal - HOSSEINI, Naser - ZHUKOVA, Inga - DLOUHÝ, Ivo - ŠAJGALÍK, Pavol - TATARKO, Peter**. ZrB2-SiC composites with rare-earth oxide additives. In Journal of Innovative Materials in Extreme Conditions, 2023, vol. 4, iss. 1, pp. 22-29. ISSN 2738-0882. Dostupné na internete: http://jimec.edu.rs/volume-4-issue-1-year-2023/ Typ: ADEB

DE LA TORRE OLVERA, Guido** - TATARKOVÁ, Monika. Sintering behavior and phase transformation of silicon nitride with bioactive glass additive. In Workshop - Processing and properties of advanced ceramics and glasses: Proceedings. Košice, Slovakia: Institute of Materials Research, SAS, 2023, p. 108-113. ISBN 978-80-89782-16-1. Typ: AFD

HOSSEINI, Naser** - VALENZA, Fabrizio - GAMBARO, S. - CHLUP, Zdeněk - KOVALČÍKOVÁ, Alexandra - DLOUHÝ, Ivo - TATARKO, Peter. Wettability and joining of (Mo-Nb-Ta-V-W)C high entropy carbide by NiTa eutectic alloys. In Processing and properties of advanced ceramics and glasses: Proceedings. Stará Lesná, 25.-27.10.2023. Košice, Slovakia: Institute of Materials Research, SAS, 2023, p. 40-46. ISBN 978-80-89782-16-1. Typ: AFD

ZHUKOVA, Inga** - TATARKOVÁ, Monika - KOMBAMUTHU, Vasanthakumar - KOVALČÍKOVÁ, Alexandra - CSANÁDI, Tamás - DUSZA, Ján - DLOUHÝ, Ivo - MATOVIČ, Branko - ZAGORAC, Dejan - TATARKO, Peter. Theoretical predictions and synthesis of (Ti-Zr-Hf-Nb-Ta)B2 structures with non-equimolar compositions. In Processing and properties of advanced ceramics and glasses: Proceedings. Stará Lesná, 25.-27.10.2023. Košice, Slovakia: Institute of Materials Research, SAS, 2023, p. 114-119. ISBN 978-80-89782-16-1. Typ: AFD

**Domáce projekty**

**Programy: VEGA**

**1.) Fázové premeny oxidov kovov v roztavených fluoridových systémoch** *(Phase changes of metal oxides in fluoride melts)*

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| **Zodpovedný riešiteľ:** | Miroslav Boča |
| **Trvanie projektu:** | 1.1.2020 / 31.12.2023 |
| **Evidenčné číslo projektu:** | 2/0024/20 |
| **Organizácia je koordinátorom projektu:** | áno |
| **Koordinátor:** | Ústav anorganickej chémie SAV, v. v. i. |
| **Počet spoluriešiteľských inštitúcií:** | 0 |
| **Čerpané financie:** | SAV: 21965 € |

<u>*Dosiahnuté výsledky:*</u>
V súčasnej dobe sa problematika takmer úplnej závislosti Európskej únie na dodávkach materiálov kritických prvkov z mimoeurópskeho prostredia rieši aj v Európskom parlamente alebo Európskej komisii. V snahe prispieť k rozvoju procesov, ktoré by viedli k efektívnej výrobe/recyklácií kritických prvkov sme namerali ucelený súbor dát pre hustotu roztavených systémov. Z experimentálnych meraní hustôt a následnej analýzy objemových vlastností vyplýva, že v poradí systémov (LiF-CaF2)eut-NdF3, (LiF-NaF)eut-NdF3, (LiF-MgF2)eut-NdF3 rastie nežiadúci efekt objemovej expanzie s prídavkom NdF3. Tento trend bol pozorovaný aj pre systémy s prídavkom SmF3 a GdF3.

MLYNÁRIKOVÁ, Jarmila – BOČA, Miroslav – KUBÍKOVÁ, Blanka. Densities and Volume Properties of the Melts of the Systems (LiF + NaF)eut + SmF3, (LiF + NaF)eut + GdF3, and (LiF + NaF)eut + NdF3. In Journal of Chemical and Engineering Data, 2023, vol. 68, no. 5, p. 1133-1144. (2022: 2.6 – IF, Q2 – JCR, 0.625 – SJR, Q2 – SJR). ISSN 0021-9568. Dostupné na: https://doi.org/10.1021/acs.jced.3c00084

**2.) Hlinitano-kremičitanové sklené a sklokeramické materiály spevnené iónovou výmenou a dodatočnými funckionalitami** *(Ion exchange strengthened aluminosilicate glass/glass-ceramics with additional functionalities)*

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| **Zodpovedný riešiteľ:** | Dušan Galusek |
| **Trvanie projektu:** | 1.1.2021 / 31.12.2024 |
| **Evidenčné číslo projektu:** | VEGA 2/0028/21 |
| **Organizácia je koordinátorom projektu:** | áno |
| **Koordinátor:** | Ústav anorganickej chémie SAV, v. v. i. |
| **Počet spoluriešiteľských inštitúcií:** | 1 - Slovensko: 1 |
| **Čerpané financie:** | SAV: 8173 € |

<u>*Dosiahnuté výsledky:*</u>
Skúmal sa vplyv LiOH ako dopantu na zhutňovanie práškov $MgAl_2O_4$ pomocou metódy SPS a na finálne vlastosti a transparentnosť hutnej keramiky. Dva komerčné prášky horečnatého spinelu s rôznymi veľkosťami špecifického povrchu sa dopovali až do 0,6 hm.% LiOH a spekali sa pomocou SPS s nízkou (2,75 °C/min) a vysokou (100 °C/min) rýchlosťou ohrevu. Nižšia rýchlosť ohrevu bola optimálna pre nedopovaný horečnatý spinel (bez LiOH) s najvyššou reálnou in-line transmitanciou (RIT) 84,8% pri vlnovej dĺžke 633 nm. V druhej časti projektu sa pripravilo sklo so zložením $2CaO$-$Al_2O_3$-$SiO_2$ (gehlenit) dopované 0, 0,25, 0,50 a 1,50 mol. % $Bi^{3+}$. Pripravené vzorky boli RTG amorfné. Tepelné vlastnosti pripravených skiel sa skúmali pomocou DTA. DTA záznamy všetkých študovaných vzoriek obsahovali len jeden exotermický efekt priradený kryštalizácii gehlenitu. Teplota kryštalizácie klesala s narastajúcim obsahom Bi. Na základe hodnôt kinetických parametrov sa určilo, že rýchlosť nukleácie gelentiu v sklách je konštantná, a nezávisle od obsahu Bi je rast kryštálov trojrozmerný a riadený difúziou.

POUCHLÝ, Václav** - TALIMIAN, Ali - KAŠTYL, Jaroslav - CHVÍLA, Martin - ŠČASNOVIČ, Erik - BETLRÁN, Ana M. - LOZANOF, Juan G. - GALUSEK, Dušan. Transparent LiOH-doped magnesium aluminate spinel produced by spark plasma sintering: Effects of heating rate and dopant concentration. In Journal of the European Ceramic Society, 2023, vol. 43, iss. 8, pp. 3544-3552. (2022: 5.7 - IF, Q1 - JCR, 1.257 - SJR, Q1 - SJR). ISSN 0955-2219. Dostupné na: https://doi.org/10.1016/j.jeurceramsoc.2023.01.059

MAJEROVÁ, Melinda** - PRNOVÁ, Anna - KRAXNER, J. - PECUŠOVÁ, B. - PLŠKO, A. - GALUSEK, Dušan. Study of thermal properties and crystallization kinetics of Bi-doped 2CaO-Al2O3-SiO2 glasses. In Journal of Thermal Analysis and Calorimetry, 2023, vol. 148, no. 4, p. 1533–1541. (2022: 4.4 - IF, Q1 - JCR, 0.753 - SJR, Q1 - SJR).

**3.) Luminofory s nulovým teplotným zhášaním luminiscencie pre aplikácie v pc-WLED s NUV excitáciou** *(Zero-thermal-quenching phosphors for NUV converted pc-WLEDs application)*

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| **Zodpovedný riešiteľ:** | Dušan Galusek |
| **Trvanie projektu:** | 1.1.2022 / 31.12.2024 |
| **Evidenčné číslo projektu:** | VEGA 1/0476/22 |
| **Organizácia je koordinátorom projektu:** | nie |
| **Koordinátor:** | Ústav anorganickej chémie SAV, v. v. i. |
| **Počet spoluriešiteľských inštitúcií:** | 0 |
| **Čerpané financie:** | MŠ: 5584 € |

<u>*Dosiahnuté výsledky:*</u>

Optimalizovaná bola príprava mikroguľôčok v systéme Y2O-Al2O3 dopovanom luminiscenčne aktívnymi iónmi Eu3+/2+. Detailne preštudované boli luminiscenčné vlastnosti v závislosti od koncentrácie aktivátora, podmienok prípravy skryštalizovaných mikroguľočok (optimalizovaný časovo-teplotný režim v redukčnej atmosfére). Eu2+ -dopované systémy vykazujú pri excitácii NUV emisiu bieleho svetla, ktorú je možno ladiť vlnovou dĺžkou excitačného žiarenia s posunom do červenej spektrálnej oblasti. Pripravené systémy vykazovali nízke zhášanie luminiscencie s teplotou v teplotnom intervale 25-200°C. Žiarovým lisovaním a technikou SPS (Spark Plasma Sintering) boli pripravené kompozity dopované Eu2+/Eu3+ emitujúce biele a červené svetlo pri excitácii NUV iba s jedným typom aktivátora v matrici. Detailne preštudované boli aj transparentné materiály na báze MgAl2O4 dopované luminiscenčnými aktivátormi Tb3+ a Cr3+, čo umožnilo ladenie farby emitovaného svetla (luminiscencie) v závislosti od excitačnej vlnovej dĺžky. Z pohľadu optickej termometrie sa sľubnými javia oxy-fluorifové sklá obsahujúce fluoridové nano-krytalické fázy NaYF4 a LiYF4 dopované Er3+/Yb3+ aktivátormi.

Publikačné výstupy:
PECUŠOVÁ, Beáta - PRNOVÁ, Anna** - VALÚCHOVÁ, Jana - PARCHOVIANSKÝ, Milan - KLEMENT, Róbert - GALUSEK, Dušan. Crystallization and photoluminescence properties of Er-doped microspheres with ytterbium-aluminium garnet composition. In Ceramics International, 2023, vol. 49, iss. 9, pp. 14895-14903. (2022: 5.2 - IF, Q1 - JCR, 0.918 - SJR, Q1 - SJR). https://doi.org/10.1016/j.ceramint.2022.08.070 Type: ADCA

TRUONG, N.M.P. - SEDANO, M. - DURÁN, A. - BALDA, R. - PASCUL, M.J. - KLEMENT, R. Er/Yb co-doped LiYF4 transparent oxyfluoride glass-ceramics with up-conversion optical properties, Ceram. Int. 49 (2023) 41201 - 41209.

GRIEBENOW, Kristin** - TRUONG, Mai-Phuong - MUNOZ, Francisco - KLEMENT, Róbert - GALUSEK, Dušan. Tuning the fluorescence of Dy3+ via the structure of borophosphate glasses. In Scientific Reports, 2023, vol. 13, iss. 1, art no. 1919. (2022: 4.6 - IF, Q2 - JCR, 0.973 - SJR, Q1 - SJR). ISSN 2045-2322. Dostupné na: https://doi.org/10.1038/s41598-023-28941-1 Type: ADCA

**4.) Elektromagnetické tienenie funkčne gradientných vrstevnatých kompozitov na báze SiC s prídavkom grafénu a uhlíkových nanorúrok** *(Electromagnetic shielding properties of functionally graded layered SiC-graphene and SiC-carbon nanotubes composites)*

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| **Zodpovedný riešiteľ:** | Ondrej Hanzel |
| **Trvanie projektu:** | 1.1.2021 / 31.12.2024 |
| **Evidenčné číslo projektu:** | 2/0007/21 |
| **Organizácia je koordinátorom projektu:** | áno |
| **Koordinátor:** | Ústav anorganickej chémie SAV, v. v. i. |
| **Počet spoluriešiteľských inštitúcií:** | 0 |
| **Čerpané financie:** | SAV: 8885 € |

*Dosiahnuté výsledky:*
V rámci riešenia projektu bol pripravený granulovaný prášok karbidu kremičitého pomocou vymrazovacieho granulátora a prídavku granulačných aditív. Následne tento granulovaný SiC prášok bol tepelne žíhaný. Takto tepelne upravený prášok bol lisovaný uniaxiálne a spekaný pri teplote 1900°C vo vákuu pri tlaku 70 MPa s rôznou dobou výdrže od 5 min do 80 min. Týmto procesom sme dosiahli takmer úplne hutný (relatívna hustota bola vyššia ako 99 % teoretickej hustoty) materiál karbidu kremičitého s rôznym pomerom α-SiC β ?-SiC fázy. Na takto pripravených materiáloch bola pomocou SEM pozorovaná mikroštruktúra a lomové plochy. Taktiež XRD a Raman preukázali, že s rastúcou dobou spekania rástol podiel ?-SiC fázy v materiáli. Ďalej bol skúmaný vplyv ?-SiC a ?-SiC fázy na funkčné vlastnosti SiC (elektrickú a tepelnú vodivosť). Z výsledkov vyplýva, že s rastúcim obsahom ?-SiC (z 63 na 94 %) stúpa tepelná difuzivita z 47.3 na 68.4 mm2/s a zároveň elektrická vodivosť klesá zo 104 na 8 S/m. SiC materiál s najvyššou tepelnou difuzivitou mal po prepočítaní cez špecifickú tepelnú kapacitu a hustotu, tepelnú vodivosť okolo 190 W/m.K., čo je jedna z najvyšších tepelných vodivostí pre SiC materiál spekaný do teploty 1900°C.

Publikácie:
TEPLICKÝ, Tibor - GREGOROVÁ, Martina - KALAFUTOVÁ, Adriana - HANZEL, Ondrej - MATEAŠÍK, Anton - FILOVÁ, Barbora - ČUNDERLÍKOVÁ, Beata**. Characterization of collagen type I matrices for pathophysiologically relevant spatial cancer cell cultures. In Biophysical Chemistry, 2023, vol. 293, art.no. 106944-1-106944-12. (2022: 3.8 - IF, Q2 - JCR, 0.672 - SJR, Q2 - SJR). ISSN 0301-4622. Dostupné na: https://doi.org/10.1016/j.bpc.2022.106944 Typ: ADCA

BYSTRICKÝ, Roman** - ŠKRÁTEK, Martin - RUSNÁK, Jaroslav - PRECNER, Marián - ŤAPAJNA, Milan - ŠAJGALÍK, Pavol. Electrical and magnetic properties of silicon carbide composites with titanium and niobium carbide as sintering aids. In Ceramics International, 2023, vol. 49, p. 5319-5326. (2022: 5.2 - IF, Q1 - JCR, 0.918 - SJR, Q1 - SJR). ISSN 0272-8842. Dostupné na: https://doi.org/10.1016/j.ceramint.2022.10.055 Typ: ADCA

**5.) Štruktúra a vlastnosti bio aktívnych skiel dopovaných iónmi s potenciálne terapeutickými a antibakteriálnymi účinkami** *(Structure and properties of bioactive glasses doped with ions with potential therapeutic and antibacterial effects)*

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| **Zodpovedný riešiteľ:** | Mária Chromčíková |
| **Trvanie projektu:** | 1.1.2020 / 31.12.2023 |
| **Evidenčné číslo projektu:** | 2/0091/20 |
| **Organizácia je koordinátorom projektu:** | áno |
| **Koordinátor:** | Ústav anorganickej chémie SAV, v. v. i. |
| **Počet spoluriešiteľských inštitúcií:** | 1 - Slovensko: 1 |
| **Čerpané financie:** | SAV: 557 € |

<u>*Dosiahnuté výsledky:*</u>
Ťažiskom riešeného projektu v roku 2023 bolo komplexné skúmanie vzťahov medzi zložením, štruktúrou a fyzikálnymi vlastnosťami bio skiel obsahujúcich okrem SiO2 aj sieťotvorný oxid P2O5. Termodynamický model Shakhmatkina a Vedishcheva 45S5 Bioglass® dopovaný rôznymi koncentráciami Li2O sa stanovilo pri T = 800 K. Bolo identifikovaných 55 zložiek z ktorých na základe štatistických výpočtov sa získalo 10 významných zložiek s nezanedbateľným rovnovážnym množstvom. Pre každé študované sklo bola stanovená: teplota skleného prechodu, koeficient tepelná rozťažnosť skla a metastabilnej taveniny pomocou termodilatometrie. Nízkoteplotná viskozita bola merané termomechanickou analýzou. Aktivačná energia viskózneho toku bola vyhodnotená z teplotnej závislosti viskozity. Kompozičná závislosť nameraných vlastností bola analyzovaná pomocou korelačnej analýzy s Q-distribúciou silikátových a fosfátových jednotiek. Následne sa skúmala aktivačná energia viskózneho toku a teplota sklený prechod u ktorých bola pozorovaná silná negatívna korelácia medzi SiQ0, SiQ1, SiQ2, a PQ0. Zároveň bola identifikovaná silná pozitívna korelácia pre SiQ3, SiQ4, PQ1, a PQ2. Potvrdilo to aj zníženie miery zosvietenia, ktoré znižuje hodnoty E?* a Tg. Výsledky boli úspešne prezentované na konferencii (3rd Journal of Thermal Analysis and Calorimetry Conference and 9th V4 Thermoanalytical Conference) a následne opublikované v Journal of Thermal Analysis and Calorimetry (https://doi.org/10.1007/s10973-023-12668-2).

**6.) Pórovité keramické anódy pre sodíkové batérie novej generácie** *(Porous ceramic anodes for novel sodium-ion batteries)*

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| **Zodpovedný riešiteľ:** | Zoltán Lenčéš |
| **Trvanie projektu:** | 1.12.2022 / 31.12.2024 |
| **Evidenčné číslo projektu:** | 2/0167/22 |
| **Organizácia je koordinátorom projektu:** | áno |
| **Koordinátor:** | Ústav anorganickej chémie SAV, v. v. i. |
| **Počet spoluriešiteľských inštitúcií:** | 0 |

**Čerpané financie:** SAV: 7146 €

Dosiahnuté výsledky:
Pórovité amorfné keramické anódy na báze Si-O-C pre sodíkové batérie boli pripravené zosieťovaním a následnou dvojstupňovou pyrolýzou (900°C/3 h, 1200°C/1 h) polymérneho prekurzoru. Vzorky boli pyrolyzované v atmosfére dusíka namiesto argónu s cieľom zvýšiť elektrickú a tepelnú vodivosť SiOC anódy. Syntetizované SiOC prášky boli mleté vo wolfrám karbidovom planetovom mlyne za podmienok nízkoenergického (LEM) a vysokoenergického mletia (HEM) s cieľom zistiť vplyv morfológie práškov (tvar a veľkosť častíc) na elektrochemické vlastnosti SiOC anód. Povrchové analýzy (XPS a EDX) práškov ukázali, že chemické zloženie povrchu práškov mletých za LEM a HEM podmienok je porovnateľné. SiOC anódy pripravené z vysokoenergicky mletých práškov vykazovali lepšie elektrochemické vlastnosti (nižšiu rezistivitu prenosu náboja a rýchlejšiu difúziu Na+ iónov). Tým sa podarilo dosiahnuť vyššiu celkovú špecifickú kapacitu pre HEM SiOC anódy. Dosiahnuté výsledky ukázali, že nižšia veľkosť častíc a vyšší merný povrch SiOC práškov má kladný vplyv na špecifickú kapacitu anódy. Z toho dôvodu boli pripravené aj SiOC aerogély z roztoku polymérneho prekurzoru a DVB spojiva v n-hexáne. Reakcie prebiehali v tlakovej nádobe pri 180°C po dobu 24 hodín. Z aerogélov budú pripravené SiOC anódy a následne testované.
Časť výskumu bola zameraná aj na prípravu keramických anód na báze Zr-O-C-(N) zo zmesi práškov ZrO2 a uhlíkových sadzí žíhaním v atmosfére argónu a dusíka.

Publikačné výstupy:
KUCHERYAVAYA, Anastasia - LENČÉŠ, Zoltán - ŠAJGALÍK, Pavol - HARMUTH, Harald. Zirconium oxycarbides and oxycarbonitrides: A review. In International Journal of Applied Ceramic Technology, 2023, vol. 20, no. 2 p. 541-562. (2022: 2.1 - IF, Q2 - JCR, 0.419 - SJR, Q2 - SJR). ISSN 1546-542X. Dostupné na: https://doi.org/10.1111/ijac.14188

GÜNEREN, Alper - NADA, Ahmed A. - LENČÉŠ, Zoltán. Improved decay performance of Si/Gr anodes using water-soluble functionalized alginate binders. In Engineering ceramics 2023: Advanced research workshop. Book of abstracts. Smolenice, 7.-11.5.2023. Bratislava: SAV, 2023, p. 19. ISBN 978-80-973578-5-6.

GÜNEREN, Alper - LENČÉŠ, Zoltán. Silicon oxycarbide anodes for Na-ion batteries. Book of abstracts, XVIII Conference & Exhibition of the European Ceramic Society, July 2-6, 2023, Lyon, France.

**7.) Pokrok vo výpočte a interpretácii spektroskopických parametrov zlúčenín ťažkých prvkov**
*(Advancing in calculation and interpretation of spectroscopic parameters of heavy element compounds)*

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| **Zodpovedný riešiteľ:** | Oľga Malkin |
| **Trvanie projektu:** | 1.1.2021 / 31.12.2024 |
| **Evidenčné číslo projektu:** | 2/0135/21 |
| **Organizácia je koordinátorom projektu:** | áno |
| **Koordinátor:** | Ústav anorganickej chémie SAV, v. v. i. |
| **Počet spoluriešiteľských inštitúcií:** | 0 |
| **Čerpané financie:** | SAV: 12350 € |

Dosiahnuté výsledky:
ZHANG, Lutao - CHRISTIE, Francesca A. - TARCZA, Anna E. - LANCASTER, Helena G. - TAYLOR, Laurence J. - BU?HL, Michael - MALKINA, Oľga - DEREK WOOLLINS, J. - CARPENTER-WARREN, Cameron L. - CORDES, David B. - SLAWIN, Alexandra M. Z. - CHALMERS, Brian A.** - KILIAN, Petr**. Phosphine and Selenoether peri-Substituted Acenaphthenes and Their Transition-Metal Complexes: Structural and NMR Investigations. In Inorganic Chemistry, 2023, vol. 62, iss. 39, pp. 16084-16100. (2022: 4.6 - IF, Q1 - JCR, 0.997 - SJR, Q1 - SJR). ISSN 0020-1669. Dostupné na: https://doi.org/10.1021/acs.inorgchem.3c02255
Type: ADCA

**8.) Vývoj a charakterizácia sférických mikročastíc vhodných na prípravu 3D sklených a**

**sklo-keramických štruktúr** *(Development and characterisation of spherical microparticles for preparation of advanced 3D glass and glass-ceramic structures)*

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| **Zodpovedný riešiteľ:** | Monika Michálková |
| **Trvanie projektu:** | 1.1.2020 / 31.12.2023 |
| **Evidenčné číslo projektu:** | 1/0456/20 |
| **Organizácia je koordinátorom projektu:** | nie |
| **Koordinátor:** | Ústav anorganickej chémie SAV, v. v. i. |
| **Počet spoluriešiteľských inštitúcií:** | 0 |
| **Čerpané financie:** | MŠ: 2401 € |

Dosiahnuté výsledky:

V projekte boli pripravené a podrobne charakterizované rôzne typy sklenených mikrosfér – plné, pórovité. Akermanitové sklá boli pripravené tavením zatiaľ čo sklá na báze hlinito-yttritého granátu sa pripravili sól-gélovým procesom. Jedným z najdôležitejších výsledkov je, že sa z alkalicky aktivovaného farmaceutického skleneného odpadu podarilo pripraviť 3D tlačou filter bez potreby zhutnenia spekaním.

- Po alkalickej aktivácii poskytuje farmacuetické sklo stabilné gély, ktoré vytvárajú silné väzby medzi susednými časticami. Rovnomernosť a silná adhézia medzi jednotlivými komponentmi umožnili dosiahnuť vysoký pomer pevnosti k hustote (pevnosť v tlaku 1,5 MPa, pričom pórovitosť presahuje 70 %);
- Reakčná rýchlosť DIW spracovaných skeletov na dosiahnutie 100 % degradácie metylénovej modrej je 75 min, čo je priaznivé v porovnaní s inými uvádzanými kompozitmi na báze TiO2, ktoré sa pohybujú od 90 do 240 min. Okrem toho sa vzorky môžu opakovane použiť počas piatich cyklov bez toho, aby došlo k výraznej strate účinnosti.

Zoznam publikovaných prác

1. J. Kraxner et al., “Additive manufacturing of Ca-Mg silicate scaffolds supported by flame-synthesized glass microspheres,” Ceram. Int., vol. 48, no. 7, pp. 9107–9113, 2022, doi: 10.1016/j.ceramint.2021.12.095. (2021: 5.532 - IF, Q1 - JCR, 0.887 - SJR, Q1 - SJR, karentované - CCC). Typ: ADCA, 4 cit (podiel 1)
2. P. Larionau et al., “Low-alkali borosilicate glass microspheres from waste cullet prepared by flame synthesis,” Int. J. Appl. Glas. Sci., vol. 12, no. 4, pp. 562–569, Oct. 2021, doi: 10.1111/ijag.16144. (2020: 2.029 - IF, Q2 - JCR, 0.383 - SJR, Q3 - SJR, karentované - CCC) Typ: ADCA, 2 cit (podiel 0,5)
3. M. Mahmoud, J. Kraxner, H. Elsayed, and E. Bernardo, “Fabrication and environmental applications of glass microspheres: A review,” Ceram. Int., vol. 49, no. April, pp. 39745–39759, 2023, doi: 10.1016/j.ceramint.2023.10.040. (2022: 5.2 - IF, Q1 - JCR, 0.918 - SJR, Q1 - SJR). Typ: ADCA, 0 cit (podiel 0.8)
4. A. Dasan et al., “Akermanite glass microspheres: Preparation and perspectives of sinter- crystallization,” Int. J. Appl. G, no. April, pp. 551–561, 2021, doi: 10.1111/ijag.16115. (2020: 2.029 - IF, Q2 - JCR, 0.383 - SJR, Q3 - SJR, karentované - CCC) Typ: ADCA, 1 cit (podiel 0.6)
5. D. Lago, J. Kraxner, and E. Bernardo, “Novel glass-based membranes for Cu adsorption: From alkali activation to sintering,” Heliyon, vol. 9, no. April, 2023, doi: 10.1016/j.heliyon.2023.e18221. (2022: 4 - IF, Q2 - JCR, 0.609 - SJR, Q1 - SJR) Typ: ADCA (podiel 0.6)
6. M. Michálková et al., “Viscous flow spark plasma sintering of glass microspheres with YAG composition and high tendency to crystallization,” J. Eur. Ceram. Soc., vol. 41, no. 2, pp. 1537–1542, 2021, doi: 10.1016/j.jeurceramsoc.2020.10.015. (2020: 5.302 - IF, Q1 - JCR, 1.204 - SJR, Q1 - SJR, karentované - CCC). Typ: ADCA, 5 cit (podiel 0,5)
7. M. Mahmoud, J. Kraxner, H. Elsayed, D. Galusek, and E. Bernardo, “Advanced Dye Sorbents from Combined Stereolithography 3D Printing and Alkali Activation of Pharmaceutical Glass Waste,” Materials (Basel)., vol. 15, no. 19, p. 6823, Oct. 2022, doi: 10.3390/ma15196823. (2021: 3.748 - IF, Q1 - JCR, 0.604 - SJR, Q2 - SJR, karentované - CCC). Typ: ADCA, 5 cit (podiel 1)
8. A. Dasan et al., “3D Printing of Hierarchically Porous Lattice Structures Based on Akermanite Glass Microspheres and Reactive Silicone Binder,” J. Funct. Biomater., vol. 13, no. 1, p. 8, Jan. 2022, doi: 10.3390/jfb13010008. (2021: 4.901 - IF, Q2 - JCR, 0.875 - SJR, Q2 - SJR, karentované - CCC) Typ: ADCA, 7 cit (podiel 1)
9.M. Mahmoud et al., “Porous Glass Microspheres from Alkali-Activated Fiber Glass Waste,” Materials (Basel)., vol. 15, no. 3, p. 1043, Jan. 2022, doi: 10.3390/ma15031043. 2021: 3.748 - IF, Q1 - JCR, 0.604 - SJR,

Q2 - SJR, karentované - CCC) Typ: ADCA, 7 cit (podiel 1)
10.M. Mahmoud et al., “Chemical routes to materials Enhanced methylene blue adsorption by double alkali activation of highly porous glass microspheres prepared from waste glass,” J. Mater. Sci., vol. 59, no. 1, pp. 73–85, 2024, doi: 10.1007/s10853-023-09207-7. 2022: 4.58 - IF, Q1 - JCR, 0.81 – SJR, Typ: ADCA, 0 cit (podiel 0.8)
11. M. Mahmoud, J. Kraxner, A. Mehta, H. Elsayed, and E. Bernardo, “ Alkali activation-induced cold consolidation of waste glass?: Application in organic-free direct ink writing of photocatalytic dye destructors,” J. Eur. Ceram. Soc. November 2023, doi: 10.1016/j.jeurceramsoc.2023.12.023. 0 citation (2022: 5.7 - IF, Q1 - JCR, 1.257 - SJR, Q1 - SJR) Typ: ADCA, 0 cit (podiel 0.8)

**9.) Potenciál vrstevnatých aluminosilikátov ako excelentných nosičov polykatiónov: dizajnovanie nových kompozitných nanomateriálov** *(Potential of layered aluminosilicates as excellent guests to accommodate polymeric cations: design of new composite materials)*

| | |
|---|---|
| **Zodpovedný riešiteľ:** | Helena Pálková |
| **Trvanie projektu:** | 1.1.2021 / 31.12.2024 |
| **Evidenčné číslo projektu:** | 2/0166/21 |
| **Organizácia je koordinátorom projektu:** | áno |
| **Koordinátor:** | Ústav anorganickej chémie SAV, v. v. i. |
| **Počet spoluriešiteľských inštitúcií:** | 0 |
| **Čerpané financie:** | SAV: 21201 € |

*Dosiahnuté výsledky:*
V predposlednom roku riešenia projektu sa pokračovalo v príprave modifikovaných vrstevnatých silikátov použitím rôznych katiónových polymérov ako je N,N,N-trimetylchitosan, polydiallyldimetylamónium (PDDA) a polyoxazolínmi a polyethylénimínmi. Uskutočnila sa detailná charakterizácia pomocou spektroskopických metód. Sledovala sa schopnosť polykatiónom modifikovaných vzoriek adsorbovať vodu pri rôznych relatívnych vlhkostiach. Rozpracovala sa metodiky prípravy polykatiónu z biopolyméru chitosan N,N,N-trimetylchitosan ako aj metodika prípravy tenkých filmov vo viaczložkovom systéme polykatión-vrstevnatý silikát-plastifikátor. Na pripravených vzorkách sa plánuje sledovanie ich antibakteriálnych vlastností.

Publikácie:
MADEJOVÁ, Jana** - BARLOG, Martin - SLANÝ, Michal - BASHIR, Sanam - SCHOLTZOVÁ, Eva - TUNEGA, Daniel - JANKOVIČ, Ľuboš. Advanced materials based on montmorillonite modified with poly(ethylenimine) and poly(2-methyl-2-oxazoline): Experimental and DFT study. In Colloids and Surfaces A: Physicochemical and Engineering Aspects, 2023, vol. 659, art. no. 130784. (2022: 5.2 - IF, Q2 - JCR, 0.792 - SJR, Q1 - SJR). ISSN 0927-7757. Dostupné na: https://doi.org/10.1016/j.colsurfa.2022.130784 Typ: ADCA

SKOURA, Eva - BOHÁČ, Peter - BARLOG, Martin - PÁLKOVÁ, Helena - MAUTNER, Andreas - BUGYNA, Larysa - BUJDÁKOVÁ, Helena - BUJDÁK, Juraj**. Structure, photoactivity, and antimicrobial properties of phloxine B / poly(caprolactone) nanocomposite thin films. In Applied Clay Science, 2023, vol. 242, art no. 107037. (2022: 5.6 - IF, Q1 - JCR, 0.985 - SJR, Q1 - SJR). ISSN 0169-1317. Dostupné na: https://doi.org/10.1016/j.clay.2023.107037 Typ: ADCA

Príspevky na konferenciách a seminároch
BARLOG, M. Study of enhanced fluorescence of cationic dye crysral violet after interaction with either pristine or by ethyleneamines modified matrix of synthetic hectorite. EUROCLAY 2023. International Conference of European Clay Groups Association, Villa Romanazzi Carducci Conference Centre, Book of Abstracts, p. 18, JULY 24-27, 2023, BARI, Italy. ISBN: 978-88-7522-052-5

KUREKOVÁ, Valéria** - BOHÁČ, Peter - BELUŠÁKOVÁ, Silvia - BUJDÁK, Juraj. Saponite modified with a fluorescent polymer and photosensitizer – resonance energy transfer. In Design of Advanced Inorganic Materials - Workshop on the occasion of 70th anniversary of the institute of inorganic Chemistry SAS : Book

of abstracts. Bratislava, Slovakia: Institute of inorganic Chemistry Slovak academy of sciences, 2023, p. 17. ISBN 978-80-973578-7-0.
PÁLKOVÁ, Helena** - ZIMOWSKA, M. - JANKOVIČ, Ľuboš - BUJDÁKOVÁ, H. Immobilization of metal nanoparticles on organo-modified layered silicates. In Design of Advanced Inorganic Materials - Workshop on the occasion of 70th anniversary of the institute of inorganic Chemistry SAS: Book of abstracts. Bratislava, Slovakia: Institute of inorganic Chemistry Slovak academy of sciences, 2023, p. 29. ISBN 978-80-973578-7-0
PRIBUS, Marek** - BOHÁČ, Peter - BUJDÁK, Juraj. Hydrolysis of a cyanine dye in water-ethanol mixtures. In Design of Advanced Inorganic Materials - Workshop on the occasion of 70th anniversary of the institute of inorganic Chemistry SAS: Book of abstracts. Bratislava, Slovakia: Institute of inorganic Chemistry Slovak academy of sciences, 2023, p. 32. ISBN 978-80-973578-7-0.
https://uach.sav.sk/sk/wp-content/uploads/sites/2/Book-of-abstracts-web-1.pdf

**10.) Pokročilé materiály na báze anorganických vrstevnatých štruktúr študované modelovým a experimentálnym prístupom** *(Advanced materials based on the inorganic layered structures studied by model and experimental approaches)*

| | |
|---|---|
| **Zodpovedný riešiteľ:** | Eva Scholtzová |
| **Trvanie projektu:** | 1.1.2023 / 31.12.2026 |
| **Evidenčné číslo projektu:** | 2/0026/23 |
| **Organizácia je koordinátorom projektu:** | áno |
| **Koordinátor:** | Ústav anorganickej chémie SAV, v. v. i. |
| **Počet spoluriešiteľských inštitúcií:** | 0 |
| **Čerpané financie:** | SAV: 10978 € |

<u>*Dosiahnuté výsledky:*</u>
Riešenie jednotlivých úloh v prvom roku riešenia prinieslo 3 publikácie v karentovaných časopisoch venované štúdiu interakcií polutantov (diurón a atrazín) s povrchom imogolitu a liečiva rifampicínu s montmorillonitom, ktorý sa ukázal byť vhodným potenciálnym nosičom tohto liečiva:
1. GIANNI, Eleni - PŠENIČKA, Milan - MACKOVÁ, Kateřina - SCHOLTZOVÁ, Eva - JANKOVIČ, Ľuboš - MAREŠ, Martin - PAPOULIS, Dimitrios - POSPÍŠIL, Miroslav**. New detail insight into Halloysite structure: Mechanism behind nanotubular morphology described by density functional theory and molecular dynamics supported by experiments. In Journal of Molecular Structure, 2023, vol. 1287, art. no. 135639-1-135639-15. (2022: 3.8 - IF, Q2 - JCR, 0.482 - SJR, Q2 - SJR). ISSN 0022-2860. Dostupné na: https://doi.org/10.1016/j.molstruc.2023.135639 Typ: ADCA

2. MORENO RODRÍGUEZ, Daniel - GIANNI, Eleni - POSPÍŠIL, Miroslav - SCHOLTZOVÁ, Eva. Is Imogolite a suitable adsorbent agent for the herbicides like diuron and atrazine? In Journal of Molecular Liquids, 2023, vol. 38, art. no. 121732-1-121732-12. (2022: 6 - IF, Q1 - JCR, 0.914 - SJR, Q1 - SJR, karentované - CCC). (2023 - Current Contents, WOS, SCOPUS). ISSN 0167-7322. Dostupné na: https://doi.org/10.1016/j.molliq.2023.121732 Typ: ADCA

3. SCHOLTZOVÁ, Eva - JANKOVIČ, Ľuboš - TUNEGA, Daniel. Montmorillonite as an Anti-Tuberculosis rifampicin drug carrier: DFT and Experimental study. In Clays and Clay Minerals, 2023, vol. 71, no. 2, p. 229-241. (2022: 2.2 - IF, Q2 - JCR, 0.37 - SJR, Q2 - SJR). ISSN 0009-8604. Typ: ADCA

Na zahranicných a domácich konferenciách boli prezentované ďalšie výsledky venované tematike projektu:
1. GIANNI, Eleni - MORENO RODRÍGUEZ, Daniel - TYROLOGOU, Pavlos - COUTO, Nazaré - SCHOLTZOVÁ, Eva - POSPÍŠIL, Miroslav - PAPOULIS, Dimitrios - KOUKOUZAS, Nikolaos. Clay minerals as simultaneous sorbents of PFAS and pesticides. In L'innovazione per la sostenibilit? ambientale nell'epoca della multitransizione, RemTech Expo 2023: Book of abstracts. - Roma, Italy: Consiglio Nazionale delle Ricerche, 2023, pp. 259-262. ISBN 9788880805755. (RemTech Expo 2023 : medzinárodná konferencia. RemTech Expo 2023 : medzinárodná konferencia) Typ: AFC

2. SCHOLTZOVÁ, Eva** - SZABÓ, Tamas. Adsorption of benzethonium chloride by graphene oxide surface

– a combined theoretical and experimental study. In 9th International Conference on Carbon for Energy Storage and Environmental Protection: Book of abstracts. 1. vyd. - Budapest: Faculty of Chemical Technology and Biotechnology, Budapest University of Technology and Economics, 2023, p. 83, O-27. Typ: GII

3. SCHOLTZOVÁ, Eva - JANKOVIČ, Ľuboš - TUNEGA, D. Adsorbtion of rifampicine drug on montmorillonite. In 9th Workshop of Slovak clay group. Clay minerals and selected industrial minerals in material science, applications, and environmental technology: Book of abstracts. - Slovakia: Slovak clay group, 2023, p. 26. ISBN 978-80-972367-6-2. Typ: AFK

4. BASHIR, Sanam - MORENO-RODRÍGUEZ, Daniel - SCHOLTZOVÁ, Eva. Theoretical study of the stability of poly(2- methyl-2-oxazoline) - saponite hybrid structure. In 9th Workshop of Slovak clay group. Clay minerals and selected industrial minerals in material science, applications, and environmental technology: Book of abstracts. Slovakia: Slovak clay group, 2023, p. 8. ISBN 978-80-972367-6-2. http://www.slovakclaygroup.sk/images/Book_of_abstracts_1.pdf Typ: AFH

5. ŠKORŇA, Peter** - BASHIR, Sanam - SCHOLTZOVÁ, Eva. Structural characterisation of poly(2-methyl-2-oxazoline)- and tetrabuthylphosphonium-modified montmorillonite after adsorption of toxic hexavalent selenium oxyanions. In 9th Workshop of Slovak clay group. Clay minerals and selected industrial minerals in material science, applications, and environmental technology: Book of abstracts. Slovakia: Slovak clay group, 2023, p. 17. ISBN 978-80-972367-6-2. Typ: AFH

6. BASHIR, Sanam** - MORENO-RODRIGUEZ, Daniel - SCHOLTZOVÁ, Eva. A DFT-D3 study of interactions of saponite and hectorite clay minerals with poly(2-methyl-2- oxazoline) (PMeOX) polymer. In 17th International Congress of Quantum Chemistry. - Bratislava: International Academy of Quantum Molecular Science, p. 393. ISBN 978-80-973578-8-7. Typ: AFL

7. MORENO-RODRÍGUEZ, Daniel - GIANNI, E. - POSPÍŠIL, M. - SCHOLTZOVÁ, Eva. Herbicides adsorbed on the imogolite nanotube. In 9th Workshop of Slovak clay group. Clay minerals and selected industrial minerals in material science, applications, and environmental technology: Book of abstracts. Slovakia: Slovak clay group, 2023, p. 13. ISBN 978-80-972367-6-2. Typ: AFH

8. ŠKORŇA, Peter** - JANKOVIČ, Ľuboš - SCHOLTZOVÁ, Eva - TUNEGA, Daniel. Theoretical and experimental study of the adsorption of toxic perchlorate and periodate compounds with tetrahexylphosphonium-modified beidellite. In International Conference of European Clay Groups Association - EUROCLAY 2023: Scientific Research Abstracts - Volume 14. 14. - Bari, Italy: Digilabs, 2023, p. 276. ISBN 978-88-7522-052-5. ISSN 2464-9147. Typ: AFK

9. SCHOLTZOVÁ, Eva** - GIANNI, Eleni - POSPÍŠIL, Miroslav. Adsorption of diclofenac on halloysite spiral - a computational study. In International Conference of European Clay Groups Association - EUROCLAY 2023: Scientific Research Abstracts - Volume 14. 14. - Bari, Italy: Digilabs, 2023, p. 260. ISBN 978-88-7522-052-5. ISSN 2464-9147. (EUROCLAY 2023 - International Conference of European Clay Groups Association : medzinárodná konferencia) Typ: AFK

10. MORENO-RODRÍGUEZ, Daniel - SCHOLTZOVÁ, Eva. Grafting dopamine on kaolinite: a theoretical approach. In International Conference of European Clay Groups Association - EUROCLAY 2023: Scientific Research Abstracts - Volume 14. 14. - Bari, Italy: Digilabs, 2023, p. 191. ISBN 978-88-7522-052-5. ISSN 2464-9147. (EUROCLAY 2023 - International Conference of European Clay Groups Association : medzinárodná konferencia) Typ: AFG

11. BASHIR, Sanam** - ŠKORŇA, Peter - SCHOLTZOVÁ, Eva. Interaction of beidellite and saponite clay minerals with poly(2-methyl-2-oxazoline): a density functional theory study. In International Conference of European Clay Groups Association - EUROCLAY 2023: Scientific Research Abstracts - Volume 14. 14. - Bari, Italy: Digilabs, 2023, p. 19. ISBN 978-88-7522-052-5. ISSN 2464-9147. Typ: AFK

12.BASHIR, Sanam** - ŠKORŇA, Peter - SCHOLTZOVÁ, Eva. Theoretical study of the structural stability of different clay-polymer hybrids by the DFT-D3 method. In CMSS23: 4rd International Congress on Materials & Structural Stability: Abstract Proceedings. 4. - Rabat, Morocco: Mohammed V University in

Rabat Morocco, 2023, p. P1-471. Typ: GII

13.MORENO-RODRÍGUEZ, Daniel** - SCHOLTZOVÁ, Eva. Dopamine grafted on kaolinite. In Design of Advanced Inorganic Materials - Workshop on the occasion of 70th anniversary of the institute of inorganic Chemistry SAS: Book of abstracts. - Bratislava, Slovakia : Institute of inorganic Chemistry Slovak academy of sciences, 2023, p. 27. ISBN 978-80-973578-7-0. Typ: AFL

14.SCHOLTZOVÁ, Eva** - SZABÓ, T. Graphene oxide as an effective sorbent material of benzethonium cation. In Design of Advanced Inorganic Materials - Workshop on the occasion of 70th anniversary of the institute of inorganic Chemistry SAS: Book of abstracts. Bratislava, Slovakia: Institute of inorganic Chemistry Slovak academy of sciences, 2023, p. 34. ISBN 978-80-973578-7-0. Typ: AFL

15.ŠKORŇA, Peter** - SCHOLTZOVÁ, Eva - JANKOVIČ, Ľuboš. Adsorption of nitrate and nitrite pollutants from water sources and soils by organically-modified smectites. In Design of Advanced Inorganic Materials - Workshop on the occasion of 70th anniversary of the institute of inorganic Chemistry SAS: Book of abstracts. Bratislava, Slovakia: Institute of inorganic Chemistry Slovak academy of sciences, 2023, p. 35. ISBN 978-80-973578-7-0. Typ: AFL

**11.) Fluoridové taveninové systémy pre zelenú výrobu hliníka bez produkcie CO2** *(Molten fluoride systems for green production of aluminium without CO2 emissions)*

| | |
|---|---|
| **Zodpovedný riešiteľ:** | František Šimko |
| **Trvanie projektu:** | 1.1.2022 / 31.12.2025 |
| **Evidenčné číslo projektu:** | 2/0046/22 |
| **Organizácia je koordinátorom projektu:** | áno |
| **Koordinátor:** | Ústav anorganickej chémie SAV, v. v. i. |
| **Počet spoluriešiteľských inštitúcií:** | 0 |
| **Čerpané financie:** | SAV: 14400 € |

*Dosiahnuté výsledky:*
Uskutočnila sa komplexná štruktúrna a fázová analýza systému CsF?Al2O3. Metódou termickej analýzy sa zadefinovali fázové polia vo fázovom diagrame a identifikovali sa tuhé fázy, existujúce v skúmanom systéme. Systém reprezentuje stabilnú diagonálu kvartérneho systému CsF–Al2O3–AlF3–Cs2O. Bola identifikovaná nová fáza, a to oxofluórohlinitan cézny, Cs2Al2O3F2, pričom sa stanovila aj jej štruktúra. Charakteristikou tejto kryštálovej štruktúry je prítomnosť vrstiev, zložených z jednotlivých (AlO3F) tetrédrov, zdieľajúcich navzájom spoločné rohy, v ktorých sú umiestnené atómy kyslíka, zatiaľ čo atómy fluóru oddeľujú jednotlivé vrstvy. Počet a množstvo neekvivaletných kryštalografických polôh jednotlivých atómov, prítomných v uvedenej štruktúre sa určil pomocou 19F, 27Al a 133Cs MAS NMR spektier v tuhom stave. Taktiež sa pomocou termickej analýzy sa stanovili fázové diagramy systémov Na3AlF6–NdF3 a (Na3AlF6–NdF3)eut–Nd2O3. Po termickej analýze bola vykonaná röntgenová difrakcia stuhnutých vzoriek oboch systémov. XRD analýza systému Na3AlF6–NdF3 ukázala tvorbu dvoch nových zlúčenín; NaNdF4 a NdOF. Tvorba NdOF je pravdepodobne produktom vysokoteplotnej hydrolýzy medzi vlhkosťou v atmosfére a NdF3. XRD analýza stuhnutých vzoriek systému (Na3AlF6–NdF3)eut–Nd2O3 ukázala tvorbu nasledujúcich nových zlúčenín; NaNdF4, NdOF, NdAlO3 a NaF.

ŠIMKO, František** - RAKHMATULLIN, Aydar - KING, Graham - ALLIX, Mathieu - BESSADA, Catherine - NETRIOVÁ, Zuzana - KRISHNAN, Dhiya - KORENKO, Michal**. Cesium Oxo-fluoro-aluminates in the CsF-Al2O3 System: Synthesis and Structural Characterization. In Inorganic Chemistry, 2023, vol. 62, iss. 38, pp. 15651?15663. (2022: 4.6 - IF, Q1 - JCR, 0.997 - SJR, Q1 - SJR). ISSN 0020-1669. Dostupné na: https://doi.org/10.1021/acs.inorgchem.3c02386

KRISHNAN, Dhiya - KORENKO, Michal** - ŠIMKO, František** - AMBROVÁ, Marta - SZATMÁRY, Lórant - RAKHMATULLIN, Aydar. Ionic Conductivity of the Molten Systems (LiF–CaF2)eut–NdF3, (LiF–NaF)eut–NdF3, (NaF–CaF2)eut–NdF3, and (LiF–MgF2)eut–NdF3. In Ionics, 2023, vol. 29, iss. 12, pp.

5139-5146. (2022: 2.8 - IF, Q2 - JCR, 0.507 - SJR, Q2 - SJR). ISSN 0947-7047. Dostupné na: https://doi.org/10.1007/s11581-023-05232-3

**12.) In-situ tvorba bioaktívneho funkčne gradientného nitridu kremičitého počas spekania v elektrickom poli** *(The in-situ formation of bioactive functionally graded silicon nitride by field assisted sintering)*

| | |
|---|---|
| **Zodpovedný riešiteľ:** | Monika Tatarková |
| **Trvanie projektu:** | 1.1.2022 / 31.12.2025 |
| **Evidenčné číslo projektu:** | 2/0161/22 |
| **Organizácia je koordinátorom projektu:** | áno |
| **Koordinátor:** | Ústav anorganickej chémie SAV, v. v. i. |
| **Počet spoluriešiteľských inštitúcií:** | 0 |
| **Čerpané financie:** | SAV: 12944 € |

<u>*Dosiahnuté výsledky:*</u>
Hlavnou úlohou bolo pripraviť funkčne gradientný (FG) biokeramický materiál na báze Si3N4, ktorý pozostáva z minimálne 3 vrstiev s rôznym chemickým zložením: Si3N4+CaSiO3, Si3N4+CaSiO3 a Si3N4+CaSiO3+Y2O3. Tieto vrstevnaté materiály boli pripravené homogenizáciou jednotlivých práškových zmesí, postupnou konsolidáciou jednotlivých vrstiev pomocou jednoosového lisovania za studena, a následným spekaním celej sústavy za asistencie elektrického prúdu. Za najdôležitejší výsledok možno považovať stanovenie optimálnych podmienok prípravy, ktoré vedú k tvorbe vysokohutného materiálu s výbornou priľnavosťou jednotlivých vrstiev. Následná etapa projektu sa zameria na štúdium mechanických vlastnosti týchto materiálov a ich porovnanie s vlastnosťami FG materiálu vytvoreného in-situ z homogénnej práškovej zmesi priamym vplyvom elektrického prúdu.

Publikácie:
ÜNSAL, Hakan - FÜRDŐSOVÁ, Zuzana - CHLUP, Zdeněk - TATARKOVÁ, Monika - KOVALČÍKOVÁ, Alexandra - HIČÁK, Michal - HOSSEINI, Naser - ZHUKOVA, Inga - DLOUHÝ, Ivo - ŠAJGALÍK, Pavol - TATARKO, Peter**. ZrB2-SiC composites with rare-earth oxide additives. In Journal of Innovative Materials in Extreme Conditions, 2023, vol. 4, iss. 1, pp. 22-29. ISSN 2738-0882. Dostupné na internete: http://jimec.edu.rs/volume-4-issue-1-year-2023/. Typ: ADEB.

DE LA TORRE OLVERA, Guido** - TATARKOVÁ, Monika. Sintering behavior and phase transformation of silicon nitride with bioactive glass additive. In Workshop - Processing and properties of advanced ceramics and glasses: Proceedings. Košice, Slovakia: Institute of Materials Research, SAS, 2023, p. 108-113. ISBN 978-80-89782-16-1. Typ: AFD

HOSSEINI, Naser** - VALENZA, Fabrizio - GAMBARO, S. - CHLUP, Zdeněk - KOVALČÍKOVÁ, Alexandra - DLOUHÝ, Ivo - TATARKO, Peter. Wettability and joining of (Mo-Nb-Ta-V-W)C high entropy carbide by NiTa eutectic alloys. In Processing and properties of advanced ceramics and glasses: Proceedings. Stará Lesná, 25.-27.10.2023. Košice, Slovakia: Institute of Materials Research, SAS, 2023, p. 40-46. ISBN 978-80-89782-16-1. Typ: AFD

ZHUKOVA, Inga** - TATARKOVÁ, Monika - KOMBAMUTHU, Vasanthakumar - KOVALČÍKOVÁ, Alexandra - CSANÁDI, Tamás - DUSZA, Ján - DLOUHÝ, Ivo - MATOVIČ, Branko - ZAGORAC, Dejan - TATARKO, Peter. Theoretical predictions and synthesis of (Ti-Zr-Hf-Nb-Ta)B2 structures with non-equimolar compositions. In Processing and properties of advanced ceramics and glasses: Proceedings. Stará Lesná, 25.-27.10.2023. Košice, Slovakia: Institute of Materials Research, SAS, 2023, p. 114-119. ISBN 978-80-89782-16-1. Typ: AFD

**Programy: APVV**

**13.) Interakcia fluoridových taveninových systémov prvkov vzácnych zemín s oxidmi kritických prvkov v kontexte špeciálnych aplikácií** *(Interaction of fluoride melts of rare earth elements with oxides of critical elements in the context of special applications)*

| | |
|---|---|
| **Zodpovedný riešiteľ:** | Miroslav Boča |
| **Trvanie projektu:** | 1.7.2020 / 30.6.2024 |
| **Evidenčné číslo projektu:** | APVV-19-0270 |
| **Organizácia je koordinátorom projektu:** | áno |
| **Koordinátor:** | Ústav anorganickej chémie SAV, v. v. i. |
| **Počet spoluriešiteľských inštitúcií:** | 0 |
| **Čerpané financie:** | APVV: 60000 € |

Dosiahnuté výsledky:

Bola realizovaná termická analýza roztavenhého systému (LiF-NaF)eut-LnF3; Ln=Sm, Nd, Gd až do obsahu x(LnF3 = 0.4). Vo všetkých troch prípadoch sa v dvojzložkových sústavách NaF-LnF3 tvorí ternárna zlúčenina NaLnF4 a jej kryštalizačné pole je prítomné vo všetkých troch diagramoch. Ternárna zlúčenina LiLnF4 sa tvorí len v sústave LiF-GdF3. Pre uvedené sústavy bola meraná aj hustota Archimedovou metódou a tieto experimentálne údaje poslúžili na objemovú charakterizáciu študovaných sústav. Hustoty i molárne objemy rastú s nárastom obsahu LnF3 vo všetkých prípadoch. Hodnoty parciálnych molárnych objemov pre LnF3 v tavenine (LiF-NaF)eut pri nekonečnom zriedení sú pozitívne. Na základe pozitívnych hodnôt môžeme konštatovať, že pri tavení LnF3 v tavenine (LiF-NaF)eut dochádza k objemovej expanzii. Táto objemová expanzia klesá s narastajúcim protónovým číslom LnF3 a vo všeobecnosti je vyššia pri nižších teplotách.

MLYNÁRIKOVÁ, Jarmila - BOČA, Miroslav - KUBÍKOVÁ, Blanka. Densities and Volume Properties of the Melts of the Systems (LiF + NaF)eut + SmF3, (LiF + NaF)eut + GdF3, and (LiF + NaF)eut + NdF3. In Journal of Chemical and Engineering Data, 2023, vol. 68, no. 5, p. 1133-1144. (2022: 2.6 - IF, Q2 - JCR, 0.625 - SJR, Q2 - SJR). ISSN 0021-9568. Dostupné na: https://doi.org/10.1021/acs.jced.3c00084

**14.) Fotofunkčné hybridné materiály organických luminofórov a nanočastíc vrstevnatých silikátov** *(Photofunctional hybrid materials of organic luminophores and nanoparticles of layered silicates)*

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| **Zodpovedný riešiteľ:** | Peter Boháč |
| **Trvanie projektu:** | 1.7.2023 / 30.6.2026 |
| **Evidenčné číslo projektu:** | APVV-22-0150 |
| **Organizácia je koordinátorom projektu:** | nie |
| **Koordinátor:** | Prírodovedecká fakulta UK |
| **Počet spoluriešiteľských inštitúcií:** | 0 |
| **Čerpané financie:** | APVV: 8500 € |

Dosiahnuté výsledky:

V prvej fáze projektu boli študované základné interakcie vybraných farbív s vrstevnatými kremičitanmi s cieľom pozorovať identifikovať javy ako molekulová agregácia, indukovaná emisia a fotosenzibilizácia singletového kyslíka.

Jedným zo skúmaných farbív bolo Reichardtovho farbivo adsorbované na piatich rôznych ílových minerálоch – saponite (Sumecton), baidellite, montmorillonite (Kunipia F) a dvoch hektoritoch (Laponit RD a hektorit SHCa). Zistilo sa, že adsorpciou tohto farbiva na častice ílových minerálov nedochádza k výraznejším zmenám v absorpčných spektrách, na druhej strane však môžeme pozorovať v týchto systémoch fluorescenciu, ktorá sa v prípade voľného farbiva v roztoku nepozorovala, čo je spôsobené javom adsorpciou indukovanej emisie.

Ďalším študovaným systémom boli systémy s farbivom 2-[(1E)?2?[4?(difenylamino)fenyl]etenyl]?3?metyl?1,3?benzotiazol?3?ium (Ozn. SIG373). Pilotné experimenty indikujú, že v roztokoch dochádza k degradácii farbiva a poklesu absorbancie s časom, zatiaľ čo v

hybridných sústavách so smektitmi dochádzalo k stabilizácii a signifikantnému zvýšeniu luminiscencie. Stabilizácia nestabilných molekúl na povrchu smektitov môže zohrávať významnú úlohu pri využití farbív.
Na základe predbežného štúdia farbív s potenciálom kombinácie javov potlačenia agregácie a fotosenzibilizácie singletového kyslíka sme indentifikovali vplyv ťažkého aómu halogenidu na fotosenzibilizačné vlastností organických farbív. Pre potvrdenie predbežných pozorovaní bola vybraná séria molekúl fluoresceínu a jeho halogénových derivátov: 4,5,6,7-tetrachlórflorescein, 4,5,6,7-tetrachlór-2',4',5',7'-tetrafluórflorescein, 4,5,6,7-tetrachlór-2',4',5',7'-tetrachlórflorescein, floxín B a Rose Bengal.
Pre štúdium kombinácie javov adospricou indukovanej emisie (AIE) a senzibilizácie singletového kyslíka boli vybrané hybridné systémy na báze porfyrínových farbív. Študované boli farbívá Pt (III) meso-Tetra (N-Metyl-4-Pyridyl) porfyrín (PtTMPyP4+) a Pd (III) meso-Tetra (N-Metyl-4-Pyridyl) porfyrín (PdTMPyP4+). Ako nosič bol použitý syntetický smektit Sumecton. V pripravených vzorkách bol pozorovaný efekt adsorpciou indukovanej emisie, pričom jeho účinok bol vyšší vo vzorkách s nižším loadingom. Ďalej sme testovali schopnosť materiálov generovať singletový kyslík pomocou senzorovej molekuly ADMA, ktorá sa reakciou so singletovým kyslíkom rozkladá, čo je možné detekovať využitím UV-VIS spektroskopie. Všetky pripravené vzorky preukázali schopnosť produkovať singletový kyslík, pričom sme pozorovali rozklad ADMA v priebehu jednej až troch hodín. Účinnosť tvorby singletového kyslíka a rozkladu ADMA stúpala s množstvom použitého porfyrínového farbiva, pričom sme nezaznamenali signifikantné rozdiely medzi jednotlivými typmi porfyrínov.
Jedným z cieľov projektu je modifikácia povrchov polymérov pripravenými hybridnými systémami. Pre tento účel sme testovali vhodnosť využitia metódy “layer-by-layer” (LBL) s využitím spray-coatingu.
Metódou “layer-by-layer” (LBL) boli pripravené tenké filmy na báze smektitu (Sumecton – S), aniónového organického farbiva (Floxín B – PhB) a polykatiónového elektrolytu (Poly(dialyldimetylamónium) chlorid) – PDDA). Absorpčné spektrá, podobne ako v iných systémoch s PhB, vykazovali maximálnu absorbanciu pri 559 nm. So zvyšujúcim sa počtom vrstiev PhB/S/PDDA sa postupne zvyšovali aj hodnoty absorbancie, čo korelovalo so zvyšujúcim sa množstvom aniónov PhB vo filme. Emisné spektrá vykazovali maximálnu intenzitu pri 570 nm a podobne ako pri absorpčných spektrách sa hodnoty intenzity postupne zvyšovali spolu so zvyšujúcim sa počtom vrstiev PhB/S/PDDA.

**15.) Anódy pre Li-iónové batérie na báze uhlík-kremíkových kompozitov** *(Carbon-silicon based composite anodes for Li-ion batteries)*

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| **Zodpovedný riešiteľ:** | Karol Fröhlich |
| **Zodpovedný riešiteľ v organizácii SAV:** | Zoltán Lenčéš |
| **Trvanie projektu:** | 1.7.2020 / 30.6.2024 |
| **Evidenčné číslo projektu:** | APPV-19-0461 |
| **Organizácia je koordinátorom projektu:** | nie |
| **Koordinátor:** | Centrum pre využitie pokročilých materiálov SAV, v. v. i. |
| **Počet spoluriešiteľských inštitúcií:** | 3 - Slovensko: 3 |
| **Čerpané financie:** | APVV: 6330 € |

*Dosiahnuté výsledky:*
Anódy pre lítiové batérie na báze uhlíka a kremíka (C/Si) boli pripravené vysokoenergetickým mletím v planetovom mlyne za optimalizovaných podmienok mletia. Boli študované dve zloženia aktívneho materiálu C/Si, konkrétne v hmotnostnom pomere 80:20 a 50:50. Napriek vyššej teoretickej kapacite C/Si anód v pomere 50:50 tieto vykazovali horšie elektrochemické vlastnosti. Dôvodom bola horšia adhézia anódy k medenej fólii (zberač prúdu).
Je všeobecne známe, že pri nabíjaní a vybíjaní batérií dochádza k veľkým objemovým zmenám častíc kremíku (300%), ich droleniu/lámaniu a následne k degradácii batérie. Z toho dôvodu boli testované rôzne druhy vo vode rozpustných spojív, ako komerčných (CMC/SBR) tak aj novovyvinutých (dopamín-alginát, sulfo-alginát), ktoré by dokázali obmedziť degradáciu častíc kremíku v dôsledku veľkých objemových zmien. Študoval sa aj vplyv obsahu spojiva v rozmedzí 4 – 15 hm%. Elektrochemické testy ukázali, že najvyššiu špecifickú kapacitu mali C/Si anódy s 10 hm% sulfo-alginátu.
Boli pripravené aj C/Si anódy, kde bol uhlík pridaný vo forme grafénu. Nepodarilo sa dosiahnuť výraznejšieho

zlepšenia elektrochemických vlastností anódy, pravdepodobne v dôsledku kolmej orientácie grafénových vrstvičiek k toku Na iónov.
Systematicky sme študovali aj vplyv vrstvičky ZnO pripravenej depozíciou atómovej vrstvy (ALD) na elektrochemické vlastnosti C/Si anódy. Hrúbku ZnO vrstvy sme kontrolovali počtom depozičných cyklov (10, 20, 40 cyklov). Elektrochemické testy ukázali, že najvyššiu kapacitu sa podarilo dosiahnuť pre anódu so ZnO vrstvou pripravenej 20 ALD cyklami (hrúbka vrstvy cca 5 nm). Na porovnanie boli pripravené aj anódy s prídavkom ZnO nanoprášku, ale špecifická kapacita bola nižšia v porovnaní s anódou pokrytou ALD ZnO vrstvičkou.

Výstupy:
KUCHERYAVAYA, Anastasia - LENČÉŠ, Zoltán - ŠAJGALÍK, Pavol - HARMUTH, Harald. Zirconium oxycarbides and oxycarbonitrides: A review. In International Journal of Applied Ceramic Technology, 2023, vol. 20, no. 2 p. 541-562. (2022: 2.1 - IF, Q2 - JCR, 0.419 - SJR, Q2 - SJR). ISSN 1546-542X. Dostupné na: https://doi.org/10.1111/ijac.14188

GÜNEREN, Alper - NADA, Ahmed A. - LENČÉŠ, Zoltán. Improved decay performance of Si/Gr anodes using water-soluble functionalized alginate binders. In Engineering ceramics 2023: Advanced research workshop. Book of abstracts. Smolenice, 7.-11.5.2023. Bratislava: SAV, 2023, p. 19. ISBN 978-80-973578-5-6.

GÜNEREN, Alper - LENČÉŠ, Zoltán. Silicon oxycarbide anodes for Na-ion batteries. Book of abstracts, XVIII Conference & Exhibition of the European Ceramic Society, July 2-6, 2023, Lyon, France.

**16.) Nanoštrukturované, funkčne navrstvené a bio-inšpirované 3D iplantáty na báze titánu** *(Nanostructured, functionally graded, and bioinspired 3D Ti-based implants)*

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| **Zodpovedný riešiteľ:** | Miroslav Hnatko |
| **Trvanie projektu:** | 1.8.2021 / 30.6.2025 |
| **Evidenčné číslo projektu:** | APVV-20-0322 |
| **Organizácia je koordinátorom projektu:** | áno |
| **Koordinátor:** | Ústav anorganickej chémie SAV, v. v. i. |
| **Počet spoluriešiteľských inštitúcií:** | 1 - Slovensko: 1 |
| **Čerpané financie:** | APVV: 47500 € |

*Dosiahnuté výsledky:*
Pokrokové inžinierstvo biomedicínskych substrátov využívajúce DES, ktoré poskytuje možnosť syntetizovať mikro- a nanotextúry na 3D tlačených substrátoch Ti–6Al–4V, možno vyzdvihnúť ako jeden z najvýznamnejších dosiahnutých výsledkov. Nový prístup demonštroval schopnosť vytvoriť hierarchickú povrchovú štruktúru s mikro aj nanovzormi ako skutočné kostné tkanivo. Navyše bola preukázaná možnosť kombinácie novej elektrochemickej metódy s klasickým pieskovaním. Kombinácia pieskovania a elektrochemického spracovania v DES predstavuje životaschopnú stratégiu na úpravu povrchu, ktorá ponúka príležitosti na výrobu implantátov na báze titánu, ktoré vykazujú vynikajúce povrchové vlastnosti a podporujú lepšiu biologickú integráciu. Tento pokrok má potenciál prispieť k oblasti biomedicínskeho inžinierstva zlepšením výkonu a biokompatibility titánových implantátov. Získané výsledky sa stali podkladom pre medzinárodnú patentovú prihlášku s názvom „Metóda elektrochemickej povrchovej úpravy biomedicínskych produktov vyrobených z titánu alebo zliatin na báze Ti“, ktorá bola zaregistrovaná pod číslom PCT/SK2023/050006 (12.04.2023), autori : A. Kityk a M. Hnatko.

Publikácie:
KITYK, Anna** - PAVLÍK, Viliam - HNATKO, Miroslav. Green electropolishing using choline chloride-based deep eutectic solvents: A review. In Journal of Molecular Liquids, 2023, vol. 392, art no. 123519. (2022: 6 - IF, Q1 - JCR, 0.914 - SJR, Q1 - SJR, karentované - CCC). (2023 - Current Contents, WOS, SCOPUS). ISSN 0167-7322. Dostupné na: https://doi.org/10.1016/j.molliq.2023.123519

KITYK, Anna** - ŠVEC, Peter - ŠOLTÝS, Ján - PAVLÍK, Viliam - HNATKO, Miroslav. Deep inside of the mechanism of electrochemical surface etching of ? + ? Ti6Al4V alloy in room-temperature deep eutectic solvent Ethaline. In Journal of Molecular Liquids, 2023, vol. 375, no. 121316. (2022: 6 - IF, Q1 - JCR, 0.914 - SJR, Q1 - SJR, karentované - CCC). (2023 - Current Contents, WOS, SCOPUS). ISSN 0167-7322. Dostupné na: https://doi.org/10.1016/j.molliq.2023.121316

KITYK, Anna** - PAVLÍK, Viliam - HNATKO, Miroslav. Exploring deep eutectic solvents for the electrochemical and chemical synthesis of photoand electrocatalysts for hydrogen evolution. In International Journal of Hydrogen Energy, 2023, vol. 48, iss. 100, pp. 39823-39853. (2022: 7.2 - IF, Q1 - JCR, 1.318 - SJR, Q1 - SJR). ISSN 0360-3199. Dostupné na: https://doi.org/10.1016/j.ijhydene.2023.07.158

**17.) Nové vysoko-entropické keramické materiály pre pokročilé aplikácie** *(New High - Entropy Ceramics for Advanced Applications)*

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| **Zodpovedný riešiteľ:** | Pavol Hvizdoš |
| **Zodpovedný riešiteľ v organizácii SAV:** | Pavol Šajgalík |
| **Trvanie projektu:** | 1.7.2020 / 30.6.2024 |
| **Evidenčné číslo projektu:** | APPV-19-0497 |
| **Organizácia je koordinátorom projektu:** | nie |
| **Koordinátor:** | Ústav materiálového výskumu SAV, v. v. i. |
| **Počet spoluriešiteľských inštitúcií:** | 0 |
| **Čerpané financie:** | APVV: 18500 € |

*Dosiahnuté výsledky:*
Riešenie projektu sa v tomto roku sústredilo na štúdium mechanických vlastností tzv. duálneho vysokoentropického materiálu, ktorý pozostáva z 60% vysokoentropického karbidu (Hf-Zr-Ta-Nb-Ti)C a 40% vysokoentropického boridu (Hf-Zr-Ta-Nb-Ti)B2. Vysokočistý a plne hutný materiál bol pripravený v predchádzajúcej etape, a v tomto roku sa podarilo realizovať podrobnú mikroštruktúrnu analýzu, ako aj stanoviť vplyv fázového zloženia a hraníc zŕn na nanotvrdosť a tribologické vlastnosti. V rámci projektu sa tiež podarilo pripraviť hutný vysokoentropický karbid (Hf-Ta-Zr-Nb-Ti)C, pričom sa študoval vplyv množstva prídavku SiC whiskerov na jeho zhutnenie, mikroštruktúru a mechanické vlastnosti.

Publikácie
HRUBOVČÁKOVÁ, Monika - CSANÁDI, Tamás - SEDLÁK, Richard** - KOVALČÍKOVÁ, Alexandra - SHEPA, Ivan - MÚDRA, Erika - SOPČÁK, Tibor - ÜNSAL, Hakan - TATARKO, Peter - ŠAJGALÍK, Pavol - DUSZA, Ján. The effect of SiC whiskers addition on the microstructure and mechanical properties of a (Hf-Ta-Zr-Nb-Ti)C-SiC composite. In Ceramics International, 2023, vol. 49, p. 24179-24186. (2022: 5.2 - IF, Q1 - JCR, 0.918 - SJR, Q1 - SJR). ISSN 0272-8842. Dostupné na: https://doi.org/10.1016/j.ceramint.2022.10.239 Typ: ADCA

NAUGHTON-DUSZOVÁ, Annamária** - MEDVEĎ, Dávid - ĎAKOVÁ, Lenka - KOVALČÍKOVÁ, Alexandra - ŠVEC, Peter - TATARKO, Peter - ÜNSAL, Hakan - HVIZDOŠ, Pavol - ŠAJGALÍK, Pavol - DUSZA, Ján. Highly wear resistant dual-phase (Ti-Zr-Nb-Hf-Ta)C/(Ti-Zr-Nb-Hf-Ta) B2 high-entropy ceramics. In Advances in Applied Ceramics, 2023, vol. 122, no. 3-4, p. 107-118. (2022: 2.2 - IF, Q2 - JCR, 0.45 - SJR, Q2 - SJR). ISSN 1743-6753. Dostupné na: https://doi.org/10.1080/17436753.2023.2238160 Typ: ADCA

NAUGHTON-DUSZOVÁ, Annamária** - ŠVEC, Peter** - KOVALČÍKOVÁ, Alexandra - SEDLÁK, Richard - TATARKO, Peter - HVIZDOŠ, Pavol - ŠAJGALÍK, Pavol - DUSZA, Ján. On the phase and grain boundaries in dual phase carbide/boride ceramics from micro to atomic level. In Journal of the European Ceramic Society, 2023, vol. 43, p. 6765-6773. (2022: 5.7 - IF, Q1 - JCR, 1.257 - SJR, Q1 - SJR). ISSN 0955-2219. Dostupné na: https://doi.org/10.1016/j.jeurceramsoc.2023.07.034 Typ: ADCA

NAUGHTON-DUSZOVÁ, Annamária** - ĎAKOVÁ, Lenka - CSANÁDI, Tamás - KOVALČÍKOVÁ,

Alexandra - KOMBAMUTHU, Vasanthakumar - ÜNSAL, Hakan - TATARKO, Peter - TATARKOVÁ, Monika - HVIZDOŠ, Pavol - ŠAJGALÍK, Pavol. Nanohardness and indentation fracture resistance of dual-phase high-entropy ceramic. In Ceramics International, 2023, vol. 49, p. 24239-24245. (2022: 5.2 - IF, Q1 - JCR, 0.918 - SJR, Q1 - SJR). ISSN 0272-8842. Dostupné na: https://doi.org/10.1016/j.ceramint.2022.12.027
Typ: ADCA

**18.) Vývoj pokročilých metód určených na presnú predpoveď a analýzu röntgenových spektier molekúl s otvorenou obálkou** *(Development of advanced methods for accurate prediction and analysis of X-ray spectra of open-shell species)*

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| **Zodpovedný riešiteľ:** | Stanislav Komorovský |
| **Trvanie projektu:** | 1.7.2023 / 30.6.2027 |
| **Evidenčné číslo projektu:** | APVV-22-0488 |
| **Organizácia je koordinátorom projektu:** | áno |
| **Koordinátor:** | Ústav anorganickej chémie SAV, v. v. i. |
| **Počet spoluriešiteľských inštitúcií:** | 1 - Slovensko: 1 |
| **Čerpané financie:** | APVV: 15910 € |

<u>*Dosiahnuté výsledky:*</u>

- Do programového balíka ReSpect sme implementovali referenčnú metódu na výpočet absorpčných spektier pre systémy s otvorenou obálkou. Táto metóda nie je vhodná na praktické kvantovo chemické výpočty, keďže sa dá použiť len na malé systémy, napriek tomu ide o dôležitý krok v projekte keďže nám poskytne referenčné dáta ktoré budú užitočné pri implementovaní hlavného cieľa projektu: metódy DR-TDDFT.
- Navyše sme implementovali nástroj na vizualizáciu tranzitnej hustoty, čiže aj na vizualizáciu spektier v röntgenovej oblasti čo je ďalším z hlavných cieľov projektu.

**19.) Ultra-vysokoteplotné karbidy so zvýšenou oxidačnou odolnosťou** *(Novel enhanced oxidation-resistant ultra-high temperature carbides)*

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| **Zodpovedný riešiteľ:** | Alexandra Kovalčíková |
| **Zodpovedný riešiteľ v organizácii SAV:** | Peter Tatarko |
| **Trvanie projektu:** | 1.7.2023 / 30.6.2027 |
| **Evidenčné číslo projektu:** | APVV-22-0493 |
| **Organizácia je koordinátorom projektu:** | nie |
| **Koordinátor:** | Ústav materiálového výskumu SAV, v. v. i. |
| **Počet spoluriešiteľských inštitúcií:** | 0 |
| **Čerpané financie:** | APVV: 11940 € |

<u>*Dosiahnuté výsledky:*</u>
Počiatočná etapa projektu bola zameraná na získanie vstupných surovín keramických práškov, z ktorých sa následne pripravili dva druhy vysokoentropických karbidov na báze (Mo-Nb-Ta-V-W)C a (Zr-Hf-Ta-Nb-Ti)C. Materiály boli pripravené homogenizáciou karbidických práškov s následnou syntézou v tuhom stave pri teplotách 1400 – 2000°C. Podarilo sa pripraviť jednofázové zloženie, ktoré budú v ďalšom kroku charakterizované a študované. Rovnako sa v ďalšej etape navrhnú a pripravia nové karbidické systémy s potenciálne zlepšenými vlastnosťami pri vysokých teplotách.

Publikácie:
HOSSEINI, Naser** - VALENZA, Fabrizio - GAMBARO, S. - CHLUP, Zdeněk - KOVALČÍKOVÁ, Alexandra - DLOUHÝ, Ivo - TATARKO, Peter. Wettability and joining of (Mo-Nb-Ta-V-W)C high entropy

carbide by NiTa eutectic alloys. In Processing and properties of advanced ceramics and glasses: Proceedings. Stará Lesná, 25.-27.10.2023. Košice, Slovakia: Institute of Materials Research, SAS, 2023, p. 40-46. ISBN 978-80-89782-16-1. (APVV-21-0402: Vývoj nových keramických materiálov komplexného zloženia pre extrémne aplikácie. APVV-22-0493 : Ultra-vysokoteplotné karbidy so zvýšenou oxidačnou odolnosťou. Processing and properties of advanced ceramics and glasses: vedecký seminár) Typ: AFD

**20.) Vplyv radiačnej záťaže na sklovláknitú izoláciu z hľadiska recirkulácie chladiva v havarijných podmienkach jadrových elektrární s tlakovodnými reaktormi** *(Influence of radiation load on fiberglass insulation in terms of refrigerant recirculation in emergency conditions of nuclear power plants with pressurized water reactors)*

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| **Zodpovedný riešiteľ:** | Marek Liška |
| **Trvanie projektu:** | 1.7.2023 / 30.6.2027 |
| **Evidenčné číslo projektu:** | APVV-22-0004 |
| **Organizácia je koordinátorom projektu:** | nie |
| **Koordinátor:** | VÚEZ, a.s. |
| **Počet spoluriešiteľských inštitúcií:** | 0 |
| **Čerpané financie:** | APVV: 9255 € |

*Dosiahnuté výsledky:*
Vypracoval sa návrh laboratórneho testovacieho zariadenia na skúmanie krehkosti sklovláknitej izolácie. Navrhla sa metodika na charakterizáciu vlastností sklovláknitej izolácie po zrýchlenom starnutí metódou analýzy obrazu.

**21.) Bentonit: strategická surovina Slovenska - inovatívne hodnotenie zdrojov a ich kvality pre jej efektívne využívanie** *(Bentonite: Slovak strategic raw material - Innovative assessment of bentonite quality and origin for its efficient use)*

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| **Zodpovedný riešiteľ:** | Jana Madejová |
| **Trvanie projektu:** | 1.1.2021 / 30.6.2025 |
| **Evidenčné číslo projektu:** | APVV-20-0175 |
| **Organizácia je koordinátorom projektu:** | nie |
| **Koordinátor:** | Katedra ložiskovej geológie PriF UK v Bratislave |
| **Počet spoluriešiteľských inštitúcií:** | 4 - Slovensko: 4 |
| **Čerpané financie:** | APVV: 8200 € |

*Dosiahnuté výsledky:*
V rámci riešenia projektu sa testovala možnosť využitia slovenských bentonitov na prípravu geopolymérov. Geopolyméry sú anorganické polyméry vytvorené reakciou medzi alkalickým roztokom a aluminosilikátovou surovinou. Cieľom prvých experimentov bolo študovať vplyv teploty kalcinácie a koncentrácie alkalického aktivátora na proces geopolymerizácie gélov na báze metabentonitu. S postupným zvyšovaním koncentrácie alkalického aktivátora (5, 10 a 20% NaOH) a teploty kalcinácie (700, 750, 800 °C) sa zlepšovala geopolymerizácia. Uvedení trend sa prejavil aj na zvyšovaní merného povrchu, čo je veľmi sľubné pre adsorpčné procesy. Získané výsledky boli prezentované na zahraničnej konferencii a publikovane v karentovanom časopise.

SLANÝ, Michal - KUZIELOVÁ, Eva - ŽEMLIČKA, Matúš - MATEJDES, Marián - PALOU, Martin T. Metabentonite and metakaolin-based geopolymers: relation between kind of clay mineral, calcination temperature, and concentration of alkaline activator. In CEEC-PCMS1. 1st Central and Eastern European Conference on Physical Chemistry and Materials Science, 26-30 July 2022, Split, Croatia: book of abstracts. - Central and Eastern European Committee for Thermal Analysis and Calorimetry (CEEC-TAC), 2022, p. 76. ISBN 978-606-11-8164-3.
SLANÝ, Michal** - KUZIELOVÁ, Eva - ŽEMLIČKA, Matúš - MATEJDES, Marián - STRUHÁROVÁ,

Alena - PALOU, Martin T. Metabentonite and metakaolin based geopolymers/zeolites: relation between kind of clay, calcination temperature and concentration of alkaline activator. In Journal of Thermal Analysis and Calorimetry, 2023, vol. 148, no. 20, p. 10531-10547. (2022: 4.4 - IF, Q1 - JCR, 0.753 - SJR, Q1 - SJR). ISSN 1388-6150

**22.) Bionanokompozitné materiály na báze vrstevnatých silikátov** *(Bionanocomposites based on organic polycations and layered silicates)*

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| **Zodpovedný riešiteľ:** | Jana Madejová |
| **Trvanie projektu:** | 1.7.2020 / 30.6.2024 |
| **Evidenčné číslo projektu:** | APVV-19-0487 |
| **Organizácia je koordinátorom projektu:** | áno |
| **Koordinátor:** | Ústav anorganickej chémie SAV, v. v. i. |
| **Počet spoluriešiteľských inštitúcií:** | 0 |
| **Čerpané financie:** | APVV: 34100 € |

Dosiahnuté výsledky:

V roku 2023 sa dokončila príprava a charakterizácia kompozitných materiálov na báze montmorilonitu a troch polymérov - poly(2-metyl-2-oxazolín), poly(2-etyl-2-oxazolín) a poly(2-propyl-2-oxazolín). Študoval sa vply množstva polyméru a dĺžky bočného reťazca na adsorpčné vlastvosti a štruktúrne parameter pripravených materiálov. Zo získaných výsledkov sa pripravila publikácia [1], ktorá bola odoslaná do časopisu Macromolecules. Pokračovalo aj riešenie úloh zameraných na fotoaktívne vlastnosti hybridných materiálov organických farbív s vrstevnatými kremičitanmi. Farbivá pseudoizokyanín a derivát benzotiazolu boli študované pomocou experimentálnych spektroskopických metód a teoretických počítačových metód. Súbežne s experimentálnymi prácami pokračovali aj kvantovo-chemické simulačné výpočty väzbových interakcií a interkalačnej energie študovaných hybridných systémov polymér-ílový minerál a pollutant. Zistilo sa, že modifikácia smektitov výrazne podporuje stabilitu adsorbovaných polutantov. Ďalej boli pripravené ďalšie modely na báze iných smektitov (beidellit, saponit, Hectorit) s PMeOx za účelom štúdia vplyvu typu smektitu na mechanické vlastnosti polyméru. Výsledky sú spracované do článku [2] a budú čoskoro zaslané do Journal of Molecular Structure.

[1] PRIBUS, Marek** - JANKOVIČ, Ľuboš – KUREKOVÁ BIZOVSKÁ Valéria - BARLOG, Martin, MADEJOVÁ, Jana. Intercalation Characteristics of Montmorillonite Modified with Poly(2-n-alkyl-2-oxazoline)s. Macromolecules
[2] BASHIR, Sanam** - SCHOLTZOVÁ, Eva - TUNEGA, Daniel. Mechanical properties of pristine smectite clay minerals and clay-polymer hybrids studied by the DFT method. Journal of Molecular Structure.

**23.) Vývoj nástrojov pre pokročilú analýzu a predikciu parametrov spektier EPR, NMR a pNMR komplexných systémov obsahujúcich ťažké prvky** *(Development of tools for advanced analysis and prediction of parameters of EPR, NMR and pNMR spectra of complex systems containing heavy elements)*

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| **Zodpovedný riešiteľ:** | Oľga Malkin |
| **Trvanie projektu:** | 1.7.2020 / 30.6.2024 |
| **Evidenčné číslo projektu:** | APVV-19-0516 |
| **Organizácia je koordinátorom projektu:** | áno |
| **Koordinátor:** | Ústav anorganickej chémie SAV, v. v. i. |
| **Počet spoluriešiteľských inštitúcií:** | 0 |
| **Čerpané financie:** | APVV: 37500 € |

Dosiahnuté výsledky:

KONEČNÝ, Lukáš - KOMOROVSKÝ, Stanislav - VÍCHA, Jan - KENNETH, Ruud - REPISKÝ, Michal.

Exact Two-Component TDDFT with Simple Two-Electron Picture- Change Corrections: X-ray Absorption Spectra Near L- and M-Edges of Four-Component Quality at Two-Component Cost. In Journal of Physical Chemistry A.Molecules, spectroscopy, kinetics, environment, and general theory, 2023, vol. 127, pp. 1360-1376. (2022: 2.9 - IF, Q2 - JCR, 0.675 - SJR, Q2 - SJR). ISSN 1089-5639. Dostupné na: https://doi.org/10.1021/acs.jpca.2c08307 Typ: ADCA

PIKULOVÁ, Petra - MISENKOVA, Debora - MAREK, Radek - KOMOROVSKÝ, Stanislav - NOVOTNÝ, Jan. Quadratic Spin - Orbit Mechanism of the Electronic g-Tensor. In Journal of Chemical Theory and Computation, 2023, vol. 19, iss. 6, pp. 1765-1776. (2022: 5.5 - IF, Q1 - JCR, 1.665 - SJR, Q1 - SJR). ISSN 1549-9618. Dostupné na: https://doi.org/10.1021/acs.jctc.2c01213 Typ: ADCA

**24.) Povrchy polymérov modifikované vrstevnatými nanočasticami a fotoaktívnymi farbivami** *(Polymer surfaces modified with layered nanoparticles and photoactive dyes)*

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| **Zodpovedný riešiteľ:** | Helena Pálková |
| **Trvanie projektu:** | 1.7.2019 / 30.6.2023 |
| **Evidenčné číslo projektu:** | APVV-18-0075 |
| **Organizácia je koordinátorom projektu:** | nie |
| **Koordinátor:** | Ústav anorganickej chémie SAV, v. v. i. |
| **Počet spoluriešiteľských inštitúcií:** | 0 |
| **Čerpané financie:** | APVV: 14000 € |

<u>*Dosiahnuté výsledky:*</u>
Projekt bol riešený pol roka. V tomto období sa ukončili všetky experimentálne práce na projekte a boli vyhodnotené experimenty.

Publikácie:
MADEJOVÁ, Jana** - BARLOG, Martin - SLANÝ, Michal - BASHIR, Sanam - SCHOLTZOVÁ, Eva - TUNEGA, Daniel - JANKOVIČ, Ľuboš. Advanced materials based on montmorillonite modified with poly(ethylenimine) and poly(2-methyl-2-oxazoline): Experimental and DFT study. In Colloids and Surfaces A: Physicochemical and Engineering Aspects, 2023, vol. 659, art. no. 130784. (2022: 5.2 - IF, Q2 - JCR, 0.792 - SJR, Q1 - SJR). ISSN 0927-7757. Dostupné na: https://doi.org/10.1016/j.colsurfa.2022.130784 Typ: ADCA

SKOURA, Eva - BOHÁČ, Peter - BARLOG, Martin - PÁLKOVÁ, Helena - MAUTNER, Andreas - BUGYNA, Larysa - BUJDÁKOVÁ, Helena - BUJDÁK, Juraj**. Structure, photoactivity, and antimicrobial properties of phloxine B / poly(caprolactone) nanocomposite thin films. In Applied Clay Science, 2023, vol. 242, art no. 107037. (2022: 5.6 - IF, Q1 - JCR, 0.985 - SJR, Q1 - SJR). ISSN 0169-1317. Dostupné na: https://doi.org/10.1016/j.clay.2023.107037 Typ: ADCA

SCHOLTZOVÁ, Eva - JANKOVIČ, Ľuboš - TUNEGA, Daniel. Montmorillonite as an Anti-Tuberculosis rifampicin drug carrier: DFT and Experimental study. In Clays and Clay Minerals, 2023, vol. 71, no. 2, p. 229-241. (2022: 2.2 - IF, Q2 - JCR, 0.37 - SJR, Q2 - SJR). ISSN 0009-8604. Dostupné na: https://doi.org/10.1007/s42860-023-00245-5 Typ: ADCA

**25.) Smerom k nanotechnológiám využívajúcim bioaktívne častice/molekuly v boji proti mikrobiálnym biofilmom** *(Towards nanotechnologies using bioactive particles/molecules in the fight against microbial biofilms)*

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| **Zodpovedný riešiteľ:** | Helena Pálková |
| **Trvanie projektu:** | 1.7.2022 / 30.6.2026 |
| **Evidenčné číslo projektu:** | APVV-21-0302 |
| **Organizácia je koordinátorom projektu:** | nie |
| **Koordinátor:** | Prírodovedecká fakulta UK |

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| **Počet spoluriešiteľských inštitúcií:** | 0 |
| **Čerpané financie:** | APVV: 15000 € |

*Dosiahnuté výsledky:*
V ďalšej fáze projektu sa ukončilo štúdium kompozitných materiálov, pripravených predchádzajúcej etape, t.j. povlaky z organicky-modifikovaných vrstevnatých silikátov a antibakteriálneho farbiva Floxín , ktoré boli nanesené na povrchoch technických polyméroch. Otestovala sa ich antibakteriálna aktivita a uskutočnili sa doplňujúce analýzy ich mechanických vlastností, ktoré môžu vhodne doplniť informácie získané z testovania antibakteriálnych vlastností, ako aj z testovania ich fotoaktivity. V ďalších experimentoch sa pripravila série vzoriek, v ktorej sa použil na modifikáciu vrstevnatých silikátov polykatión chitosanu, konkrétne N,N,N-trimetylchitosan. Pripravený polykatión sa použil na prípravu tenkých filmov s nanočasticami vrstevnatého silikátu, pričom sa menili parametre: typ plastifikátora na dosiahnutie kompatibility jednotlivých zložiek pre tenké filmy, rôzne množstvá smektitu. Zámerom bolo pripraviť tenké a stabilné transparentné filmy, ktoré by boli vhodné na použitie pre testovanie antibakteriálnych vlastností, a ktoré budú vykazovať lepšie antibakteriálne vlastnosti v porovnaní so samotným chitosanom. Nanočastice silikátu sa modifikovali pomocou iného bežne dostupného typu polykatiónu polydiallyldimetylamóniového (PDDA), ako aktívna zložka sa použili nanočastice striebra, ktoré vzorkám dodali antibakteriálne vlastnosti. Porovnaním dvoch rôznych typov vrstevnatých silikátov sa pozorovala rozdielna antibakteriálna efektivita podľa typu silikátu.

Publikácie
BUJDÁK, Juraj** - ŠIMONOVÁ, Tímea - BOHÁČ, Peter - MÉSZÁROS, Róbert*. Adsorption of Dye Molecules and Its Potential for the Development of Photoactive Hybrid Materials Based on Layered Silicates. In Journal of Physical Chemistry B, 2023, vol. 127, iss. 5, pp. 1063-1073. (2022: 3.3 - IF, Q3 - JCR, 0.795 - SJR, Q1 - SJR). ISSN 1520-6106. Dostupné na: https://doi.org/10.1021/acs.jpcb.2c07814 Type: ADCA

SKOURA, Eva - BOHÁČ, Peter - BARLOG, Martin - PÁLKOVÁ, Helena - MAUTNER, Andreas - BUGYNA, Larysa - BUJDÁKOVÁ, Helena - BUJDÁK, Juraj**. Structure, photoactivity, and antimicrobial properties of phloxine B / poly(caprolactone) nanocomposite thin films. In Applied Clay Science, 2023, vol. 242, art no. 107037. (2022: 5.6 - IF, Q1 - JCR, 0.985 - SJR, Q1 - SJR). ISSN 0169-1317. Dostupné na: https://doi.org/10.1016/j.clay.2023.107037 Type: ADCA

Abstrakty príspevkov na konferenciách
BARLOG, Martin Study of enhanced fluorescence of cationic dye crysral violet after interaction with either pristine or by ethyleneamines modified matrix of synthetic hectorite. EUROCLAY 2023. International Conference of European Clay Groups Association, Villa Romanazzi Carducci Conference Centre, Book of Abstracts, p. 18, JULY 24-27, 2023, BARI, Italy. ISBN: 978-88-7522-052-5

BUJDÁK, Juraj** - ŠUTEKOVÁ, Monika - LABUTA, Jan. Thermally activated surface adsorption to improve the photoactivity of an organic luminophore. In International Conference of European Clay Groups Association EUROCLAY 2023: Scientific Research Abstracts Volume 14. Bari, Italy Digilabs, 2023, p. 34. ISBN 978-88-7522-052-5. ISSN 2464-9147. Type: AFG

PÁLKOVÁ, Helena** - BARLOG, Martin - BUJDÁK, Juraj. Infrared study of organomodified smectites functionalized with a laser dye. In International Conference of European Clay Groups Association - EUROCLAY 2023: Scientific Research Abstracts - Volume 14. Bari, Italy: Digilabs, 2023, p. 226. ISBN 978-88-7522-052-5. ISSN 2464-9147. Type: AFG

PLANETOVÁ, Viktória** - BOHÁČ, Peter - BUJDÁK, Juraj - KLEMENT, Róbert. The mechanism of adsorption-induced emission of pseudoisocyanine cation in smectite colloids. In International Conference of European Clay Groups Association - EUROCLAY 2023: Scientific Research Abstracts Volume 14. Bari, Italy: Digilabs, 2023, p. 239. ISBN 978-88-7522-052-5. ISSN 2464-9147. Type: AFK

SKOURA, Eva** - BOHÁČ, Peter - BARLOG, Martin - BUGYNA, Larysa - BUJDÁKOVÁ, Helena - BUJDÁK, Juraj. Nanocomposite photoactive films deposited onto poly(caprolactone) surface via melt fusion. In International Conference of European Clay Groups Association - EUROCLAY 2023: Scientific Research Abstracts - Volume 14. Bari, Italy: Digilabs, 2023, p. 277. ISBN 978-88-7522-052-5. ISSN 2464-9147.

BUJDÁK, Juraj, Polymer surfaces modified with layered silicates and organic dyes. 9th Workshop of Slovak Clay Group: Clay Minerals and Selected Industrial Minerals in Material Science, Applications, and Environmental Technology, Book of Abstracts, p. 10, JUNE 26 – 28, 2023, TERCHOVÁ, SLOVAKIA. ISBN 978-80-972367-6-2

**26.) Pokročilé materiály s eutektickou mikroštruktúrou pre vysokoteplotné funkčné aplikácie** *(Advanced materials with eutectic microstructure for high temperature and functional applications)*

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| **Zodpovedný riešiteľ:** | Anna Prnová |
| **Trvanie projektu:** | 1.7.2020 / 30.6.2024 |
| **Evidenčné číslo projektu:** | APVV-19-0010 |
| **Organizácia je koordinátorom projektu:** | nie |
| **Koordinátor:** | Trenčianska univerzita Alexandra Dubčeka v Trenčíne |
| **Počet spoluriešiteľských inštitúcií:** | 1 - Slovensko: 1 |
| **Čerpané financie:** | APVV: 18360 € |

<u>*Dosiahnuté výsledky:*</u>
V roku 2023 sa podarilo optimalizovať prípravu práškových prekurzorov, taktiež sa pokračovalo v optimalizácii veľkosti častíc systémov použitých na žiarové lisovanie. Vďaka týmto krokom sa podarilo pripraviť materiály so zaujímavými mechanickými vlastnosťami (Hv=18 GPa, KIC= 4.7 MPa m1/2. Riešilia sa kinetika kryštalizácie vybraných skiel a overovala sa možnosť použitia JMAK modelu pri výbere a návrhu vhodných zložení a pri predikcii teplotného správania sa systémov. Pokračovalo sa v príprave a charakterizácii nových navrhnutých zložení v systémoch: Al2O3-Y2O3-Yb2O3-Er2O3 a Al2O3-Yb2O3-Er2O3, pričom boli pripravené systémy emitujúce čisté červené a čisté zelené svetlo, ktoré by mohli byť použité pri príprave fosforov pre vysokoteplotné aplikácie (1000°C).

PECUŠOVÁ, Beáta – PRNOVÁ, Anna** – VALÚCHOVÁ, Jana – PARCHOVIANSKÝ, Milan – KLEMENT, Róbert – GALUSEK, Dušan. Crystallization and photoluminescence properties of Er-doped microspheres with ytterbium-aluminium garnet composition. In Ceramics International, 2023, vol. 49, iss. 9, pp. 14895-14903. (2022: 5.2 – IF, Q1 – JCR, 0.918 – SJR, Q1 – SJR). ISSN 0272-8842. Dostupné na: https://doi.org/10.1016/j.ceramint.2022.08.070 Typ: ADCA

PRNOVÁ, Anna** – VALÚCHOVÁ, Jana – PARCHOVIANSKÝ, Milan – ŠVANČÁREK, Peter – ŠIMKO, František – RAKHMATULLIN, Aydar – PÁLKOVÁ, Helena – HRUŠKA, Branislav – KLEMENT, Róbert – GALUSEK, Dušan. Structure, thermal properties and crystallization behavior of binary Y2O3-Al2O3 glasses with high alumina content. In Journal of Materials Research and Technology-JMR&T, 2023, vol. 26, pp. 2333-2351. (2022: 6.4 – IF, Q1 – JCR, 1.05 – SJR, Q1 – SJR). ISSN 2238-7854. Dostupné na: https://doi.org/10.1016/j.jmrt.2023.08.067 Typ: ADCA

AKUSEVICH, Alena** – PECUŠOVÁ, Beáta – PRNOVÁ, Anna – MICHÁLKOVÁ, Monika – ŠVANČÁREK, Peter – PARCHOVIANSKÝ, Milan – KLEMENT, Robert – GALUSEK, Dušan. DSC/TG, RTG a SEM analýza teplotného správania hlinitanových skiel. In Konference o speciálních anorganických pigmentech a práškových materiálech: Sborník příspěvků 25. ročníku. – Pardubice, ČR: Univerzita Pardubice, 2023, p. 9-11. ISBN 978-80-7560-472-9.

MAJEROVÁ, Melinda** – PRNOVÁ, Anna – MICHÁLKOVÁ, Monika – PECUŠOVÁ, Beáta – KLEMENT, Robert – GALUSEK, Dušan. Vplyv veľkosti častíc na teplotné správanie hlinitanových skiel. In Konference o speciálních anorganických pigmentech a práškových materiálech: Sborník příspěvků 25. ročníku. – Pardubice, ČR : Univerzita Pardubice, 2023, p. 40-43. ISBN 978-80-7560-472-9.

MICHALÍK, Jakub** – VALÚCHOVÁ, Jana – PARCHOVIANSKÝ, Milan – HRUŠKA, Branislav – KLEMENT, Robert – PRNOVÁ, Anna –GALUSEK, Dušan. Príprava a spektrálne vlastnosti Er, Yb a Li dopovaných materiálov s YAG zložením. In Konference o speciálních anorganických pigmentech a práškových materiálech: Sborník příspěvků 25. ročníku. – Pardubice, ČR : Univerzita Pardubice, 2023, p. 49-52. ISBN 978-80-7560-472-9.

HRUŠKA, Branislav** – VALÚCHOVÁ, Jana – PRNOVÁ, Anna – PARCHOVIANSKÝ, Milan – ŠVANČÁREK, Peter – KLEMENT, Robert. Thermal properties and structure of Y2O3-Al2O3-Y2O3 glasses as precursors for preparation of ceramics materials with eutectic microstructure. In 7th Central and Eastern European Conference on Thermal analysis and Calorimetry: Book of abstracts. Brno : Faculty of Chemistry of BUT, Brno University of Technology, 2023, p. 289. ISBN 978-606-11-8461-3.

**27.) Vývoj nových keramických materiálov komplexného zloženia pre extrémne aplikácie** *(Development of new compositionally-complex ceramics for extreme applications)*

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| **Zodpovedný riešiteľ:** | Peter Tatarko |
| **Trvanie projektu:** | 1.7.2022 / 30.6.2026 |
| **Evidenčné číslo projektu:** | APVV-21-0402 |
| **Organizácia je koordinátorom projektu:** | áno |
| **Koordinátor:** | Ústav anorganickej chémie SAV, v. v. i. |
| **Počet spoluriešiteľských inštitúcií:** | 0 |
| **Čerpané financie:** | APVV: 45863 € |

<u>*Dosiahnuté výsledky:*</u>
Riešenie projektu nadviazalo na výsledky riešenia v predchádzajúcom roku, kde na základe teoretických výpočtov boli zvolené 3 systémy vysokoentropických boridov s rôznym pomerom jednotlivých prechodných kovov (Hf, Zr, Ta, Nb, Ti): (Ta0.6Hf0.1Zr0.1Nb0.1Ti0.1)B2, (Ta0.6Hf0.25Zr0.05Nb0.05Ti0.05)B2, a (Ta0.6Hf0.2Zr0.1Nb0.05Ti0.05)B2. V tomto roku boli tieto materiály pripravené boro/karbidickou redukciou oxidových prekurzorov a následným spekaním za asistencie elektrického prúdu. Proces prípravy bol optimalizovaný za účelom získania jednofázového tuhého roztoku s relatívnou hostotou nad 98%. Podrobnou fázovou analýzou sa podarilo preukázať, že mriežkové parametre pripravených materiálov sú v dobrej zhode s teoreticky vypočítanými údajmi. Štúdium tvrdosti týchto materiálov jasne preukázalo, že neekvimolárne diboridové materiály vykázali vyššiu tvrdosť ako referenčné ekvimolárne zloženie (Ta0.2Hf0.2Zr0.2Nb0.2Ti0.2)B2. V ďalšom kroku sa budú študovať ďalšie vlastnosti týchto materiálov a zároveň sa uskutočnia ďalšie teoretické výpočty s cieľom navrhnúť nové diboridové štruktúry.

Publikácie:
NAUGHTON-DUSZOVÁ, Annamária** - MEDVEĎ, Dávid - ĎAKOVÁ, Lenka - KOVALČÍKOVÁ, Alexandra - ŠVEC, Peter - TATARKO, Peter - ÜNSAL, Hakan - HVIZDOŠ, Pavol - ŠAJGALÍK, Pavol - DUSZA, Ján. Highly wear resistant dual-phase (Ti-Zr-Nb-Hf-Ta)C/(Ti-Zr-Nb-Hf-Ta) B2 high-entropy ceramics. In Advances in Applied Ceramics, 2023, vol. 122, no. 3-4, p. 107-118. (2022: 2.2 - IF, Q2 - JCR, 0.45 - SJR, Q2 - SJR). ISSN 1743-6753. Dostupné na: https://doi.org/10.1080/17436753.2023.2238160 Typ: ADCA

NAUGHTON-DUSZOVÁ, Annamária** - ŠVEC, Peter** - KOVALČÍKOVÁ, Alexandra - SEDLÁK, Richard - TATARKO, Peter - HVIZDOŠ, Pavol - ŠAJGALÍK, Pavol - DUSZA, Ján. On the phase and grain boundaries in dual phase carbide/boride ceramics from micro to atomic level. In Journal of the European Ceramic Society, 2023, vol. 43, p. 6765-6773. (2022: 5.7 - IF, Q1 - JCR, 1.257 - SJR, Q1 - SJR). ISSN 0955-2219. Dostupné na: https://doi.org/10.1016/j.jeurceramsoc.2023.07.034 Typ: ADCA

ÜNSAL, Hakan - FÜRDŐSOVÁ, Zuzana - CHLUP, Zdeněk - TATARKOVÁ, Monika - KOVALČÍKOVÁ, Alexandra - HIČÁK, Michal - HOSSEINI, Naser - ZHUKOVA, Inga - DLOUHÝ, Ivo - ŠAJGALÍK, Pavol - TATARKO, Peter**. ZrB2-SiC composites with rare-earth oxide additives. In Journal of Innovative Materials in Extreme Conditions, 2023, vol. 4, iss. 1, pp. 22-29. ISSN 2738-0882. Dostupné na internete: http://jimec.edu.rs/volume-4-issue-1-year-2023/. Typ: ADEB.

HOSSEINI, Naser** - VALENZA, Fabrizio - GAMBARO, S. - CHLUP, Zdeněk - KOVALČÍKOVÁ, Alexandra - DLOUHÝ, Ivo - TATARKO, Peter. Wettability and joining of (Mo-Nb-Ta-V-W)C high entropy carbide by NiTa eutectic alloys. In Processing and properties of advanced ceramics and glasses: Proceedings. Stará Lesná, 25.-27.10.2023. Košice, Slovakia: Institute of Materials Research, SAS, 2023, p. 40-46. ISBN 978-80-89782-16-1. Typ: AFD

ZHUKOVA, Inga** - TATARKOVÁ, Monika - KOMBAMUTHU, Vasanthakumar - KOVALČÍKOVÁ, Alexandra - CSANÁDI, Tamás - DUSZA, Ján - DLOUHÝ, Ivo - MATOVIČ, Branko - ZAGORAC, Dejan - TATARKO, Peter. Theoretical predictions and synthesis of (Ti-Zr-Hf-Nb-Ta)B2 structures with non-equimolar compositions. In Processing and properties of advanced ceramics and glasses: Proceedings. Stará Lesná, 25.-27.10.2023. Košice, Slovakia: Institute of Materials Research, SAS, 2023, p. 114-119. ISBN 978-80-89782-16-1. Typ: AFD

**Programy: Iné projekty**

**28.) Nové hybridné nanomateriály na báze vrstevnatých hlinitokremičitanov a kvartérnych polykatiónov chitosanu** *(Novel hybrid nanomaterials based on layered aluminosilicates and chitosan quaternary polycations)*

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| **Zodpovedný riešiteľ:** | Valéria Kureková |
| **Trvanie projektu:** | 1.7.2023 / 30.6.2024 |
| **Evidenčné číslo projektu:** | |
| **Organizácia je koordinátorom projektu:** | áno |
| **Koordinátor:** | Ústav anorganickej chémie SAV, v. v. i. |
| **Počet spoluriešiteľských inštitúcií:** | 0 |
| **Čerpané financie:** | SAV: 2500 € |

*Dosiahnuté výsledky:*
vodná fáza projektu bola zameraná na optimalizáciu prípravy polykatiónu chitosanu s tromi metylovými reťazcami. Po nastavení vhodných reakčných podmienok bol pripravený N,N,N-trimetyl chitosan so stupňom kvaternizácie 50%. Pripravený polykatión bol spolu so smektitom Sumectonom a plastifikátorom glycerolom použitý pri príprave tenkých transparentných filmov, ktoré boli rozpustné vo vode. V úlohe plastifikátora sa použil taktiež tributyl citrát, pričom sa podarilo pripraviť filmy so zníženou rozpustnosťou vo vode. Takto pripravené filmy boli z jednej strany zatavené polyetylénom, čím sa ich rozpustnosť vo vode znížila päťnásobne. Tenké filmy na báze trimetyl chitosanu a smektitu boli pripravené taktiež metódou „layer-by-layer“. Na aktivované sklíčko boli striedavo nanášané vrstvy polykatiónu a smektitu a takýmto spôsobom sa podarilo pripraviť tenký film, ktorý bol vo vode nerozpustný.

**Programy: SASPRO**

**29.) Výskum ternárnych fáz v systémoch M-R-F (kde M – Li-Cs, (NH4); R – Sc, Y, Ln) pre vývoj nových multifunkčných materiálov** *(Investigation of the ternary phases in the systems M-R-F (where M – Li-Cs, (NH4); R – Sc, Y, Ln) for the development of new multifunctional materials)*

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| **Zodpovedný riešiteľ:** | Miroslav Boča |
| **Trvanie projektu:** | 1.9.2022 / 31.8.2024 |
| **Evidenčné číslo projektu:** | 1171/01/02 |
| **Organizácia je koordinátorom projektu:** | áno |
| **Koordinátor:** | Ústav anorganickej chémie SAV, v. v. i. |
| **Počet spoluriešiteľských inštitúcií:** | 0 |
| **Čerpané financie:** | SAV: 13606 €<br>EU: 32880 € |

*Dosiahnuté výsledky:*

Viaczložkové fluoridy (MxRyFz) s alkalickými kovmi a kovmi vzácnych zemín sú veľmi zaujímavé kvôli svojim optickým vlastnostiam, ktoré sú definované hlavne usporiadaním katiónov (tvorených R a M) a ich okolia v kryštálových štruktúrach. Počas prvého roku realizácie projektu bola pozornosť venovaná zvláštnostiam syntézy (nízkoteplotné a vysokoteplotné metódy) a charakterizácii získaných vzoriek.
Syntéza z tavenín bola aplikovaná pri skúmaní interakcie komponentov v systémoch (LiF-CaF2)eut-nLnF3 (Ln = Nd, Sm, Gd; n = 0,01-0,4 (pre Nd, Sm) / 0,3 (Gd)). Spontánne ochladenie roztavených zmesí (LiF-CaF2)eut-n{NdF3,SmF3,GdF3} môže viesť ku kryštalizácii počiatočných zložiek, ternárnych fluoridov, ako aj tuhých roztokov. Po reakcii medzi (LiF-CaF2)eut a LnF3 sa teda predpokladá, že je možné pozorovať nasledujúce fázy: počiatočné zložky, t.j. LiF, CaF2 a LnF3, usporiadané ternárne fázy, napr. LiGdF4, nestechiometrické ternárne fázy, napr. Ca1-xLnxF2+x alebo Ln1-yCayF3-y. Čistý CaF2 je pozorovaný len pri nízkych koncentráciách LnF3, čo potvrdzuje predpoklad, že neidentifikované fázy obsahujú Ca a majú zloženie CaxLnyFz. Posun odrazov indikuje tvorbu tuhých roztokov (alebo rozsah homogenity) v rámci rozsahu koncentrácie. Na Rietveldovu analýzu vzoriek (LiF-CaF2)eut-n{NdF3,SmF3,GdF3} bol zvolený model kryštálovej štruktúry CeH3 pre kubické fázy Ca1-xLnxF2+x. Počiatočné hodnoty pre x boli vypočítané podľa stanovených parametrov buniek. Bunkové parametre kubických fáz Ca1-xLnxF2+x sa menia s obsahom LnF3 a pri porovnaní troch rôznych systémov súhlasia s účinkom kontrakcie lantanoidov.
Syntéza z roztokov bola použitá pre zlúčeniny Na2K(Zr,Hf)F7. Nové zmiešané katiónové fluoridy Na2KHfF7 a Na2K(Zr,Hf)F7 spolu s izoštruktúrálnym Na2KZrF7 boli syntetizované reakciami vo vodných roztokoch a štrukturálne charakterizované pri laboratórnej teplote s použitím prášku a monokryštálovej Röntgenovej difrakcie. Transformácie tuhých fáz pri zvýšených teplotách boli odhalené počas experimentov diferenciálnej skenovacej kalorimetrie a ďalej potvrdené rôntgenovou práškovou difrakciou závislou od teploty. Zistilo sa, že zmiešané katiónové fázy Na2KZrF7, Na2KHfF7 a Na2K(Zr,Hf)F7 podliehajú ireverzibilným fázovým transformáciám, ktoré možno vysvetliť ich rozkladom nad 400°C. Kompletný súbor DSC údajov pre Na2KZrF7, Na2KHfF7 a Na2K(Zr,Hf)F7 ukazuje, že tieto zlúčeniny podliehajú ireverzibilným tansformáciám, ktoré sú spojené fázovým rozkladom nad 400°C na zlúčeniny s jedným druhom katiónu. Je potrebné poznamenať, že zlúčeniny Na2KMF7 (M = Zr, Hf alebo Zr/Hf) a K3MF7 (M = Zr, Hf) majú v rámci série podobné tepelné vlastnosti. Napriek tomu je rozdiel medzi Na2KMF7 a K3ZrF7 významný. Možno konštatovať, že náhrada Zr?Hf má malý vplyv na vlastnosti, zatiaľ čo substitučný efekt Na?K je oveľa silnejší. Preto by stabilita týchto zlúčenín by preto mala výrazne závisieť od polomerov iónov Na alebo K a menej od polomerov Zr alebo Hf. Táto vlastnosť umožňuje syntetizovať fázy s presnou symetriou a požadovanými tepelnými vlastnosťami.

MATSELKO, Oksana – POUPON, Morgane – SAMOLOVA, Erika – VASKOVÁ, Zuzana – KUBÍKOVÁ, Blanka – NETRIOVÁ, Zuzana – MIČUŠÍK, Matej – BOČA, Miroslav. New mixed cation heptafluorozirconates/hafnates. In ChemZi: Zborník abstraktov. – Bratislava : Slovenská chemická spoločnosť, 2023, p. 83. ISSN 1336-7242. Dostupné na internete: https://75zjazd.schems.sk/zbornik-abstraktov/ (75. Zjazd chemikov : vedecká konferencia. 75. Zjazd chemikov : vedecká konferencia) Typ: AFH

MATSELKO, Oksana – VASKOVÁ, Zuzana – MIČUŠÍK, Matej – BOČA, Miroslav. XPS study of some alkaline metal heptafluorozirconates/hafnates. In Design of Advanced Inorganic Materials – Workshop on the occasion of 70th anniversary of the institute of inorganic Chemistry SAS: Book of abstracts. – Bratislava, Slovakia: Institute of inorganic Chemistry Slovak academy of sciences, 2023, p. 24. ISBN 978-80-973578-7-0. (Design of Advanced Inorganic Materials – Workshop on the occasion of 70th anniversary of the institute of inorganic Chemistry SAS: vedecká konferencia) Typ: AFL

**30.) Umelé fotosyntetické systémy založené na fotoaktívnych molekulách a kvantových bodoch** *(Artificial photosynthetic systems based on photoactive molecules and quantum dots)*

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| **Zodpovedný riešiteľ:** | Juraj Bujdák |
| **Trvanie projektu:** | 1.9.2022 / 31.8.2025 |
| **Evidenčné číslo projektu:** | 1258/02/02 |
| **Organizácia je koordinátorom projektu:** | áno |
| **Koordinátor:** | Ústav anorganickej chémie SAV, v. v. i. |
| **Počet spoluriešiteľských** | 0 |

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| **inštitúcií:** | |
| **Čerpané financie:** | SAV: 19524 €<br>EU: 32880 € |

*Dosiahnuté výsledky:*

Hlavným cieľom prebiehajúceho projektu je pripraviť umelý fotosyntetický systém dispergovateľný vo vode, ktorý by bol schopný zachytávať slnečné žiarenie na ploche o veľkosti rádovo niekoľko tisíc µm2 na časticu. Takto zachytená slnečná energia by mohla byť následne využitá na rôzne aplikácie vrátane fotodegradácie, fotodezinfekcie alebo fotokatalytických procesov. V projekte je navrhnutý prenos energie prostredníctvom umelej antény a mechanizmov nežiarivého alebo žiarivého prenosu energie. Získaná energia bude následne nasmerovaná ku kvantovým bodom umiestnených na periférii antény. Predpokladá sa, že excitačná energia prijatá kvantovými bodmi aktivuje procesy prebiehajúce na rozhraní medzi kvantovými bodmi a vodou. Hlavným cieľom v rámci prvého roku tohto projektu bolo vytvoriť robustný experimentálny postup na prípravu antény pozostávajúcej z enkapsulovaných fotoaktívnych molekúl medzi dvomi vrstvami vrstevnatého silikátu. Okrem použitia komerčne dostupných fotoaktívnych molekúl sa použili aj syntetizované štruktúry obsahujúce dlhý alkylový reťazec, prostredníctvom ktorého sa dá kontrolovať hydrofobicita a taktiež aj rovnováha fotoaktívnych molekúl nachádzajúcich sa v medzivrství alebo v binárnom rozpúšťadle. Interkaláciu fotoaktívnych molekúl do medzivrstvového priestoru vrstevnatého silikátu možno dosiahnuť prostredníctvom iónovej výmeny. Pri tomto postupe sú pôvodné sodné katióny nachádzajúce sa v medzivrstvovom priestore vrstevnatého silikátu nahradené fotoaktívnymi molekulami, pričom je tento proces primárne riadený coulombickými interakciami medzi kladne nabitými molekulami a záporne nabitými vrstvami silikátu. Iónová výmena musí byť uskutočnená tak, aby sa pripravila usporiadaná heteroštruktúra so striedajúcimi sa medzivrstvami sodíka a fotoaktívnych molekúl, čo znamená že k výmene musí dôjsť iba v každej druhej medzivrstve. Po rozdispergovaní usporiadanej heteroštruktúry vo vodnom prostredí dochádza k solvatácii sodných katiónov. V závislosti od vrstvového náboja, objemová zmena medzivrstvového priestoru obsahujúca solvatované sodné katióny prekonáva coulombickú interakciu medzi vrstvami a sodíkom, čím dochádza k delaminácii monovrstiev fotoaktívnych molekúl enkapsulovaných medzi dvomi vrstvami vrstevnatého silikátu. Dodržaním optimalizovaných experimentálnych podmienok, akými sú zloženie binárneho rozpúšťadla, teplota a koncentrácia fotoaktívnych molekúl sa podarilo pripraviť usporiadané heteroštruktúry použitím syntetických vrstevnatých silikátov s vrstvovým nábojom 0.5 a 0.7 e-/huc. K úspešnej delaminácii usporiadanej heteroštruktúry došlo len v prípade vrstevnatého silikátu s menším vrstvovým nábojom, zatiaľčo podmienky potrebné k delaminácii usporiadanej heteroštruktúry s vyšším vrstvovým nábojom sa stále skúmajú. Pri použití oboch vrstevnatých silikátov bolo pozorované zvýšenie kvantového výťažku fotoaktívnych molekúl, ktoré bolo výraznejšie pre vyšší vrstvový náboj. Vyšší kvantový výťažok má pozitívny dopad na efektivitu prenosu energie na kvantové body. Efektivita však závisí aj od orientácie fotoaktívnych molekúl v medzivrstvovom priestore, a preto je dôležité vedieť ako je orientovaný prechodový dipólový moment. Túto otázku je možné zodpovedať použitím statickej fluorescenčnej spektroskopie v kombinácii s Levenberg-Marquardtovým iteračným postupom umožňujúcim fitovať experimentálne údaje požadovanou funkciou a následne extrahovať relevantné údaje.

**Programy: Štrukturálne fondy EÚ Výskum a inovácie**

**31.) Vybudovanie centra pre využitie pokročilých materiálov SAV** *(Building a centre for advanced material application SAS)*

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| **Zodpovedný riešiteľ:** | Miroslav Hnatko |
| **Zodpovedný riešiteľ v organizácii SAV:** | Miroslav Hnatko |
| **Trvanie projektu:** | 1.7.2019 / 30.6.2023 |
| **Evidenčné číslo projektu:** | NFP313020T081 |
| **Organizácia je koordinátorom projektu:** | nie |
| **Koordinátor:** | Centrum pre využitie pokročilých materiálov SAV, v. v. i. |
| **Počet spoluriešiteľských inštitúcií:** | 6 - Slovensko: 6 |
| **Čerpané financie:** | ŠF: 14094 € |

*Dosiahnuté výsledky:*
V rámci pod aktivity 1.4. Pokročilé keramické materiály boli splnené všetky stanovené ciele v plnej miere. Dosiahnuté výsledky dosiahnuté počas poslednej doby riešenia sú zhrnuté v nasledujúcich publikáciách.

Publikácie:
BYSTRICKÝ, Roman** - ŠKRÁTEK, Martin - RUSNÁK, Jaroslav - PRECNER, Marián - ŤAPAJNA, Milan – HNATKO, Miroslav - ŠAJGALÍK, Pavol. Electrical and magnetic properties of silicon carbide composites with titanium and niobium carbide as sintering aids. In Ceramics International, 2023, vol. 49, p. 5319-5326. (2022: 5.2 - IF, Q1 - JCR, 0.918 - SJR, Q1 - SJR). ISSN 0272-8842. Dostupné na: https://doi.org/10.1016/j.ceramint.2022.10.055

KITYK, Anna** - PAVLÍK, Viliam - HNATKO, Miroslav. Green electropolishing using choline chloride-based deep eutectic solvents: A review. In Journal of Molecular Liquids, 2023, vol. 392, art no. 123519. (2022: 6 - IF, Q1 - JCR, 0.914 - SJR, Q1 - SJR, karentované - CCC). (2023 - Current Contents, WOS, SCOPUS). ISSN 0167-7322. Dostupné na: https://doi.org/10.1016/j.molliq.2023.123519

KITYK, Anna** - ŠVEC, Peter - ŠOLTÝS, Ján - PAVLÍK, Viliam - HNATKO, Miroslav. Deep inside of the mechanism of electrochemical surface etching of ? + ? Ti6Al4V alloy in room-temperature deep eutectic solvent Ethaline. In Journal of Molecular Liquids, 2023, vol. 375, no. 121316. (2022: 6 - IF, Q1 - JCR, 0.914 - SJR, Q1 - SJR, karentované - CCC). (2023 - Current Contents, WOS, SCOPUS). ISSN 0167-7322. Dostupné na: https://doi.org/10.1016/j.molliq.2023.121316

KITYK, Anna** - PAVLÍK, Viliam - HNATKO, Miroslav. Exploring deep eutectic solvents for the electrochemical and chemical synthesis of photoand electrocatalysts for hydrogen evolution. In International Journal of Hydrogen Energy, 2023, vol. 48, iss. 100, pp. 39823-39853. (2022: 7.2 - IF, Q1 - JCR, 1.318 - SJR, Q1 - SJR). ISSN 0360-3199. Dostupné na: https://doi.org/10.1016/j.ijhydene.2023.07.158

KUCHERYAVAYA, Anastasia** - LENČÉŠ, Zoltán** - ŠAJGALÍK, Pavol - HARMUTH, Harald. Zirconium oxycarbides and oxycarbonitrides: A review. In International Journal of Applied Ceramic Technology, 2023, vol. 20, no. 2 p. 541-562. (2022: 2.1 - IF, Q2 - JCR, 0.419 - SJR, Q2 - SJR). ISSN 1546-542X. Dostupné na: https://doi.org/10.1111/ijac.14188

SINGH, Meinam Annebushan** - SARMA, Deba Kumar - HANZEL, Ondrej - ŠAJGALÍK, Pavol - RAMKUMAR, Janakarajan. Characterization of surface topography during multi-pass WEDM of MWCNT alumina composites. In CIRP Journal of Manufacturing Science and Technology, 2023, vol. 41, pp. 338-349. (2022: 4.8 - IF, Q2 - JCR, 1.065 - SJR, Q1 - SJR). ISSN 1755-5817. Dostupné na: https://doi.org/10.1016/j.cirpj.2022.11.019

ŠIMKO, František** - LENČÉŠ, Zoltán - KIM, Young-Wook - NOSKO, Martin - KONTRÍK, Martin - KORENKO, Michal. High temperature corrosion resistance of electrically conductive nitrogen doped silicon carbide ceramics in molten fluorides. In Journal of the European Ceramic Society, 2023, vol. 43, p. 3931-3940. (2022: 5.7 - IF, Q1 - JCR, 1.257 - SJR, Q1 - SJR). ISSN 0955-2219. Dostupné na: https://doi.org/10.1016/j.jeurceramsoc.2023.03.001

**Programy: DoktoGranty**

**32.) Mechanical properties of advanced materials based on the clay minerals and polymers studied by the computational method** *('Mechanical properties of advanced materials based on the clay minerals and polymers studied by the computational method)*

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| **Zodpovedný riešiteľ:** | Sanam Bashir |
| **Trvanie projektu:** | 1.1.2023 / 31.12.2023 |
| **Evidenčné číslo projektu:** | 2022-PP0426 |
| **Organizácia je koordinátorom projektu:** | áno |
| **Koordinátor:** | Ústav anorganickej chémie SAV, v. v. i. |

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| **Počet spoluriešiteľských inštitúcií:** | 0 |
| **Čerpané financie:** | SAV: 2000 € |

*Dosiahnuté výsledky:*
Výskum sa zameral na pochopenie mechanických vlastností ílových minerálov zo skupiny smektitov a ich kompozitov s polymérmi. Skúmali sa interakcie polymérnej matrice poly(2-metyl-2-oxazolín) (PMeOx) v medzivrstvovom priestore montmorillonitu (Mt) experimentálnymi aj výpočtovými metódami (DFT metóda). Okrem toho sme štúdium rozšírili aj na ďalšie typy ílových minerálov zo skupiny smektitov, a to beidellit (Bd), saponit (Sap) a hektorit (Ht). Cieľom bola analýza typov interakcií v medzivrství skúmaných smektitovv, štúdium vplyvu interkalácie polyméru na (d001) a výpočet elastických konštánt a elastických modulov pre čisté ílové minerály a kompozity. Na základe získaných výsledkov sa zistilo, že hektorit (Ht) vykazuje vynikajúce mechanické vlastnosti v rámci skúmanej skupiny smektitov a jeho potenciál pre prípravu kompozitov s polymérom PMeOX.

Výstupy:
2. BASHIR, Sanam** - ŠKORŇA, Peter - SCHOLTZOVÁ, Eva. Interaction of beidellite and saponite clay minerals with poly(2-methyl-2-oxazoline): a density functional theory study. In International Conference of European Clay Groups Association - EUROCLAY 2023: Scientific Research Abstracts - Volume 14. 14. - Bari, Italy: Digilabs, 2023, p. 19. ISBN 978-88-7522-052-5.
2. BASHIR, Sanam** - MORENO-RODRIGUEZ, Daniel - SCHOLTZOVÁ, Eva. A DFT-D3 study of interactions of saponite and hectorite clay minerals with poly(2-methyl-2- oxazoline) (PMeOX) polymer. In 17th International Congress of Quantum Chemistry: book af abstract. 1. vyd. - Bratislava: International Academy of Quantum Molecular Science, 2023, p. 393. ISBN 978-80-973578-8-7.

**33.) Wetting behaviour and high temperature interactions between Mo-Nb-Ta-V-W high entropy alloy and (Mo-Nb-Ta-V-W)C high entropy ceramics** *(Wetting behaviour and high temperature interactions between Mo-Nb-Ta-V-W high entropy alloy and (Mo-Nb-Ta-V-W)C high entropy ceramics)*

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| **Zodpovedný riešiteľ:** | Naser Hosseini |
| **Trvanie projektu:** | 1.1.2023 / 31.12.2023 |
| **Evidenčné číslo projektu:** | |
| **Organizácia je koordinátorom projektu:** | áno |
| **Koordinátor:** | Ústav anorganickej chémie SAV, v. v. i. |
| **Počet spoluriešiteľských inštitúcií:** | 0 |
| **Čerpané financie:** | SAV: 2000 € |

*Dosiahnuté výsledky:*
Jedným z cieľov projektu bolo pripraviť vysokoentropické zliatiny na báze (Mo-Nb-Ta-V-W) a (Zr-Hf-Ta-Nb-Ti), a študovať ich interakciu s povrchmi vysokoentropických karbidov obsahujúcich rovnaké prechodné kovy, t.j. (Mo-Nb-Ta-V-W)C a (Zr-Hf-Ta-Nb-Ti)C. Tieto zliatiny boli pripravené cestou práškovej metalurgie s následným spekaním za asistencie elektrického poľa, ale aj niekoľkonásobným oblúkovým tavením jednotlivých kovov. Zliatiny pripravené oblúkovým tavením vykázali vyššiu homogenitu a čistotu. Ďalším cieľom projektu bolo štúdium zmáčavosti roztavených zliatin na báze Ni na povrchoch vysokoentropických karbidov. Pri použití čistého Ni došlo k výraznému poškodeniu/rozpusteniu základného vysokoentropického materiálu, čo vylučuje možnosť využiť čistý Ni ako spojivo. Na zamedzenie tohto poškodenia/rozpustnosti, bola vytvorená eutektická zliatina Ni-Ta, ktorej uhol zmáčania bol < 15°. Zároveň nedošlo k rozpusteniu základného materiálu, a tak táto zliatina bola zvolená ako spojivo pre vysokonetropické karbidy.

Publikácie:
HOSSEINI, Naser** – VALENZA, Fabrizio – GAMBARO, S. – CHLUP, Zdeněk – KOVALČÍKOVÁ, Alexandra – DLOUHÝ, Ivo – TATARKO, Peter. Wettability and joining of (Mo-Nb-Ta-V-W)C high entropy carbide by NiTa eutectic alloys. In Processing and properties of advanced ceramics and glasses: Proceedings.

Stará Lesná, 25.-27.10.2023. Košice, Slovakia: Institute of Materials Research, SAS, 2023, p. 40-46. ISBN 978-80-89782-16-1. Typ: AFD

TATARKO, Peter** – HOSSEINI, Naser – CHLUP, Zdeněk – KOVALČÍKOVÁ, Alexandra – ZHOU, Xiaobing – VALENZA, Fabrizio – CASALEGNO, Valentina – DLOUHÝ, Ivo. Wetting and joining of ceramic matrix composites with refractory transition metal-based alloys. In 11th International Conference on High Temperature Ceramic Matrix Composites (HT-CMC 11): E-Abstract book. Seoul, Korea: The federation of Korea ceramic associations, 2023, p. 352. Typ: GII

**Programy: Európsky fond regionálneho rozvoja (EFRR)**

**34.) Rozvoj a podpora výskumno – vývojových aktivít Centra pre testovanie kvality a diagnostiku materiálov v oblastiach špecializácie RIS3 SK (ITMS2014+: 313011W442)** *(Rozvoj a podpora výskumno – vývojových aktivít Centra pre testovanie kvality a diagnostiku materiálov v oblastiach špecializácie RIS3 SK)*

| | |
|---|---|
| **Zodpovedný riešiteľ:** | Dušan Galusek |
| **Trvanie projektu:** | 1.1.2019 / 30.6.2023 |
| **Evidenčné číslo projektu:** | ITMS2014+ 313011W442 |
| **Organizácia je koordinátorom projektu:** | nie |
| **Koordinátor:** | Trenčianska univerzita Alexandra Dubčeka v Trenčíne |
| **Počet spoluriešiteľských inštitúcií:** | 4 - Slovensko: 4 |
| **Čerpané financie:** | SF: 15921 € |

*Dosiahnuté výsledky:*
V rámci projektu sa dobudovala výskumná infraštruktúra pracoviska, zakúpili a nainštalovali sa XPS analyzátor a poloprevádzková link ana povrchové úpravy skla sa rozšírila o 2 PVD moduly (plochú a rotujúcu katódu).
V rámci vedeckých aktivít projektu sa vyvinula metóda prípravy nanočastíc Y2O3 dopovaných CeO2 precipitačnou metódou a optimalizoval sa postup prípravy kusovej Y2O3 keramiky s použitím týchto práškov. V rámci inej výskumnej aktivity projektu sa vyvinul nový druh sklenej membrány pre odstraňovanie toxických kovových polutantov z odpadových vôd. Membrány sa pripravili alkalickou aktiváciou odpadového skla, na povrchu ktorého sa v dôsledku aktivácie vytvorili štruktúry schopné adsorbovať ťažké kovy. Skúmal sa tiež vplyv obsahu Al2O3 na kryštalizáciu NaYF4 v oxyfluoridových sklách a vplyv na mikroštruktúru výslednej sklokeramiky.

1. PUTENPURAYIL, Nibu Govindan - NAJAFZADEHKHOEE, Aliasghar** - TALIMIAN, Ali - POUCHLY, Vaclav - MICHÁLKOVÁ, Monika - ŠVANČÁREK, Peter - KLEMENT, Róbert - GALUSEK, Dušan. Sintering of Ce3+-doped yttria nanoparticles prepared by precipitation method (2023) Open Ceramics, 13, art. no. 100315, DOI: 10.1016/j.oceram.2022.100315

2. LAGO, Diana** - KRAXNER, Jozef - GALUSEK, Dušan - BERNARDO, Enrico. Novel glass-based membranes for Cu adsorption: From alkali activation to sintering. In Heliyon, 2023, vol. 9, iss. 8, art no. e18221. (2022: 4 - IF, Q2 - JCR, 0.609 - SJR, Q1 - SJR). ISSN 2405-8440. Dostupné na: https://doi.org/10.1016/j.heliyon.2023.e18221 Type: ADCA

## *Príloha A-3* - Publikačná činnosť organizácie

*Príloha je generovaná z ARL.*

### ADCA Vedecké práce v zahraničných karentovaných časopisoch – impaktovaných

ADCA01 AKBARI, Mohammad Karbalaei** - LOPA, Nasrin Siraj - SHAHRIARI, Marina - NAJAFZADEHKHOEE, Aliasghar - GALUSEK, Dušan - ZHUIYKOV, Serge. Functional Two-Dimensional Materials for Bioelectronic Neural Interfacing. In Journal of Functional Biomaterials, 2023, vol. 14, iss. 1, art no. 35. (2022: 4.8 - IF, Q2 - JCR, 0.637 - SJR, Q2 - SJR). ISSN 2079-4983. Dostupné na: https://doi.org/10.3390/jfb14010035

ADCA02 AMBATI, Ramu - PAVLÍK, Viliam - SILLIKOVÁ, Veronika - BOČA, Miroslav. Corrosion Behavior of Incoloy (R) 800H, Hastelloy (R) G35 (R) and 316L Stainless Steel in the Molten Eutectic Fluoride Mixture FLiNaK and Its Vapors. In Materials, 2023, vol. 16, no. 7, art. no. 2679-1-2679-14. (2022: 3.4 - IF, Q2 - JCR, 0.563 - SJR, Q2 - SJR). ISSN 1996-1944. Dostupné na: https://doi.org/10.3390/ma16072679

ADCA03 AMBATI, Ramu - PAVLÍK, Viliam - SILLIKOVÁ, Veronika - MATSELKO, Oksana - BOČA, Miroslav. Corrosion of Hastelloy-N and Hastelloy-G35 from vapors gerated from FLiNaK salt with addition of 5% oxygen in argon atmosphere. In Materials and Corrosion - Werkstoffe und Korrosion, 2023, vol. 74, no. 5, pp. 670-682. (2022: 1.8 - IF, Q3 - JCR, 0.416 - SJR, Q2 - SJR). ISSN 0947-5117. Dostupné na: https://doi.org/10.1002/maco.202213412

ADCA04 AMBROVÁ, Marta** - KORENKO, Michal - SZATMÁRY, Lórant. Influence of the Sulfur Species on the Current Efficiency and Carbon Consumption in the Aluminum Electrolysis Process. In Metallurgical and Materials Transactions B : Process Metallurgy and Materials Processing Science, 2023, vol. 54, iss. 5, pp. 2541-2551. (2022: 3 - IF, Q2 - JCR, 0.804 - SJR, Q1 - SJR). ISSN 1073-5615. Dostupné na: https://doi.org/10.1007/s11663-023-02855-9

ADCA05 AMSLER, Jonas** - PLESSOW, Philipp N. - STUDT, Felix - BUČKO, Tomáš**. Anharmonic Correction to Free Energy Barriers from DFT-Based Molecular Dynamics Using Constrained Thermodynamic Integration. In Journal of Chemical Theory and Computation, 2023, vol.19, iss. 9, pp. 2455-2468. (2022: 5.5 - IF, Q1 - JCR, 1.665 - SJR, Q1 - SJR). ISSN 1549-9618. Dostupné na: https://doi.org/10.1021/acs.jctc.3c00169 (APVV-20-0127 : Od presných ab initio výpočtov k predpovediam teplotne závislých vlastností molekúl a materiálov)

ADCA06 BUJDÁK, Juraj**. Controversial Issues Related to Dye Adsorption on Clay Minerals: A Critical Review. In Molecules, 2023, vol. 28, iss. 19, art no. 6951. (2022: 4.6 - IF, Q2 - JCR, 0.704 - SJR, Q1 - SJR, karentované - CCC). (2023 - Current Contents, WOS, SCOPUS). ISSN 1420-3049. Dostupné na: https://doi.org/10.3390/molecules28196951

ADCA07 BUJDÁK, Juraj** - ŠIMONOVÁ, Tímea - BOHÁČ, Peter - MÉSZÁROS, Róbert*. Adsorption of Dye Molecules and Its Potential for the Development of Photoactive Hybrid Materials Based on Layered Silicates. In Journal of Physical Chemistry B, 2023, vol. 127, iss. 5, pp. 1063-1073. (2022: 3.3 - IF, Q3 - JCR, 0.795 - SJR, Q1 - SJR). ISSN 1520-6106. Dostupné na: https://doi.org/10.1021/acs.jpcb.2c07814

ADCA08 BYSTRICKÝ, Roman** - ŠKRÁTEK, Martin - RUSNÁK, Jaroslav - PRECNER, Marián - ŤAPAJNA, Milan - ŠAJGALÍK, Pavol. Electrical and magnetic properties of silicon carbide composites with titanium and niobium carbide as sintering aids. In Ceramics International, 2023, vol. 49, p. 5319-5326. (2022: 5.2 - IF, Q1 - JCR, 0.918 - SJR, Q1 - SJR). ISSN 0272-8842. Dostupné na: https://doi.org/10.1016/j.ceramint.2022.10.055

ADCA09 ČERNÁK, Juraj - KREŠÁKOVÁ, Lenka - TARASENKO, Róbert - DOROSHENKO, Anastassia - ORENDÁČ, Martin - JANKOVIČ, Ľuboš - MADEJOVÁ, Jana**. Intercalation of [Ni(bpy)3]2+ complex cation into synthetic saponite: Preparation, characterization and magnetic properties. In Applied Clay Science, 2023, vol. 231, no., art. no. 106728. (2022: 5.6 - IF, Q1 - JCR, 0.985 - SJR, Q1 - SJR). ISSN 0169-1317. Dostupné na: https://doi.org/10.1016/j.clay.2022.106728

ADCA10 GIANNI, Eleni - PŠENIČKA, Milan - MACKOVÁ, Kateřina - SCHOLTZOVÁ, Eva - JANKOVIČ, Ľuboš - MAREŠ, Martin - PAPOULIS, Dimitrios - POSPÍŠIL, Miroslav**. New detail insight into Halloysite structure: Mechanism behind nanotubular morphology described by density functional theory and molecular dynamics supported by experiments. In

Journal of Molecular Structure, 2023, vol. 1287, art. no. 135639-1-135639-15. (2022: 3.8 - IF, Q2 - JCR, 0.482 - SJR, Q2 - SJR). ISSN 0022-2860. Dostupné na: https://doi.org/10.1016/j.molstruc.2023.135639

ADCA11 GRIEBENOW, Kristin** - TRUONG, Mai-Phuong - MUNOZ, Francisco - KLEMENT, Róbert - GALUSEK, Dušan. Tuning the fluorescence of Dy3+ via the structure of borophosphate glasses. In Scientific Reports, 2023, vol. 13, iss. 1, art no. 1919. (2022: 4.6 - IF, Q2 - JCR, 0.973 - SJR, Q1 - SJR). ISSN 2045-2322. Dostupné na: https://doi.org/10.1038/s41598-023-28941-1

ADCA12 HRICOVÍNI, Michal - ASHER, James Richard - HRICOVÍNI, Miloš**. Intramolecular crankshaft-type rearrangement in a photoisomerised glycoconjugate. In RSC Advances, 2023, vol. 13, iss. 14, p. 9413-9417. (2022: 3.9 - IF, Q2 - JCR, 0.678 - SJR, Q2 - SJR). ISSN 2046-2069. Dostupné na: https://doi.org/10.1039/d3ra01678a

ADCA13 HRUBOVČÁKOVÁ, Monika - CSANÁDI, Tamás - SEDLÁK, Richard** - KOVALČÍKOVÁ, Alexandra - SHEPA, Ivan - MÚDRA, Erika - SOPČÁK, Tibor - ÜNSAL, Hakan - TATARKO, Peter - ŠAJGALÍK, Pavol - DUSZA, Ján. The effect of SiC whiskers addition on the microstructure and mechanical properties of a (Hf-Ta-Zr-Nb-Ti)C-SiC composite. In Ceramics International, 2023, vol. 49, p. 24179-24186. (2022: 5.2 - IF, Q1 - JCR, 0.918 - SJR, Q1 - SJR). ISSN 0272-8842. Dostupné na: https://doi.org/10.1016/j.ceramint.2022.10.239 (VEGA 2/0118/20 : Vysokoteplotné vlastnosti boridových MeB2 (Me=Ti, Zr, Hf) keramických kompozitných materiálov. VEGA 2/0175/21 : Vývoj vysokoteplotných kompozitných materiálov na báze boridov a karbidov s prídavkom grafénových platničiek pripravených progresívnymi metódami spekania. APVV-17-0328: Vývoj žiaruvzdorných pyrochlórnych fáz pre vysokoteplotné aplikácie neoxidovej keramiky. APVV-19-0497 : Nové vysokoentropické keramické materiály pre pokročilé aplikácie)

ADCA14 HRUŠKA, Branislav** - CHROMČÍKOVÁ, Mária - NOWICKA, Aleksandra - MACHÁČEK, Jan - LIŠKA, Marek. Thermodynamic model and surface-active components of barium crystal glass. In Journal of Thermal Analysis and Calorimetry, 2023, vol. 148, pp. 1705-1711. (2022: 4.4 - IF, Q1 - JCR, 0.753 - SJR, Q1 - SJR). ISSN 1388-6150. Dostupné na: https://doi.org/10.1007/s10973-022-11704-x

ADCA15 CHANDRASEKAR, Ashok Raja** - MERINO, Emilia - PAKSERESHT, Amirhossein - GALUSEK, Dušan - DURAN, Alicia - CASTRO, Yolanda. Influence of Polyols on the In Vitro Biodegradation and Bioactivity of 58S Bioactive Sol–Gel Coatings on AZ31B Magnesium Alloys. In Polymers : Open Access Polymer Science Journal, 2023, vol. 15, iss. 5, art no. 1273. (2022: 5 - IF, Q1 - JCR, 0.72 - SJR, Q1 - SJR). ISSN 2073-4360. Dostupné na: https://doi.org/10.3390/polym15051273

ADCA16 CHROMČÍKOVÁ, Mária** - SVOBODA, Roman - HRUŠKA, Branislav - PECUŠOVÁ, Beáta - NOWICKA, Aleksandra. Thermo-kinetic and structural characterization of Ce-doped glasses based on Bioglass 45S5. In Materials Chemistry and Physics, 2023, vol. 304, art no. 127833. (2022: 4.6 - IF, Q2 - JCR, 0.75 - SJR, Q1 - SJR). ISSN 0254-0584. Dostupné na: https://doi.org/10.1016/j.matchemphys.2023.127833

ADCA17 JAYKHEDKAR, Namrata** - BYSTRICKÝ, Roman - SÝKORA, Milan - BUČKO, Tomáš**. How the Temperature and Composition Govern the Structure and Band Gap of Zr-Based Chalcogenide Perovskites: Insights from ML Accelerated AIMD. In Inorganic Chemistry, 2023, vol. 62, iss. 31, pp. 12480-12492. (2022: 4.6 - IF, Q1 - JCR, 0.997 - SJR, Q1 - SJR). ISSN 0020-1669. Dostupné na: https://doi.org/10.1021/acs.inorgchem.3c01696

ADCA18 KITYK, Anna** - ŠVEC, Peter Jr. - ŠOLTÝS, Ján - PAVLÍK, Viliam - HNATKO, Miroslav. Deep inside of the mechanism of electrochemical surface etching of α + β Ti6Al4V alloy in room-temperature deep eutectic solvent Ethaline. In Journal of Molecular Liquids, 2023, vol. 375, no. 121316. (2022: 6 - IF, Q1 - JCR, 0.914 - SJR, Q1 - SJR, karentované - CCC). (2023 - Current Contents, WOS, SCOPUS). ISSN 0167-7322. Dostupné na: https://doi.org/10.1016/j.molliq.2023.121316

ADCA19 KITYK, Anna** - PAVLÍK, Viliam - HNATKO, Miroslav. Exploring deep eutectic solvents for the electrochemical and chemical synthesis of photoand electrocatalysts for hydrogen evolution. In International Journal of Hydrogen Energy, 2023, vol. 48, iss. 100, pp. 39823-39853. (2022: 7.2 - IF, Q1 - JCR, 1.318 - SJR, Q1 - SJR). ISSN 0360-3199. Dostupné na: https://doi.org/10.1016/j.ijhydene.2023.07.158

ADCA20 KITYK, Anna** - PAVLÍK, Viliam - HNATKO, Miroslav. Green electropolishing using choline chloride-based deep eutectic solvents: A review. In Journal of Molecular Liquids, 2023, vol. 392, art no. 123519. (2022: 6 - IF, Q1 - JCR, 0.914 - SJR, Q1 - SJR, karentované - CCC). (2023 - Current Contents, WOS, SCOPUS). ISSN 0167-7322. Dostupné na: https://doi.org/10.1016/j.molliq.2023.123519

ADCA21 KONEČNÝ, Lukáš - KOMOROVSKÝ, Stanislav - VÍCHA, Jan - KENNETH, Ruud - REPISKÝ, Michal. Exact Two-Component TDDFT with Simple Two-Electron Picture-Change Corrections: X-ray Absorption Spectra Near L- and M-Edges of Four-Component Quality at Two-Component Cost. In Journal of Physical Chemistry A.Molecules, spectroscopy, kinetics, environment, and general theory, 2023, vol. 127, iss. 5, pp. 1360-1376. (2022: 2.9 - IF, Q2 - JCR, 0.675 - SJR, Q2 - SJR). ISSN 1089-5639. Dostupné na: https://doi.org/10.1021/acs.jpca.2c08307

ADCA22 KUCHERYAVAYA, Anastasia** - LENČÉŠ, Zoltán** - ŠAJGALÍK, Pavol - HARMUTH, Harald. Zirconium oxycarbides and oxycarbonitrides: A review. In International Journal of Applied Ceramic Technology, 2023, vol. 20, no. 2 p. 541-562. (2022: 2.1 - IF, Q2 - JCR, 0.419 - SJR, Q2 - SJR). ISSN 1546-542X. Dostupné na: https://doi.org/10.1111/ijac.14188

ADCA23 KUZIELOVÁ, Eva** - TATARKO, Miroslav - SLANÝ, Michal - ŽEMLIČKA, Matúš - MÁSILKO, Jiři - NOVOTNÝ, Radoslav - PALOU, Martin T. Early and middle stages of multicomponent cement hydration under the effect of geothermal water and increased temperatures. In Geothermics, 2023, vol. 108, art. no. 102632, p. 1-13. (2022: 3.9 - IF, Q2 - JCR, 0.912 - SJR, Q1 - SJR). ISSN 0375-6505. Dostupné na: https://doi.org/10.1016/j.geothermics.2022.102632 (APVV-19-0490 : Výskum a vývoj mnohozložkových cementových zmesí pre špeciálne konštrukčné materiály. APVV-15-0631 : Výskum vysokohodnotných cementových kompozitov za hydrotermálnych podmienok pre potenciálne využitie v hĺbkových vrtoch. VEGA 2/0032/21 : Štúdium degradácie viaczložkových cementových materiálov v dôsledku uhličitej korózie v podmienkach simulujúcich geotermálne vrty. VEGA 2/0017/21 : Materiálové zloženie a vlastnosti samozhutniteľných ťažkých betónov)

ADCA24 KUZIELOVÁ, Eva** - SLANÝ, Michal - ŽEMLIČKA, Matúš - MÁSILKO, Jiři. Accelerated carbonation of oil-well cement blended with pozzolans and latent hydraulic materials. In Journal of Thermal Analysis and Calorimetry, 2023, vol. 148, no. 19, p. 9963–9977. (2022: 4.4 - IF, Q1 - JCR, 0.753 - SJR, Q1 - SJR). ISSN 1388-6150. Dostupné na: https://doi.org/10.1007/s10973-023-12378-9 (APVV-19-0490 : Výskum a vývoj mnohozložkových cementových zmesí pre špeciálne konštrukčné materiály. VEGA 2/0032/21 : Štúdium degradácie viaczložkových cementových materiálov v dôsledku uhličitej korózie v podmienkach simulujúcich geotermálne vrty)

ADCA25 LAGO, Diana** - KRAXNER, Jozef - GALUSEK, Dušan - BERNARDO, Enrico. Novel glass-based membranes for Cu adsorption: From alkali activation to sintering. In Heliyon, 2023, vol. 9, iss. 8, art no. e18221. (2022: 4 - IF, Q2 - JCR, 0.609 - SJR, Q1 - SJR). ISSN 2405-8440. Dostupné na: https://doi.org/10.1016/j.heliyon.2023.e18221

ADCA26 LI, Jinguy - FENG, Sen - SHI, Zhongning - WANG, Xu - BOČA, Miroslav. Characterization of europium doped yttrium nano-oxide prepared by plasma electrolysis in nitrate solution under air atmosphere at room temperature. In Ceramics International, 2023, vol. 49, iss. 19, pp. 31295-31301. (2022: 5.2 - IF, Q1 - JCR, 0.918 - SJR, Q1 - SJR). ISSN 0272-8842. Dostupné na: https://doi.org/10.1016/j.ceramint.2023.07.077

ADCA27 MA, Liwa* - SLANÝ, Michal* - GUO, Rui - DU, Weichao - LI, Yongfei - CHEN, Gang**. Study on synergistic catalysis of ex-situ catalyst and in-situ clay in aquathermolysis of water-heavy oil-ethanol at low temperature. In Chemical Engineering Journal, 2023, vol. 453, p. 139872-1-139872-11. (2022: 15.1 - IF, Q1 - JCR, 2.803 - SJR, Q1 - SJR). ISSN 1385-8947. Dostupné na: https://doi.org/10.1016/j.cej.2022.139872

ADCA28 MADEJOVÁ, Jana** - BARLOG, Martin - SLANÝ, Michal - BASHIR, Sanam - SCHOLTZOVÁ, Eva - TUNEGA, Daniel - JANKOVIČ, Ľuboš. Advanced materials based on montmorillonite modified with poly(ethylenimine) and poly(2-methyl-2-oxazoline): Experimental and DFT study. In Colloids and Surfaces A: Physicochemical and Engineering Aspects, 2023, vol. 659, art. no. 130784. (2022: 5.2 - IF, Q2 - JCR, 0.792 - SJR, Q1 - SJR). ISSN 0927-7757. Dostupné na: https://doi.org/10.1016/j.colsurfa.2022.130784

ADCA29 MAHMOUD, Mokhtar - KRAXNER, Jozef - ELSAYED, Hamada - BERNARDO, Enrico -

GALUSEK, Dušan**. Fabrication and environmental applications of glass microspheres: A review. In Ceramics International, 2023, vol. 49, iss. 24, pp. 39745-39759. (2022: 5.2 - IF, Q1 - JCR, 0.918 - SJR, Q1 - SJR). ISSN 0272-8842. Dostupné na: https://doi.org/10.1016/j.ceramint.2023.10.040

ADCA30 MAJEROVÁ, Melinda** - PRNOVÁ, Anna - KRAXNER, J. - PECUŠOVÁ, B. - PLŠKO, A. - GALUSEK, Dušan. Study of thermal properties and crystallization kinetics of Bi-doped 2CaO-Al2O3-SiO2 glasses. In Journal of Thermal Analysis and Calorimetry, 2023, vol. 148, no. 4, p. 1533–1541. (2022: 4.4 - IF, Q1 - JCR, 0.753 - SJR, Q1 - SJR). ISSN 1388-6150. Dostupné na: https://doi.org/10.1007/s10973-022-11614-y (VEGA č. 2/0028/21 : Ion exchange strengthened aluminosilicate glass/glass-ceramics with additional functionalities. VEGA č. 2/0141/21 : SQUID magnetometry of nano- and microparticles, nanocolloids and nanostructures in new applications in the field of biomedicine and materials research associated with the development of new measurement methods and procedures)

ADCA31 MATOVIC, Branko** - ZAGORAC, Dejan - ZAGORAC, Jelena - BUTULIJA, Svetlana - ERČIC, Jelena - HANZEL, Ondrej - SEDLÁK, Richard - LISNICHUK, Maksym - TATARKO, Peter. Fabrication and characterization of high entropy pyrochlore ceramics. In Boletín de la sociedad Espaňola de cerámica y vidrio, 2023, vol. 62, p. 66-76. (2022: 3.4 - IF, Q1 - JCR, 0.465 - SJR, Q2 - SJR). ISSN 0366-3175. Dostupné na: https://doi.org/10.1016/j.bsecv.2021.11.002 (APVV-SK-18-0022 : Vysokoteplotné karbidy pre aplikicie v extrémnych podmienkach. APVV-17-0328 : Vývoj žiaruvzdorných pyrochlórnych fáz pre vysokoteplotné aplikácie neoxidovej keramiky)

ADCA32 MEDVEĎ, Dávid** - IVOR, Michal - KOVALČÍKOVÁ, Alexandra - MÚDRA, Erika - CSANÁDI, Tamás - SEDLÁK, Richard - ÜNSAL, Hakan - TATARKO, Peter - TATARKOVÁ, Monika - ŠAJGALÍK, Pavol - DUSZA, Ján. Wear Behavior of (Mo-Nb-Ta-V-W)C high-entropy carbide. In International Journal of Applied Ceramic Technology, 2023, vol. 20, p. 224-235. (2022: 2.1 - IF, Q2 - JCR, 0.419 - SJR, Q2 - SJR). ISSN 1744-7402. Dostupné na: https://doi.org/10.1111/ijac.14111 (VEGA 2/0118/20 : Vysokoteplotné vlastnosti boridových MeB2 (Me=Ti, Zr, Hf) keramických kompozitných materiálov. VEGA 2/0175/21 : Vývoj vysokoteplotných kompozitných materiálov na báze boridov a karbidov s prídavkom grafénových platničiek pripravených progresívnymi metódami spekania)

ADCA33 MLYNÁRIKOVÁ, Jarmila - BOČA, Miroslav - KUBÍKOVÁ, Blanka. Densities and Volume Properties of the Melts of the Systems (LiF + NaF)eut + SmF3, (LiF + NaF)eut + GdF3, and (LiF + NaF)eut + NdF3. In Journal of Chemical and Engineering Data, 2023, vol. 68, no. 5, p. 1133-1144. (2022: 2.6 - IF, Q2 - JCR, 0.625 - SJR, Q2 - SJR). ISSN 0021-9568. Dostupné na: https://doi.org/10.1021/acs.jced.3c00084

ADCA34 MORENO RODRÍGUEZ, Daniel - GIANNI, Eleni - POSPÍŠIL, Miroslav - SCHOLTZOVÁ, Eva. Is Imogolite a suitable adsorbent agent for the herbicides like diuron and atrazine? In Journal of Molecular Liquids, 2023, vol. 38, art. no. 121732-1-121732-12. (2022: 6 - IF, Q1 - JCR, 0.914 - SJR, Q1 - SJR, karentované - CCC). (2023 - Current Contents, WOS, SCOPUS). ISSN 0167-7322. Dostupné na: https://doi.org/10.1016/j.molliq.2023.121732

ADCA35 MURÁTH, Szabolcs - DVORNÍKOVÁ, Natálie - MORENO RODRÍGUEZ, Daniel - NOVOTNÝ, Radek - POSPÍŠIL, Miroslav - URBANOVÁ, Martina - BRUS, Jiří - KOVANDA, František**. Intercalation of atorvastatin and valsartan into Mg-Al layered double hydroxide host using a restacking procedure. In Applied Clay Science, 2023, vol. 231, p. 106717-1-106717-12. (2022: 5.6 - IF, Q1 - JCR, 0.985 - SJR, Q1 - SJR). ISSN 0169-1317. Dostupné na: https://doi.org/10.1016/j.clay.2022.106717

ADCA36 NAUGHTON-DUSZOVÁ, Annamária** - MEDVEĎ, Dávid - ĎAKOVÁ, Lenka - KOVALČÍKOVÁ, Alexandra - ŠVEC, Peter Jr. - TATARKO, Peter - ÜNSAL, Hakan - HVIZDOŠ, Pavol - ŠAJGALÍK, Pavol - DUSZA, Ján. Highly wear resistant dual-phase (Ti-Zr-Nb-Hf-Ta)C/(Ti-Zr-Nb-Hf-Ta) B2 high-entropy ceramics. In Advances in Applied Ceramics, 2023, vol. 122, no. 3-4, p. 107-118. (2022: 2.2 - IF, Q2 - JCR, 0.45 - SJR, Q2 - SJR). ISSN 1743-6753. Dostupné na: https://doi.org/10.1080/17436753.2023.2238160 (VEGA 2/0118/20 : Vysokoteplotné vlastnosti boridových MeB2 (Me=Ti, Zr, Hf) keramických kompozitných materiálov. VEGA 2/0174/21 : Nanomechanické skúšanie a deformovateľnosť vysokoentropických ultra vysokoteplotných keramických materiálov. VEGA 2/0144/21 : Riadenie vlastností kovových systémov modifikáciou štruktúry na atomárnej škále pomocou vnútorných a vonkajších faktorov. APVV-17-0328 : Vývoj žiaruvzdorných pyrochlórnych fáz pre vysokoteplotné aplikácie neoxidovej keramiky. APVV-19-0497 : Nové vysokoentropické keramické materiály pre pokročilé aplikácie. APVV-21-0402 : Vývoj nových keramických materiálov komplexného zloženia pre extrémne aplikácie)

ADCA37 NAUGHTON-DUSZOVÁ, Annamária** - ŠVEC, Peter Jr.** - KOVALČÍKOVÁ, Alexandra - SEDLÁK, Richard - TATARKO, Peter - HVIZDOŠ, Pavol - ŠAJGALÍK, Pavol - DUSZA, Ján. On the phase and grain boundaries in dual phase carbide/boride ceramics from micro to atomic level. In Journal of the European Ceramic Society, 2023, vol. 43, p. 6765-6773. (2022: 5.7 - IF, Q1 - JCR, 1.257 - SJR, Q1 - SJR). ISSN 0955-2219. Dostupné na: https://doi.org/10.1016/j.jeurceramsoc.2023.07.034 (VEGA 2/0118/20 : Vysokoteplotné vlastnosti boridových MeB2 (Me=Ti, Zr, Hf) keramických kompozitných materiálov. VEGA 2/0144/21 : Riadenie vlastností kovových systémov modifikáciou štruktúry na atomárnej škále pomocou vnútorných a vonkajších faktorov. VEGA 2/0174/21: Nanomechanické skúšanie a deformovateľnosť vysokoentropických ultra vysokoteplotných keramických materiálov. APVV-17-0328: Vývoj žiaruvzdorných pyrochlórnych fáz pre vysokoteplotné aplikácie neoxidovej keramiky. APVV-19-0497 : Nové vysokoentropické keramické materiály pre pokročilé aplikácie. APVV-20-0124 : Nové zliatiny s viacerými základnými prvkami – dizajn, charakterizácia a vlastnosti. APVV-21-0402 : Vývoj nových keramických materiálov komplexného zloženia pre extrémne aplikácie)

ADCA38 NAUGHTON-DUSZOVÁ, Annamária** - ĎAKOVÁ, Lenka - CSANÁDI, Tamás - KOVALČÍKOVÁ, Alexandra - KOMBAMUTHU, Vasanthakumar - ÜNSAL, Hakan - TATARKO, Peter - TATARKOVÁ, Monika - HVIZDOŠ, Pavol - ŠAJGALÍK, Pavol. Nanohardness and indentation fracture resistance of dual-phase high-entropy ceramic. In Ceramics International, 2023, vol. 49, p. 24239-24245. (2022: 5.2 - IF, Q1 - JCR, 0.918 - SJR, Q1 - SJR). ISSN 0272-8842. Dostupné na: https://doi.org/10.1016/j.ceramint.2022.12.027 (VEGA 2/0118/20 : Vysokoteplotné vlastnosti boridových MeB2 (Me=Ti, Zr, Hf) keramických kompozitných materiálov. VEGA 2/0174/21: Nanomechanické skúšanie a deformovateľnosť vysokoentropických ultra vysokoteplotných keramických materiálov. APVV-17-0328: Vývoj žiaruvzdorných pyrochlórnych fáz pre vysokoteplotné aplikácie neoxidovej keramiky. APVV-19-0497 : Nové vysokoentropické keramické materiály pre pokročilé aplikácie)

ADCA39 OSACKÝ, Marek** - BINČÍK, Tomáš - HUDCOVÁ, Barbora - VÍTKOVÁ, Martina - PÁLKOVÁ, Helena - HUDEC, Pavol - BAČÍK, Peter - CZÍMEROVÁ, Adriana. Low-cost zeolite-based sorbents prepared from industrial perlite by-product material for $Zn^{2+}$ and $Ni^{2+}$ removal from aqueous solutions: synthesis, properties and sorption efficiency. In Heliyon, 2022, vol. 8, iss. 12, art no. e12029. (2021: 3.776 - IF, Q2 - JCR, 0.550 - SJR, Q1 - SJR, karentované - CCC). (2022 - Current Contents). ISSN 2405-8440. Dostupné na: https://doi.org/10.1016/j.heliyon.2022.e12029

ADCA40 PARCHOVIANSKÁ, Ivana** - PARCHOVIANSKY, Milan - NOWICKA, Aleksandra - PRNOVÁ, Anna - ŠVANČÁREK, Peter - PAKSERESHT, Amirhossein. Effect of sintering temperature on phase evolution, microstructure, and mechanical properties of $La_2Ce_2O_7$/40 wt.% YSZ composite ceramics. In Journal of Materials Research and Technology-JMR&T, 2023, vol. 24, pp. 4573-4586. (2022: 6.4 - IF, Q1 - JCR, 1.05 - SJR, Q1 - SJR). ISSN 2238-7854. Dostupné na: https://doi.org/10.1016/j.jmrt.2023.04.054

ADCA41 PARCHOVIANSKÁ, Ivana** - PARCHOVIANSKÝ, Milan - MEDVEĎ, Dávid - GALUSEK, Dušan. Thermal shock behavior and high-temperature oxidation performance of PDC-based environmental barrier coatings on AISI 441 stainless steel. In Surface & Coatings Technology, 2023, vol. 474, art. no. 130074. (2022: 5.4 - IF, Q1 - JCR, 0.946 - SJR, Q1 - SJR). ISSN 0257-8972. Dostupné na: https://doi.org/10.1016/j.surfcoat.2023.130074

ADCA42 PECUŠOVÁ, Beáta - PRNOVÁ, Anna** - VALÚCHOVÁ, Jana - PARCHOVIANSKÝ, Milan - KLEMENT, Róbert - GALUSEK, Dušan. Crystallization and photoluminescence properties of Er-doped microspheres with ytterbium-aluminium garnet composition. In Ceramics International, 2023, vol. 49, iss. 9, pp. 14895-14903. (2022: 5.2 - IF, Q1 - JCR, 0.918 - SJR, Q1 - SJR). ISSN 0272-8842. Dostupné na: https://doi.org/10.1016/j.ceramint.2022.08.070

ADCA43 PIKULOVÁ, Petra - MISENKOVA, Debora - MAREK, Radek - KOMOROVSKÝ, Stanislav

- NOVOTNÝ, Jan. Quadratic Spin - Orbit Mechanism of the Electronic g-Tensor. In Journal of Chemical Theory and Computation, 2023, vol. 19, iss. 6, pp. 1765-1776. (2022: 5.5 - IF, Q1 - JCR, 1.665 - SJR, Q1 - SJR). ISSN 1549-9618. Dostupné na: https://doi.org/10.1021/acs.jctc.2c01213

ADCA44 PIROŠ, Milan - VASKOVÁ, Zuzana - MAZÚR, Milan - MONCOĽ, Ján - ŠVOREC, Jozef. Hydrogen-bonded supramolecular structures in copper(II) nitrobenzoates with N-methylnicotinamide: synthesis, supramolecular structure, Hirshfeld surface analysis, spectral and DFT study. In Transition Metal Chemistry, 2023, vol.48, p. 281-295. (2022: 1.7 - IF, Q3 - JCR, 0.299 - SJR, Q2 - SJR). ISSN 0340-4285. Dostupné na: https://doi.org/10.1007/s11243-023-00542-x

ADCA45 POUCHLÝ, Václav** - TALIMIAN, Ali - KAŠTYL, Jaroslav - CHVÍLA, Martin - ŠČASNOVIČ, Erik - BETLRÁN, Ana M. - LOZANOF, Juan G. - GALUSEK, Dušan. Transparent LiOH-doped magnesium aluminate spinel produced by spark plasma sintering: Effects of heating rate and dopant concentration. In Journal of the European Ceramic Society, 2023, vol. 43, iss. 8, pp. 3544-3552. (2022: 5.7 - IF, Q1 - JCR, 1.257 - SJR, Q1 - SJR). ISSN 0955-2219. Dostupné na: https://doi.org/10.1016/j.jeurceramsoc.2023.01.059

ADCA46 PRNOVÁ, Anna** - VALÚCHOVÁ, Jana - PARCHOVIANSKÝ, Milan - ŠVANČÁREK, Peter - ŠIMKO, František - RAKHMATULLIN, Aydar - PÁLKOVÁ, Helena - HRUŠKA, Branislav - KLEMENT, Róbert - GALUSEK, Dušan. Structure, thermal properties and crystallization behavior of binary Y2O3-Al2O3 glasses with high alumina content. In Journal of Materials Research and Technology-JMR&T, 2023, vol. 26, pp. 2333-2351. (2022: 6.4 - IF, Q1 - JCR, 1.05 - SJR, Q1 - SJR). ISSN 2238-7854. Dostupné na: https://doi.org/10.1016/j.jmrt.2023.08.067

ADCA47 SHARIFAHMADIAN, Omid** - PAKSERESHT, Amirhossein - MOSAS, Kamalan Kirubaharan Amirtharaj - GALUSEK, Dušan. Doping effects on the tribological performance of diamond-like carbon coatings: A review. In Journal of Materials Research and Technology-JMR&T, 2023, vol. 27, pp. 7748-7765. (2022: 6.4 - IF, Q1 - JCR, 1.05 - SJR, Q1 - SJR). ISSN 2238-7854. Dostupné na: https://doi.org/10.1016/j.jmrt.2023.11.132

ADCA48 SHARIFAHMADIAN, Omid** - PAKSERESHT, Amirhossein - MIRZAEI, Saeed - ELIÁŠ, Marek - GALUSEK, Dušan. Mechanically robust hydrophobic fluorine-doped diamond-like carbon film on glass substrate. In Diamond and Related Materials, 2023, vol. 138, art no. 110252. (2022: 4.1 - IF, Q2 - JCR, 0.61 - SJR, Q2 - SJR). ISSN 0925-9635. Dostupné na: https://doi.org/10.1016/j.diamond.2023.110252

ADCA49 SCHOLTZOVÁ, Eva - JANKOVIČ, Ľuboš - TUNEGA, Daniel. Montmorillonite as an Anti-Tuberculosis rifampicin drug carrier: DFT and Experimental study. In Clays and Clay Minerals, 2023, vol. 71, no. 2, p. 229-241. (2022: 2.2 - IF, Q2 - JCR, 0.37 - SJR, Q2 - SJR). ISSN 0009-8604. Dostupné na: https://doi.org/10.1007/s42860-023-00245-5

ADCA50 SILLIKOVÁ, Veronika** - DULANSKÁ, Silvia - JAKUBČINOVÁ, Jana - BURGANOVÁ, Andrea - KOZLÍKOVÁ, Katarína. Fly ash sorbent modified with KMnO4 for the separation of important radionuclides. In Journal of Radioanalytical and Nuclear Chemistry, 2023, vol. 332, iss. 10, pp. 4335-4341. (2022: 1.6 - IF, Q2 - JCR, 0.379 - SJR, Q2 - SJR). ISSN 0236-5731. Dostupné na: https://doi.org/10.1007/s10967-023-09128-4

ADCA51 SINGH, Meinam Annebushan** - SARMA, Deba Kumar - HANZEL, Ondrej - ŠAJGALÍK, Pavol - RAMKUMAR, Janakarajan. Characterization of surface topography during multi-pass WEDM of MWCNT alumina composites. In CIRP Journal of Manufacturing Science and Technology, 2023, vol. 41, pp. 338-349. (2022: 4.8 - IF, Q2 - JCR, 1.065 - SJR, Q1 - SJR). ISSN 1755-5817. Dostupné na: https://doi.org/10.1016/j.cirpj.2022.11.019

ADCA52 SKOURA, Eva - BOHÁČ, Peter - BARLOG, Martin - PÁLKOVÁ, Helena - MAUTNER, Andreas - BUGYNA, Larysa - BUJDÁKOVÁ, Helena - BUJDÁK, Juraj**. Structure, photoactivity, and antimicrobial properties of phloxine B / poly(caprolactone) nanocomposite thin films. In Applied Clay Science, 2023, vol. 242, art no. 107037. (2022: 5.6 - IF, Q1 - JCR, 0.985 - SJR, Q1 - SJR). ISSN 0169-1317. Dostupné na: https://doi.org/10.1016/j.clay.2023.107037

ADCA53 SLANÝ, Michal** - KUZIELOVÁ, Eva - ŽEMLIČKA, Matúš - MATEJDES, Marián - STRUHÁROVÁ, Alena - PALOU, Martin T. Metabentonite and metakaolin-based geopolymers/zeolites: relation between kind of clay, calcination temperature and concentration of alkaline activator. In Journal of Thermal Analysis and Calorimetry, 2023, vol. 148, no. 20, p. 10531-10547. (2022: 4.4 - IF, Q1 - JCR, 0.753 - SJR, Q1 - SJR). ISSN 1388-6150. Dostupné na: https://doi.org/10.1007/s10973-023-12267-1 (VEGA 2/0032/21 : Štúdium degradácie viaczložkových cementových materiálov v dôsledku uhličitej korózie v podmienkach simulujúcich geotermálne vrty. VEGA 2/0017/21: Materiálové zloženie a vlastnosti samozhutniteľných ťažkých betónov. APVV-19-0490 : Výskum a vývoj mnohozložkových cementových zmesí pre špeciálne konštrukčné materiály)

ADCA54 SVOBODA, Roman** - NEVYHOŠTĚNÁ, Marie - MACHÁČKOVÁ, Jana - VACULÍK, Jan - KNOTKOVÁ, Kateřina - CHROMČÍKOVÁ, Mária - KOMERSOVÁ, Alena. Thermal degradation of Affinisol HPMC: Optimum Processing Temperatures for Hot Melt Extrusion and 3D Printing. In Pharmaceutical Research, 2023, vol. 40, iss. 9, pp. 2253 2268. (2022: 3.7 - IF, Q2 - JCR, 0.644 - SJR, Q2 - SJR). ISSN 0724-8741. Dostupné na: https://doi.org/10.1007/s11095-023-03592-z

ADCA55 ŠIMKO, František** - LENČÉŠ, Zoltán - KIM, Young-Wook - NOSKO, Martin - KONTRÍK, Martin - KORENKO, Michal. High temperature corrosion resistance of electrically conductive nitrogen doped silicon carbide ceramics in molten fluorides. In Journal of the European Ceramic Society, 2023, vol. 43, p. 3931-3940. (2022: 5.7 - IF, Q1 - JCR, 1.257 - SJR, Q1 - SJR). ISSN 0955-2219. Dostupné na: https://doi.org/10.1016/j.jeurceramsoc.2023.03.001

ADCA56 ŠIMKO, František** - RAKHMATULLIN, Aydar - KING, Graham - ALLIX, Mathieu - BESSADA, Catherine - NETRIOVÁ, Zuzana - KRISHNAN, Dhiya - KORENKO, Michal**. Cesium Oxo-fluoro-aluminates in the CsF−Al2O3 System: Synthesis and Structural Characterization. In Inorganic Chemistry, 2023, vol. 62, iss. 38, pp. 15651−15663. (2022: 4.6 - IF, Q1 - JCR, 0.997 - SJR, Q1 - SJR). ISSN 0020-1669. Dostupné na: https://doi.org/10.1021/acs.inorgchem.3c02386 (VEGA č. 2/0046/22 : Fluoridové taveninové systémy pre zelenú výrobu hliníka bez produkcie CO2. APVV-19-0270: Interakcia fluoridových taveninových systémov prvkov vzácnych zemín s oxidmi kritických prvkov v kontexte špeciálnych aplikácií. APVV-19-0461 : Anódy pre Li-iónové batérie na báze uhlík-kremíkových kompozitov)

ADCA57 ŠKRÁTEK, Martin** - ČAPLOVIČOVÁ, M. - ČAPLOVIČ, L. - PETRISKOVÁ, Patrícia - ŠIMON, Erik - RAKOVSKÝ, E. - BILLIK, Peter. Ag2O nanocrystals prepared by mechanochemical decomposition of Ag7O8NO3. In Materials Letters, 2023, vol. 348, art. no. 134680. (2022: 3 - IF, Q2 - JCR, 0.623 - SJR, Q2 - SJR). ISSN 0167-577X. Dostupné na: https://doi.org/10.1016/j.matlet.2023.134680 (VEGA č. 2/0141/21 : SQUID magnetometry of nano- and microparticles, nanocolloids and nanostructures in new applications in the field of biomedicine and materials research associated with the development of new measurement methods and procedures)

ADCA58 TAWFIK, Taher Anwar** - SLANÝ, Michal - PALOU, Martin T. Influence of heavyweight aggregate on the fresh, mechanical, durability, and microstructural properties of self-compacting concrete under elevated temperatures. In Journal of building engineering, 2023, vol. 80, art. no. 108104. (2022: 6.4 - IF, Q1 - JCR, 1.232 - SJR, Q1 - SJR). ISSN 2352-7102. Dostupné na: https://doi.org/10.1016/j.jobe.2023.108104 (APVV-19-0490 : Výskum a vývoj mnohozložkových cementových zmesí pre špeciálne konštrukčné materiály. APVV-15-0631 : Výskum vysokohodnotných cementových kompozitov za hydrotermálnych podmienok pre potenciálne využitie v hĺbkových vrtoch. VEGA 2/0017/21 : Materiálové zloženie a vlastnosti samozhutniteľných ťažkých betónov)

ADCA59 TEPLICKÝ, Tibor - GREGOROVÁ, Martina - KALAFUTOVÁ, Adriana - HANZEL, Ondrej - MATEAŠÍK, Anton - FILOVÁ, Barbora - ČUNDERLÍKOVÁ, Beata**. Characterization of collagen type I matrices for pathophysiologically relevant spatial cancer cell cultures. In Biophysical Chemistry, 2023, vol. 293, art.no. 106944-1-106944-12. (2022: 3.8 - IF, Q2 - JCR, 0.672 - SJR, Q2 - SJR). ISSN 0301-4622. Dostupné na: https://doi.org/10.1016/j.bpc.2022.106944

ADCA60 VOZÁROVÁ, Mária** - NEUBAUER, Erich - BAČA, Ľuboš - KITZMANTEL, M. - FERANC, Jozef - NAGY - TREMBOŠOVÁ, Veronika, rod. Trembošová - PECIAR, Peter - KRITIKOS, Michaela - ORLOVSKÁ, M. - JANEK, Marián** - MATEJDES, Marián. Preparation of fully dense boron carbide ceramics by Fused Filament Fabrication (FFF). In Journal of the European Ceramic Society, 2023, vol. 43, no., p. 1751-1761. (2022: 5.7 - IF, Q1 - JCR, 1.257 - SJR, Q1 - SJR). ISSN 0955-2219. Dostupné na:

https://doi.org/10.1016/j.jeurceramsoc.2022.12.018

ADCA61 XU, Jie - TATARKO, Peter - CHEN, Lianghao - SHAN, Xu - HUANG, Qing - ZHOU, Xiaobing**. High-strength SiC joints fabricated at a low-temperature of 1400◦C using a novel low activation filler of Praseodymium. In Journal of the American Ceramic Society, 2023, vol. 106, iss. 10, pp. 5679-5688. (2022: 3.9 - IF, Q1 - JCR, 0.852 - SJR, Q1 - SJR). ISSN 0002-7820. Dostupné na: https://doi.org/10.1111/jace.19229

ADCA62 XU, Zhongying - CAO, Xuewen - WANG, Yefei - SLANÝ, Michal** - UNČÍK, Stanislav - LI, Shanjian - TANG, Ying**. Effective corrosion inhibitor of mild steel in marine environments: Synthesis and application of hydrazides. In Sustainable Materials and Technologies, 2023, vol. 38, art. no. e00747. (2022: 9.6 - IF, Q1 - JCR, 1.605 - SJR, Q1 - SJR). ISSN 2214-9929. Dostupné na: https://doi.org/10.1016/j.susmat.2023.e00747 (APVV-19-0490 : Výskum a vývoj mnohozložkových cementových zmesí pre špeciálne konštrukčné materiály)

ADCA63 YAN, Jiao - LI, Yongfei - XIE, Xuan - SLANÝ, Michal - DONG, Sanbao - WU, Yuanpeng** - CHEN, Gang**. Research of a novel fracturing-production integral fluid based on cationic surfactant. In Journal of Molecular Liquids, 2023, vol. 369, p. 120858-1-120858-9. (2022: 6 - IF, Q1 - JCR, 0.914 - SJR, Q1 - SJR, karentované - CCC). (2023 - Current Contents, WOS, SCOPUS). ISSN 0167-7322. Dostupné na: https://doi.org/10.1016/j.molliq.2022.120858

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ADCA67 ZHANG, Lutao - CHRISTIE, Francesca A. - TARCZA, Anna E. - LANCASTER, Helena G. - TAYLOR, Laurence J. - BÜHL, Michael - MALKINA, Oľga - DEREK WOOLLINS, J. - CARPENTER-WARREN, Cameron L. - CORDES, David B. - SLAWIN, Alexandra M. Z. - CHALMERS, Brian A.** - KILIAN, Petr**. Phosphine and Selenoether peri-Substituted Acenaphthenes and Their Transition-Metal Complexes: Structural and NMR Investigations. In Inorganic Chemistry, 2023, vol. 62, iss. 39, pp. 16084-16100. (2022: 4.6 - IF, Q1 - JCR, 0.997 - SJR, Q1 - SJR). ISSN 0020-1669. Dostupné na: https://doi.org/10.1021/acs.inorgchem.3c02255

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ADEB01 ÜNSAL, Hakan** - FÜRDÖSOVÁ, Zuzana - CHLUP, Zdeněk - TATARKOVÁ, Monika - KOVALČÍKOVÁ, Alexandra - HIČÁK, Michal - HOSSEINI, Naser - ZHUKOVA, Inga - DLOUHÝ, Ivo - ŠAJGALÍK, Pavol - TATARKO, Peter**. ZrB2-SiC composites with rare-earth oxide additives. In Journal of Innovative Materials in Extreme Conditions, 2023, vol. 4, no. 1, p. 22-29. ISSN 2738-0882. Dostupné na internete: https://vinar.vin.bg.ac.rs/handle/123456789/11731 (APVV-17-0328 : Vývoj žiaruvzdorných pyrochlórnych fáz pre vysokoteplotné aplikácie neoxidovej keramiky. APVV-21-0402 : Vývoj nových keramických materiálov komplexného zloženia pre extrémne aplikácie. VEGA 2/0116/22 : Porovnanie účinku nanosfér a nanobipyramíd zlata konjugovaných so silibinínom pri liečbe fibrózy pečene in vivo)

**ADMA Vedecké práce v zahraničných impaktovaných časopisoch registrovaných v databázach Web of Science alebo SCOPUS**

ADMA01 BÖHM, Leonard** - GRANČIČ, Peter - SCHOLTZOVÁ, Eva - HEYDE, Benjamin Justus - DÜRING, Rolf-Alexander - SIEMENS, Jan - GERZABEK, Martin H. - TUNEGA, Daniel. Adsorption of the hydrophobic organic pollutant hexachlorobenzene to phyllosilicate minerals. In Environmental science and pollution research, 2023, vol. 30, pp. 36824–36837. (2022: 5.8 - IF, Q1 - JCR, 0.944 - SJR, Q1 - SJR). ISSN 0944-1344. Dostupné na: https://doi.org/10.1007/s11356-022-24818-4

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ADNB01 MAJEROVÁ, Melinda** - ŠKRÁTEK, Martin - PRNOVÁ, Anna - KRAXNER, J. - DVUREČENSKIJ, Andrej - MAŇKA, Ján - GALUSEK, Dušan. The influence of various dopants on magnetic properties of gehlenite glasses. In Proceedings of the 14th International Conference on Measurement. 1. vyd. - Bratislava : Institute of Measurement Science, SAS, 2023, 2023, p. 226-229. ISBN 978-80-972629-7-6. Dostupné na: https://doi.org/10.23919/MEASUREMENT59122.2023.10164622 (VEGA č. 2/0028/21 : Ion exchange strengthened aluminosilicate glass/glass-ceramics with additional functionalities. VEGA č. 2/0141/21 : SQUID magnetometry of nano- and microparticles, nanocolloids and nanostructures in new applications in the field of biomedicine and materials research associated with the development of new measurement methods and procedures)

**AEDA Vedecké práce v domácich recenzovaných zborníkoch, kratšie kapitoly/state v domácich monografiách alebo VŠ učebniciach**

AEDA01 AKUSEVICH, A.** - VALÚCHOVÁ, Jana - PRNOVÁ, Anna - MICHÁLKOVÁ, Monika - ŠVANČÁREK, Peter - KLEMENT, Róbert - GALUSEK, Dušan. Study of thermal behavior in system Al2O3-RE2O3 by DSC/TG, RTG and SEM. In Processing and properties of advanced ceramics and glasses: Proceedings. Stará Lesná, 25.-27.10.2023. - Košice, Slovakia

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AEDA04 ZHUKOVA, Inga** - TATARKOVÁ, Monika - KOMBAMUTHU, Vasanthakumar - KOVALČÍKOVÁ, Alexandra - CSANÁDI, Tamás - DUSZA, Ján - DLOUHÝ, Ivo - MATOVIČ, Branko - ZAGORAC, Dejan - TATARKO, Peter. Theoretical predictions and synthesis of (Ti-Zr-Hf-Nb-Ta)B2 structures with non-equimolar compositions. In Processing and properties of advanced ceramics and glasses: Proceedings. Stará Lesná, 25.-27.10.2023. - Košice, Slovakia: Institute of Materials Research, SAS, 2023, p. 114-119. ISBN 978-80-89782-16-1. (APVV-21-0402: Vývoj nových keramických materiálov komplexného zloženia pre extrémne aplikácie. Processing and properties of advanced ceramics and glasses : vedecký seminár)

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AFC04 MICHALÍK, Jakub** - VALÚCHOVÁ, Jana - PARCHOVIANSKÝ, Milan - HRUŠKA, Branislav - KLEMENT, Róbert - PRNOVÁ, Anna - GALUSEK, Dušan. Príprava a spektrálne vlastnosti Er, Yb a Li dopovaných materiálov s YAG zložením. In Konference o speciálních anorganických pigmentech a práškových materiálech : sborník příspěvků 25. ročníku. - Pardubice, ČR : Univerzita Pardubice, 2023, p. 49-52. ISBN 978-80-7560-472-9.

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**AFD Publikované príspevky na domácich vedeckých konferenciách**

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**AFE Abstrakty pozvaných príspevkov zo zahraničných konferencií**

AFE01 TATARKO, Peter** - ZHUKOVA, Inga - HOSSEINI, Naser - ÜNSAL, Hakan - CHLUP, Z. - TATARKOVÁ, Monika - KOVALČÍKOVÁ, Alexandra - DUSZA, Ján - DLOUHÝ, I. New High-Entropy Ceramics for Extreme Environment Applications. In 7th Conference of the Serbian Society for Ceramic Materials - 7CSCS 2023: Programme and the Book of abstracts. - Belgrade, Serbia: Institut za multidisciplinarna istraņivanja, 2023, p. 35. ISBN 978-86-80109-24-4. (7th Conference of the Serbian Society for Ceramic Materials - 7CSCS 2023 : medzinárodná konferencia)

AFE02 TATARKO, Peter** - ZHUKOVA, Inga - HOSSEINI, Naser - GRASSO, Salvatore - KOMBAMUTHU, Vasanthakumar - CHLUP, Zdeněk - KOVALČÍKOVÁ, Alexandra - TATARKOVÁ, Monika - DLOUHÝ, Ivo - DUSZA, Ján. Novel Diboride Ceramics for Extreme Environment Applications. In Serbian Ceramic Society Conference - advanced ceramics and application XI: Program and the book of abstracts. 11. - Belgrade, Serbia : Serbian Ceramic Society, 2023, p. 40. ISBN 978-86-905714-0-6. (Advanced Ceramics and Application - The 11th Serbian Ceramic Society Conference (ACA-XI) : medzinárodná konferencia)

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**AFG Abstrakty príspevkov zo zahraničných konferencií**

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AFG02 BUJDÁK, Juraj** - ŠUTEKOVÁ, Monika - LABUTA, Jan. Thermally activated surface adsorption to improve the photoactivity of an organic luminophore. In International Conference of European Clay Groups Association - EUROCLAY 2023: Scientific Research

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**AGJ Patentové prihlášky, prihlášky úžitkových vzorov, prihlášky dizajnov, prihlášky ochranných známok, žiadosti o udelenie dodatkových ochranných osvedčení,...**

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**ADCA Vedecké práce v zahraničných karentovaných časopisoch – impaktovaných**

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*2. [1.2] GUDIPUDI, Suresh - NAGAMUTHU, Selvaraj - SUBBIAN, Kanmani Subbu - CHILAKALAPALLI, Surya Prakasa Rao. A comprehensive investigation on machining of composites by EDM for microfeatures and surface integrity. In Journal of Micromanufacturing, 2022-05-01, 5, 1, pp. 5-20. ISSN 25165984. Dostupné na: https://doi.org/10.1177/25165984211063308., Registrované v: SCOPUS*

ADMA12 VARGAS-OSORIO, Zulema** - RUTHER, Florian - CHEN, Si - SENGUPTA, Susanta - LIVERANI, Liliana - MICHÁLEK, Martin - GALUSEK, Dušan - BOCCACCINI, Aldo**. Environmentally friendly fabrication of electrospun nanofibers made of polycaprolactone, chitosan and k-carrageenan (PCL/CSS/ k-C). In Biomedical Materials, 2022, vol. 17, p. 045019-1-045019-15. (2021: 4.103 - IF, Q2 - JCR, 0.625 - SJR, Q2 - SJR). ISSN 1748-6041. Dostupné na: https://doi.org/10.1088/1748-605X/ac6eaa

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*1. [1.1] NEAMTU, B. - BARBU, A. - NEGREA, M.O. - BERGHEA-NEAMTU, C. - POPESCU, D. - ZAHAN, M. - MIRESAN, V. Carrageenan-Based Compounds as Wound Healing Materials. In INTERNATIONAL JOURNAL OF MOLECULAR SCIENCES. AUG 2022, vol. 23, no. 16. Dostupné na: https://doi.org/10.3390/ijms23169117., Registrované v: WOS*

*2. [1.1] SACRAMENTO, M.M.A. - BORGES, J. - CORREIA, F.J.S. - CALADO, R. - RODRIGUES, J.M.M. - PATRICIO, S.G. - MANO, J.F. Green approaches for extraction, chemical modification and processing of marine polysaccharides for biomedical applications. In FRONTIERS IN BIOENGINEERING AND BIOTECHNOLOGY. ISSN 2296-4185, DEC 8 2022, vol. 10. Dostupné na: https://doi.org/10.3389/fbioe.2022.1041102., Registrované v: WOS*

**ADMB Vedecké práce v zahraničných neimpaktovaných časopisoch registrovaných v databázach Web of Science alebo SCOPUS**

ADMB01 BALOG, Miroslav - ŠAJGALÍK, Pavol - LENČÉŠ, Zoltán - HNATKO, Miroslav - KEČKÉŠ, Jozef. Hardness limits of SiC and Si3N4 ceramic materials. In Key Engineering Materials, 2005, vol. 287, p. 311-316. (2004: 0.278 - IF). (2005 - SCOPUS). ISSN 1013-9826. Dostupné na: https://doi.org/10.4028/0-87849-965-2.311

Citácie:

*1. [1.1] XIAO, Yaqi - QIAN, Jinghang - WANG, Xi - LIU, Kaiyang - QU, Xin - DENG, Shan - LI, Hongtian - CHEN, Xiuli - ZHOU, Huanfu. Enhanced structural and functional performances of Si3N4-reinforced Li2ZnTi3O8 microwave dielectric ceramics. In CERAMICS INTERNATIONAL, 2022, vol. 48, no. 23, pp. 34283-34288. ISSN 0272-8842. Available on: https://doi.org/10.1016/j.ceramint.2022.08.005., Registrované v: WOS*

ADMB02 BALOG, Miroslav - ŠAJGALÍK, Pavol - LENČÉŠ, Zoltán - KEČKÉŠ, Jozef - HUANG, J.-L. Liquid phase sintering of SiC with AlN and rare-earth oxide additives. In Ceramic Transactions : Silicon-Based Structural Ceramics for the New Millennium, 2003, vol. 142, p. 191-202.

Citácie:

*1. [1.2] ZHANG, Yongsheng - FAN, Hengzhong - HU, Litian - FANG, Yuan - SONG, Junjie. Surface Engineering Design of Alumina-Matrix Composites. In Self-Lubricating Composites: Second Edition, 2022-01-01, pp. 241-260. Dostupné na: https://doi.org/10.1007/978-3-662-64243-6_9., Registrované v: SCOPUS*

ADMB03 GSCHIEL, Sabine - HARMUTH, Harald - LENČÉŠ, Zoltán - ŠAJGALÍK, Pavol. Production of MgAlON bonded alumina refractories. In Interceram : Refractories, 2012, no. 1, p. 48-51. (2011: 0.422 - SJR, Q2 - SJR). ISSN 0020-5214.

Citácie:

*1. [1.2] YAN, Mingwei - YANG, Yumin - LI, Yong - LIU, Kaiqi - SUN, Guangchao - ZHANG, Jiayu - HU, Chaoquan. Phase Composition and Reaction Mechanism of Aluminum-Spinel Composite at 1700°C in Flowing Nitrogen. In Kuei Suan Jen Hsueh Pao/Journal of the Chinese Ceramic Society, 2021-03-01, 49, 3, pp. 590-596. ISSN 04545648. Dostupné na: https://doi.org/10.14062/j.issn.0454-5648.20200450., Registrované v: SCOPUS*

ADMB04 HAWASH, H. B. I.** - CHMIELEWSKA, Eva - NETRIOVÁ, Zuzana - MAJZLAN, Juraj - PÁLKOVÁ, Helena - HUDEC, Pavol - SOKOLÍK, Róbert. Innovative comparable study for application of iron oxyhydroxide and manganese dioxide modified clinoptilolite in removal of Zn(II) from aqueous medium. In Journal of Environmental Chemical Engineering, 2018, vol. 6, no. 5, p. 6489-6503. (2017: 0.924 - SJR, Q1 - SJR). ISSN 2213-3437. Dostupné na: https://doi.org/10.1016/j.jece.2018.09.024

Citácie:

*1. [1.1] KAYA, D. - CROFT, K. - PAMURU, S.T. - YUAN, C. - DAVIS, A.P. - KJELLERUP, B.V. Considerations for evaluating innovative stormwater treatment media for removal of dissolved contaminants of concern with focus on biochar. In CHEMOSPHERE. ISSN 0045-6535, NOV 2022, vol. 307, 4. Dostupné na: https://doi.org/10.1016/j.chemosphere.2022.135753., Registrované v: WOS*

*2. [1.2] PÉREZ JIMÉNEZ, Vanesa Anahi - HERNÁNDEZ-MONTOYA, Virginia - RAMÍREZ-MONTOYA, Luis A. - CASTILLO-BORJA, Florianne - TOVAR-GÓMEZ, Rigoberto - MONTES-MORÁN, Miguel A. Adsorption of impurities from nickel-plating baths using commercial sorbents to reduce wastewater discharges. In Journal of Environmental Management, 2021-04-15, 284, pp. ISSN 03014797. Dostupné na: https://doi.org/10.1016/j.jenvman.2021.112024., Registrované v: SCOPUS*

ADMB05 KITYK, Anna** - PROTSENKO, V. - DANILOV, F.I. - PAVLÍK, Viliam - HNATKO, Miroslav. The effect of electropolishing in a deep eutectic solvent (Ethaline) on the surface properties and corrosion resistance of aluminium-magnesium alloy. In Voprosy khimii i khimicheskoi tekhnologii, 2020, no. 4, p. 66-71. (2019: 0.222 - SJR, Q3 - SJR). ISSN 0321-4095. Dostupné na: https://doi.org/10.32434/0321-4095-2020-131-4-66-71

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*1. [1.1] CALIGNANO, F. - MERCURIO, V. - RIZZA, G. - GALATI, M. Investigation of surface shot blasting of AlSi10Mg and Ti6Al4V components produced by powder bed fusion technologies. In PRECISION ENGINEERING-JOURNAL OF THE INTERNATIONAL SOCIETIES FOR PRECISION ENGINEERING AND NANOTECHNOLOGY. ISSN 0141-6359, NOV 2022, vol. 78, p. 79-89. Dostupné na: https://doi.org/10.1016/j.precisioneng.2022.07.008., Registrované v: WOS*

ADMB06 KOMADEL, Peter - MADEJOVÁ, Jana - VALÚCHOVÁ, Jana - JANEK, Marián - BUJDÁK, Juraj. Fixation of Li+ cations in montmorillonite upon heating. In Solid State Phenomena, 2003, vol. 90-91, p. 497-502. (2003 - Current Contents). ISSN 1012-0394. (Solid State Chemistry V : 5th International Conference on Solid State Chemistry)

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*1. [1.2] NAGY, M. Noémi - KÓNYA, József. Interfacial Chemistry of Rocks and Soils, Second Edition. In Interfacial Chemistry of Rocks and Soils, Second Edition, 2021-01-01, pp. 1-258. Dostupné na: https://doi.org/10.1201/9781003020080., Registrované v: SCOPUS*

ADMB07 MACHÁČEK, Jan - GEDEON, Ondrej - LIŠKA, Marek. Normal mode analysis of Na2O.3SiO2 glass. In Physics Procedia, 2013, vol. 48, p. 85-88. (2012: 0.293 - SJR). (2013 - WOS, SCOPUS). ISSN 1875-3892. Dostupné na: https://doi.org/10.1016/j.phpro.2013.07.014

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*1. [1.1] FURUTANI, Kenta - OHKUBO, Takahiro - DU, Jincheng - OHARA, Koji - DEGUCHI, Kenzo - OHKI, Shinobu - SHIMIZU, Tadashi - INAGAKI, Yaohiro - MATSUBARA, Ryuta - ISHIDA, Keisuke. Elucidating the Atomic Structures of the Gel Layer Formed during Aluminoborosilicate Glass Dissolution: An Integrated Experimental and Simulation Study. In JOURNAL OF PHYSICAL CHEMISTRY C, 2022, vol. 126, no. 18, pp. 7999-8015. ISSN 1932-7447. Dostupné na: https://doi.org/10.1021/acs.jpcc.1c10463., Registrované v: WOS*

*2. [1.1] LIU, Hongshen - KAYA, Huseyin - LIN, Yen-Ting - OGRINC, Andrew - KIM, Seong H. Vibrational spectroscopy analysis of silica and silicate glass networks. In JOURNAL OF THE AMERICAN CERAMIC SOCIETY, 2022, vol. 105, no. 4, pp. 2355-2384. ISSN 0002-7820. Dostupné na: https://doi.org/10.1111/jace.18206., Registrované v: WOS*

ADMB08 PARCHOVIANSKÝ, Milan - BARROSO, G. - PETRÍKOVÁ, I. - MOTZ, Günter - GALUSKOVÁ, Dagmar - GALUSEK, Dušan. Polymer derived glass ceramic layers for corrosion protection of metals. In Ceramic Transactions, 2016, vol. 256, p. 187-200. (2015: 0.156 - SJR, Q4 - SJR). ISSN 1042-1122. (CMCEE)

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*1. [1.1] WANG, W.B. - TAMAKLOE, S. - DENG, Z.F. - LI, L. - CAI, W.J. - LU, K.T.Y. Effects of processing temperature on the corrosion and tribocorrosion resistance of perhydropolysilazane-derived coatings on AISI 304 steel. In SURFACE & COATINGS TECHNOLOGY. ISSN 0257-8972, JUN 15 2022, vol. 439., Registrované v: WOS*

*2. [1.2] JAYAKODY MUDIYANSELAGE, Yasith Chameendra - RAMACHANDRAN, Karthikeyan - DANIEL JAYASEELAN, Doni. Fabrication and characterisation of ZrSiinf2/inf ceramics via reactive hot-pressing. In Advances in Applied Ceramics, 2022-01-01, 121, 5-8, pp. 166-176. ISSN 17436753. Dostupné na: https://doi.org/10.1080/17436753.2022.2139448., Registrované v: SCOPUS*

*3. [1.2] ROMERO, Acacio Rincon - ELSAYED, Hamada - KRAXNER, Jozef - BERNARDO, Enrico. Glass Reactive Sintering. In Encyclopedia of Materials: Technical Ceramics and Glasses: Volume 1-3, 2021-01-01, 2, pp. V2-728. Dostupné na: https://doi.org/10.1016/B978-0-12-818542-1.00012-6., Registrované v: SCOPUS*

ADMB09 SINGH, Meinam Annebushan** - SARMA, Deba Kumar - HANZEL, Ondrej - SEDLÁČEK, Jaroslav - ŠAJGALÍK, Pavol. Wire electrical discharge machining of MWCNT filled alumina composites. In Materials Today: Proceedings, 2018, vol. 5, no. 2, p. 5722-5726. (2017: 0.314 - SJR). ISSN 2214-7853. Dostupné na: https://doi.org/10.1016/j.matpr.2017.12.167

Citácie:

*1. [1.1] MUñOZ-FERREIRO, C. - LóPEZ-PERNíA, C. - MORICHE, R. - GOMMERINGER, A. - KERN, F. - POYATO, R. - GALLARDO-LóPEZ, A. Highly efficient electrical discharge machining of yttria-stabilized zirconia ceramics with graphene nanostructures as fillers. In JOURNAL OF THE EUROPEAN CERAMIC SOCIETY. ISSN 0955-2219, OCT 2022, vol. 42, no. 13, p. 5943-5952. Dostupné na: https://doi.org/10.1016/j.jeurceramsoc.2022.06.037., Registrované v: WOS*

ADMB10 ŠIMUNEK, Ján - NOGA, Jozef. Hartree-Fock via variational coupled cluster theory: an alternative way to diagonalization free algorithm. In AIP Conference Proceedings, 2012, vol. 1504, p. 143-151. (2011: 0.161 - SJR). ISSN 0094-243X. Dostupné na: https://doi.org/10.1063/1.4771709

Citácie:

*1. [1.1] GULANIA, S. - WHITFIELD, J.D. Limitations of Hartree-Fock with quantum resources. In JOURNAL OF CHEMICAL PHYSICS. ISSN 0021-9606, JAN 28 2021, vol. 154, no. 4. Dostupné na: https://doi.org/10.1063/5.0018415., Registrované v: WOS*

**ADNB Vedecké práce v domácich neimpaktovaných časopisoch registrovaných v databázach Web of Science alebo SCOPUS**

ADNB01 KAPIŠINSKÝ, Igor - IVAN, Jozef - IŽDINSKÝ, Karol - PÁNEK, Zdeněk - ZEMÁNKOVÁ, Milina. Reanalysis of the cosmic dust L 2011 S2 and L 2009 I14 NASA samples. In Contributions to geophysics and geodesy : a journal of geophysics, geodesy, meteorology and climatology. - Bratislava : Ústav vied o zemi SAV, 1998-, 2006, vol. 36, no.1, p. 63-71. (2005: 0.218 - SJR, Q3 - SJR). (2006 - SCOPUS). ISSN 1335-2806.

Citácie:

*1. [1.2] RAPPENGLÜCK, Michael A. Natural iron silicides: A systematic review. In MINERALS, 2022, vol. 12, no. 2, article no. 188, p. 1-49. ISSN 2075-163X. Dostupné na: https://doi.org/10.3390/min12020188., Registrované v: SCOPUS*

***AEC Vedecké práce v zahraničných recenzovaných vedeckých zborníkoch, monografiách**

AEC01 KUBÍKOVÁ, Blanka - MLYNÁRIKOVÁ, Jarmila - DANĚK, Vladimír - GAUNE-ESCARD, M. Physicochemical properties of molten KF-K2NbF7-Nb2O5 system. In ECS Transactions - Molten Salts 15: In Memory of Robert Osteryoung, Vol. 35, no. 3, 2007. Editor R. Mantz, R. Hagiwara, P. Trulove, H. De Long, G. Stafford, D. Fox. - New Jersey : ECS Transactions, 2007, S. 169-178. ISBN 978-1-56677-592-2.

Citácie:

*1. [1.1] YE, Z.M. - ZENG, Y. - XIONG, X. - WEN, Q.B. - LUN, H.L. Elucidating the role of preferential oxidation during ablation: Insights on the design and optimization of multicomponent ultra-high temperature ceramics. In JOURNAL OF ADVANCED CERAMICS. ISSN 2226-4108, DEC 2022, vol. 11, no. 12, p. 1956-1975. Dostupné na: https://doi.org/10.1007/s40145-022-0659-2., Registrované v: WOS*

***AEE Vedecké práce v zahraničných nerecenzovaných vedeckých zborníkoch, monografiách**

AEE01 KAŠIAROVÁ, Monika - DUSZA, Ján - HNATKO, Miroslav - ŠAJGALÍK, Pavol. Microstructure and mechanical properties of Si3N4-SiC nanocomposites. In Nanocon 2009. Rožnov pod Radhoštěm, 20.-22.10.2009. - [S. n.], 2009. (Nanocon 2009)

Citácie:

*1. [1.1] SALEEM, Adil - IQBAL, Rashid - HUSSAIN, Arshad - JAVED, Muhammad Sufyan - ASHFAQ, M. Zeeshan - IMRAN, Muhammad - HUSSAIN, M. Muzammal - AKBAR, Abdul Rehman - JUN, Shen - MAJEED, Muhammad K. Recent advances and perspectives in carbon-based fillers reinforced Si3N4 composite for high power electronic devices. In CERAMICS INTERNATIONAL, 2022, vol. 48, no. 10, pp. 13401-13419. ISSN 0272-8842. Dostupné na: https://doi.org/10.1016/j.ceramint.2022.02.050., Registrované v: WOS*

***AFDA Publikované príspevky na medzinárodných vedeckých konferenciách poriadaných v SR**

AFDA01 DUSZA, Ján - ŠAJGALÍK, Pavol - STEEN, M. Dynamic fatigue and fracture toughness of Si3N4 + SiC nanocomposite at 1350 °C. In Key Engineering Materials, 1999, vol. 175-176, p. 311-320. (1999 - SCOPUS). ISSN 1013-9826. (Engineering Ceramics ´99 : Multifunctional properties - new perspectives)

Citácie:

*1. [1.1] ZHANG, Wangzi - PENG, Lei - XIE, Yao - ZHOU, Dexiang - SHI, Yifan - WAN, Yuanxi. Dynamic fatigue behavior of lithium hydride at elevated temperatures. In CERAMICS INTERNATIONAL, 2022, vol. 48, no. 8, pp. 10827-10833. ISSN 0272-8842. Dostupné na: https://doi.org/10.1016/j.ceramint.2021.12.299., Registrované v: WOS*

**Nezaradené publikácie**

01 MUTLU, Nurshen - KURTULDU, Fatih - UNALAN, Irem - NEŠČÁKOVÁ, Z. - KAŇKOVÁ, Hana - GALUSKOVÁ, Dagmar - MICHÁLEK, Martin - LIVERANI, Liliana - GALUSEK, Dušan** - BOCCACCINI, Aldo**. Effect of Zn and Ga doping on bioactivity, degradation, and antibacterial properties of borate 1393-B3 bioactive glass. In Ceramics International, 2022, vol. 48, no. 11, p. 16404-16417. (2021: 5.532 - IF, Q1 - JCR, 0.887 - SJR, Q1 - SJR, karentované - CCC). (2022 - Current Contents, WOS, SCOPUS). ISSN 0272-8842. Dostupné na: https://doi.org/10.1016/j.ceramint.2022.02.192

Citácie:

*1. [1.1] ATKINSON, I. Antibiofilm Activity of Biocide Metal Ions Containing Bioactive Glasses (BGs): A Mini Review. In BIOENGINEERING-BASEL. OCT 2022, vol. 9, no. 10. Dostupné na: https://doi.org/10.3390/bioengineering9100489., Registrované v: WOS*

*2. [1.1] MEHRABI, A. - KARIMI, A. - MASHAYEKHAN, S. - SAMADIKUCHAKSARAEI, A. - MILAN, P.B. In-situ forming hydrogel based on thiolated chitosan/carboxymethyl cellulose (CMC) containing borate bioactive glass for wound healing. In INTERNATIONAL JOURNAL OF BIOLOGICAL MACROMOLECULES. ISSN 0141-8130, DEC 1 2022, vol. 222, A, p. 620-635. Dostupné na: https://doi.org/10.1016/j.ijbiomac.2022.09.177., Registrované v: WOS*

## *Príloha A-4* - Údaje o pedagogickej činnosti organizácie

Semestrálne prednášky:

doc. Ing. Tomáš Bučko, PhD.
Názov semestr. predmetu: Počítačové modelovanie 2
Počet hodín za semester: 24
Názov katedry a vysokej školy: Univerzita Komenského v Bratislave, prírodovedecká fakulta

doc. Ing. Tomáš Bučko, PhD.
Názov semestr. predmetu: Úvod do teórie tuhej fázy
Počet hodín za semester: 24
Názov katedry a vysokej školy: Univerzita Komenského v Bratislave, prírodovedecká fakulta

Mgr. Stanislav Komorovský, PhD.
Názov semestr. predmetu: Relativistické efekty v chémii
Počet hodín za semester: 20
Názov katedry a vysokej školy: Prírodovedecká fakulta UK, Katedra fyzikálnaj a teoretickej chémie

Ing. Blanka Kubíková, PhD.
Názov semestr. predmetu: Metódy chemického výskumu
Počet hodín za semester: 1
Názov katedry a vysokej školy: Prírodovedecká fakulta UK, Katedra fyzikálnej a teoretickej chémie

doc. Ing. Zoltán Lenčéš, PhD.
Názov semestr. predmetu: Materiálová chémia
Počet hodín za semester: 4
Názov katedry a vysokej školy: Prírodovedecká fakulta UK, Katedra anorganickej chémie

Dr. Aliasghar Najafzadehkhoee, Ph.D.
Názov semestr. predmetu: Fundamentals of colloidal chemistry, Collodial systems: cheracterization and utilization
Počet hodín za semester: 8
Názov katedry a vysokej školy: Trenčianska univerzita Alexandra Dubčeka v Trenčíne, Inorganic technologies and materials

Ing. Anna Prnová, PhD.
Názov semestr. predmetu: Anorganická chémia
Počet hodín za semester: 30
Názov katedry a vysokej školy: Trenčianska univerzita Alexandra Dubčeka v Trenčíne, FunGlass

Ing. Michal Slaný, PhD.
Názov semestr. predmetu: Chémia stavebných materiálov
Počet hodín za semester: 8
Názov katedry a vysokej školy: Stavebná fakulta STU, Katedra materiálového inžinierstva a fyziky

Ing. Michal Slaný, PhD.
Názov semestr. predmetu: Štruktúra stavebných materiálov
Počet hodín za semester: 20
Názov katedry a vysokej školy: Stavebná fakulta STU, Katedra materiálového inžinierstva a fyziky

Semestrálne cvičenia:

doc. Ing. Tomáš Bučko, PhD.
Názov semestr. predmetu: Počítačové modelovanie 2
Počet hodín za semester: 60

Názov katedry a vysokej školy: Univerzita Komenského v Bratislave, prírodovedecká fakulta

Ing. Blanka Kubíková, PhD.
Názov semestr. predmetu: Metodika experimentu vo fyzikálnej chémii
Počet hodín za semester: 5
Názov katedry a vysokej školy: Prírodovedecká fakulta UK, Katedra fyzikálnej a teoretickej chémie

Mgr. Valéria Kureková, PhD.
Názov semestr. predmetu: Aplikovaná spektroskopia
Počet hodín za semester: 6
Názov katedry a vysokej školy: Univerzita Komenského v Bratislave, Katedra fyzikálnej a teoretickej chémie

Ing. Jarmila Mlynáriková, PhD.
Názov semestr. predmetu: Metodika experimentu vo fyzikálnej chémii teoretickej chémie
Počet hodín za semester: 10
Názov katedry a vysokej školy: Prírodovedecká fakulta UK, Katedra fyzikálnej a teoretickej chémie

Ing. Zuzana Netriová, PhD.
Názov semestr. predmetu: Metodika experimentu vo fyzikálnej chémii
Počet hodín za semester: 5
Názov katedry a vysokej školy: Prírodovedecká fakulta UK, Katedra fyzikálnej a teoretickej chémie

Mgr. Viktória Planetová
Názov semestr. predmetu: Cvičenie z fyzikálnej chémie (1)
Počet hodín za semester: 60
Názov katedry a vysokej školy: Prírodovedecká fakulta UK, Katedra fyzikálnej a teoretickej chémie

Ing. Michal Slaný, PhD.
Názov semestr. predmetu: Stavebné materiály 1
Počet hodín za semester: 4
Názov katedry a vysokej školy: Stavebná fakulta STU, Katedra materiálového inžinierstva a fyziky

<u>Semináre:</u>

James Richard Asher, PhD
Názov semestr. predmetu: General and Inorganic Chemistry (biochemistry students)
Počet hodín za semester: 40
Názov katedry a vysokej školy: Univerzita Komenského v Bratislave, Anorganicka Chemia

James Richard Asher, PhD
Názov semestr. predmetu: General and Inorganic Chemistry (environmental studies students)
Počet hodín za semester: 20
Názov katedry a vysokej školy: Univerzita Komenského v Bratislave, Anorganicka Chemia

Ing. Blanka Kubíková, PhD.
Názov semestr. predmetu: Metodika experimentu vo fyzikálnej chémii
Počet hodín za semester: 1
Názov katedry a vysokej školy: Prírodovedecká fakulta UK, Katedra fyzikálnej chémie

Ing. Jarmila Mlynáriková, PhD.
Názov semestr. predmetu: Metodika experimentu vo fyzikálnej chémii teoretickej chémie
Počet hodín za semester: 2
Názov katedry a vysokej školy: Právnická fakulta UK, Katedra fyzikálnej a teoretickej chémie

Ing. Zuzana Netriová, PhD.
Názov semestr. predmetu: Metodika experimentu vo fyzikálnej chémii

Počet hodín za semester: 1
Názov katedry a vysokej školy: Prírodovedecká fakulta UK, Katedra fyzikálnej a teoretickej chémie

Terénne cvičenia:

Individuálne prednášky:

Ing. Michal Slaný, PhD.
Názov semestr. predmetu: Stavebné materiály
Počet hodín za semester: 4
Názov katedry a vysokej školy: Stavebná fakulta STU, Katedra materiálového inžinierstva a fyziky

## Príloha A-5 - Medzinárodná mobilita organizácie

**(A) Vyslanie vedeckých pracovníkov do zahraničia na základe dohôd:**

| Krajina | Druh dohody | | | | | |
|---|---|---|---|---|---|---|
| | MAD, KD, VTS | | Medziústavná | | Ostatné | |
| | Meno pracovníka | Počet dní | Meno pracovníka | Počet dní | Meno pracovníka | Počet dní |
| Belgicko | | | | | Peter Tatarko | 3 |
| Česko | | | | | Florian Lemken | 6 |
| | | | | | Eva Scholtzová | 3 |
| Francúzsko | | | | | Jakub Michalík | 6 |
| | | | | | František Šimko | 5 |
| | | | | | Monika Tatarková | 3 |
| Grécko | | | | | Eva Scholtzová | 16 |
| Nemecko | | | | | Zoltán Lenčéš | 2 |
| | | | | | Oksana Matselko | 9 |
| Taliansko | | | | | Naser Hosseini | 100 |
| **Počet vyslaní spolu** | | | | | **10** | **153** |

**(B) Prijatie vedeckých pracovníkov zo zahraničia na základe dohôd:**

| Krajina | Druh dohody | | | | | |
|---|---|---|---|---|---|---|
| | MAD, KD, VTS | | Medziústavná | | Ostatné | |
| | Meno pracovníka | Počet dní | Meno pracovníka | Počet dní | Meno pracovníka | Počet dní |
| Česko | | | | | Marek Radek | 3 |
| Poľsko | | | | | Dr. Dawid Kozień | 26 |
| | | | | | Slawomir Zimowski | 6 |
| Srbsko | | | | | Emilija Nidžović | 33 |
| **Počet prijatí spolu** | | | | | **4** | **68** |

**(C) Účasť pracovníkov pracoviska na konferenciách v zahraničí (nezahrnutých v "A"):**

| Krajina | Názov konferencie | Meno pracovníka | Počet dní |
|---|---|---|---|
| Česko | Anorganické nekovové materiály | Jakub Michalík | 3 |
| | Konference o Speciálních Anorganických Pigmentech | Jakub Michalík | 3 |
| | | Anna Prnová | 3 |
| | NanoOstrava | Peter Boháč | 4 |
| Čína | PACRIM | Pavol Šajgalík | 6 |
| | | Peter Tatarko | 10 |
| | | Peter Tatarko | 10 |

| | | | |
|---|---|---|---|
| Francúzsko | ECERS | Guido de La Torre Olvera | 6 |
| | | Alper Güneren | 6 |
| | | Naser Hosseini | 6 |
| | | Zoltán Lenčéš | 6 |
| | | Pavol Šajgalík | 7 |
| | | Peter Tatarko | 6 |
| | | Monika Tatarková | 6 |
| | | Hakan Ünsal | 6 |
| | | Inga Zhukova | 6 |
| | SC136 | Michal Korenko | 4 |
| | | Oksana Matselko | 4 |
| | | Veronika Silliková | 4 |
| | | František Šimko | 4 |
| Japonsko | MS | Miroslav Boča | 11 |
| | | Michal Korenko | 11 |
| | | Blanka Kubíková | 11 |
| Kórejská republika | HT-CMC 11 | Ondrej Hanzel | 8 |
| | | Pavol Šajgalík | 5 |
| | | Peter Tatarko | 8 |
| Maďarsko | CESEP | Eva Scholtzová | 5 |
| | JTACC JTACC+V4 | Dhiya Krishnan | 4 |
| | | Blanka Kubíková | 4 |
| Nemecko | APAESS | Alper Güneren | 6 |
| | ICOBTE/ICHMET | Michal Slaný | 7 |
| Rakúsko | MMQC | James Richard Asher | 6 |
| | | Stanislav Komorovský | 4 |
| | | Florian Lemken | 6 |
| | | Oľga Malkin | 6 |
| | | Vladimír Malkin | 6 |
| Srbsko | ACA | Peter Tatarko | 4 |
| | CSCS | Miroslav Hnatko | 4 |
| | | Zoltán Lenčéš | 4 |
| | | Peter Tatarko | 4 |
| | | Inga Zhukova | 4 |
| Taliansko | EUROCLAY | Martin Barlog | 6 |
| | | Sanam Bashir | 5 |
| | | Juraj Bujdák | 4 |
| | | Jana Madejová | 5 |
| | | Marián Matejdes | 4 |
| | | Daniel Moreno | 6 |
| | | Helena Pálková | 4 |
| | | Viktória Planetová | 6 |
| | | Eva Scholtzová | 5 |
| | | Eva Skoura | 4 |
| | | Michal Slaný | 6 |
| | | Peter Škorňa | 6 |
| USA | ICACC | Pavol Šajgalík | 7 |
| | | Inga Zhukova | 7 |
| **Spolu** | **17** | **55** | **313** |

*Vysvetlivky: MAD - medziakademické dohody, KD - kultúrne dohody, VTS - vedecko-technická spolupráca v rámci vládnych dohôd*

Skratky použité v tabuľke C:

ACA - Advanced Ceramics and Applications XI
Anorganické nekovové materiály - účasť na konferencii: Seminár doktorandov „Anorganické nekovové materiály"
APAESS - Advanced Power, Automotive and Energy Supply Solutions
CESEP - 9th International Conference on Carbon for Energy Storage and Environmental Protection
CSCS - 7th Conference of the Serbian Society for ceramic Materials
ECERS - XVIII Conference of the European Ceramic Society
ECERS - XVIII Conference of the European Ceramic Society
EUROCLAY - International Conference on Clay Science and Technology
HT-CMC 11 - 11th International Conference on High Temperature Ceramic Matrix Composites
ICACC - 47th internatioal Conference and Expo on Advanced Ceramics and Composites
ICOBTE/ICHMET - 16th International Conference og Biogeochemistry of Trace Elements and 21st International Conference of Heavy Metals
JTACC JTACC+V4 - 3rd Journal of Thermal Analysis and Calorimetry Conference and 8th V4 (Joint Czech-Hungarian-Polish-Slovakian) Thermoanalytical Conference
Konference o Speciálních Anorganických Pigmentech - 25. ročník Konference o Speciálních Anorganických Pigmentech a Práškových Materiálech
MMQC - XVth workshop on Modern Methods in Quantum Chemistry
MS - Joint Symposium on Molten Salts
NanoOstrava - Nanomaterials and Nanotechnologies Meeting
PACRIM - 15th Pacific Rim onference of Ceramic Societies a 13th International Conference on Hiagh-performance Ceramics
SC136 - New inorganic Oxides: Synthesis characterisation and Simulations

**Príloha A-6 - Vedecko-popularizačná činnosť pracovníkov organizácie**

| Meno | Spoluautori | Typ[1] | Názov | Miesto zverejnenia | Dátum alebo počet za rok |
|---|---|---|---|---|---|
| Peter Boháč | | PB | Nanomateriály a životné prostredie | https://cloud-d.edupage.org/cloud/eduresized_vedecka_kaviaren_nanomaterialy_%281%29.jpg?z%3AQPDYCdQ99l3qps57m2qn26BAUzjI6N1GpuMfUc5WV5CbFXWL7AEBtkRgxA | 18.4.2023 |
| Anna Kityk | | iné | Propagačné video, ktoré bolo spracované v rámci projektu NITT SK II. z CVTI SR o patentoch a výsledkoch práce v rámci projektu APVV - 20-0322 "Nanostructured, functionally graded, and bioinspired 3D T | Video bude zverejnené na webových stránkach CVTI SR, SAV, a v televízii | 2023 |
| Marián Matejdes | | IN | Vodik zakladny stavebny prvok vesmiru | https://vedator.space | 20.9.2023 |
| Peter Tatarko | | PB | popularizačná prednáška o vedeckých aktivitách oddelenia keramiky | Ningbo Institute of Materials Technology & Engineering, Chinese Academy of Sciences, Ningbo, China | 3.11.2023 |
| | | PB | popularizačná prednáška o vedeckých aktivitách ústavu | Korea Institute of Materials Science, Changwon, South Korea | 25.8.2023 |
| | | PB | popularizačná prednáška o vedeckých aktivitách ústavu | Yeungnam University, Daegu, South Korea | 25.8.2023 |
| Oľga Malkin | | TL | Rozhovor | Akademia 5/2023 , s. 19 | 1 |
| Viliam Pavlík | | iné | Letná škola mladých vedcov | https://www.all4science.sk/letna-skola-mladych-vedcov-2023/ | 1 |
| Anna Prnová | Akusevich Alena, Michálková Monika, Švančárek Peter, Klement Róbert. Galusek Dušan | PB | Odborný seminár HermesLab system | Bratislava | 1 |

[1] *PB - prednáška/beseda, TL - tlač, TV - televízia, RO - rozhlas, IN - internet, EX - exkurzia, PU - publikácia, MM - multimédiá, DO - dokumentárny film*

***Príloha A-7*** **- Vyznamenania, ceny a iné ocenenia udelené organizácii a jej pracovníkom v roku 2023**

**Domáce ocenenia**

**Ocenenia SAV**

**Bashir Sanam**
Súťaž doktorandov 2023
Oceňovateľ: Predsedníctvo SAV
Opis: 3. miesto

**Boháč Peter**
Ceny Slovenskej akadémie vied za popularizáciu vedy a spoločenské aplikácie vedy
Oceňovateľ: SAV
Opis: Cena pre kolektív moderátorov popularizačného formátu Vedecký podcast SAV

**Galusek Dušan**
Cena za budovanie infraštruktúry
Oceňovateľ: Predsedníctvo SAV
Opis: Vybudovanie centra excelentného výskumu FunGlass
https://www.sav.sk/?lang=sk&doc=services-news&source_no=20&news_no=11680
Slávnostne udelené: 15.1.202

**Komorovský Stanislav**
Špičková publikácia SAV
Oceňovateľ: Predsedníctvo Slovenskej akadémie vied
Opis: Ocenenie v kategórii publikácie vo vedeckých časopisoch registrovaných v databáze Nature Index za prácu poblikovanú v Inorganic Chemistry Vol. 61, no. 2 (2022) p. 830-846.

**Malkin Oľga**
Cena SAV za výsledky dosiahnuté vo vedeckovýskumnej práci
Oceňovateľ: VR SAV
Opis: Za publikovanie práce s názvom Ako rozlíšiť medziväzbovými a neväzbovými dráhami spin-spinovejinterakcie: Všeobecné prístupy aplikované nakomplexné JPP a JPSe skalárne dráhy; 4.9.2023

**Malkin Oľga**
Špičková publikácia SAV
Oceňovateľ: UP SAV
Opis: Distinguishing "through-space" from "through-bonds" contribution in indirect nuclear spin-spin coupling: General approaches applied to complex JPP and JPSe scalar couplings, J. Amer. Chem. Soc., v. 144, no. 24 (2022), p. 10768-10784.

**Slaný Michal**
1. miesto za 2 oddelenie vied v súťaži mladých vedeckých pracovníkov a pracovníčok SAV do 35 rokov
Oceňovateľ: predsedníctvo SAV
Opis: Prednáška s názvom „Anorganicko-organické hybridné íly pre priemyselné a environmentálne aplikácie“

**Iné domáce ocenenia**

**Kityk Anna**
Prize for technology transfer in Slovakia 2023. Finalists in section innovators. (Cena za transfer technológií na Slovensku 2023. Finalisti v kategórii INOVÁTOR/INOVÁTORKA. 24. októbra 2023).
Oceňovateľ:

**Madejová Jana**
Rad Ľudovíta Štúra II. triedy za mimoriadne zásluhy o rozvoj SR v oblasti vedy
Oceňovateľ: Prezidentka Slovenskej republiky Z. Čaputová
Opis: Vyznamenanie udelené pri príležitosti 30. výročia vzniku Slovenskej Republiky (1.1.2023)

**Medzinárodné ocenenia**

**Hosseini Naser**
JECS Trust grant
Oceňovateľ: European Ceramic Society (ECerS)
Opis: Grant na 3-mesačný pobyt na zahraničnom pracovisku.

**Najafzadehkhoee Aliasghar**
JECS TRUST
Oceňovateľ: European Ceramic Society (ECerS)
Opis: 3-month short research stay at MONTANUNIVERSITÄT Leoben, Austria.

**Petrisková Patrícia**
JECS Trust grant
Oceňovateľ: European Ceramic Society (ECerS)
Opis: Grant na trojmesačný výskumný pobyt v zahraničí.

**Tatarko Peter**
1st prize in China-CEEC Youth Innovation and Entrepreneurship Competition
Oceňovateľ: China-CEEC Youth Innovation and Entrepreneurship Commitee
Opis: Certificate of honour, ďalší členovia kolektívu (M. Hnatko, Z. Lenčéš, O. Hanzel)

*Uvádzajte v štruktúre: názov ocenenia, udeľujúca inštitúcia, meno a priezvisko ocenenej osoby.*

# ČASŤ B

## Výročná správa o hospodárení organizácie za rok 2023

# 19. Rámcové informácie o hospodárení organizácie

## 19.1. Výdavky organizácie

Tabuľka 19a Výdavky organizácie (skutočnosť k 31. 12. 2023 v €)

| **Typ organizácie** *(v. v. i.)* | | **Zdroje, z ktorých sa kryli jednotlivé výdavky** | | | |
|---|---|---|---|---|---|
| **Výdavky** | **Spolu** | **kapitola SAV (111)** | **iné štátne a verejné zdroje** | **ostatné zdroje** | **% krytia z kapitoly SAV** |
| **1. Bežné výdavky** | **2 802 856,64** | **2 097 145,49** | **624 996,11** | **80 715,04** | **74,82** |
| z toho: mzdy (610) | 1 471 406,08 | 1 217 868,00 | 239 872,37 | 13 665,71 | 82,77 |
| vedecká výchova štipendiá (640) | 149 310,89 | 149 310,89 | 0,00 | 0,00 | 100,00 |
| poistné a príspevok do poisťovní (620) | 524 590,12 | 434 380,02 | 85 651,72 | 4 558,38 | 82,80 |
| tovary a služby (630) | 589 786,55 | 295 586,58 | 231 709,02 | 62 490,95 | 50,12 |
| transfery partnerom projektov (640) | 67 763,00 | 0,00 | 67 763,00 | 0,00 | 0,00 |
| **2. Kapitálové výdavky** | **19 951,98** | **8 500,00** | **0,00** | **11 451,98** | **42,60** |
| z toho: obstarávanie kapitálových aktív | 19 951,98 | 8 500,00 | 0,00 | 11 451,98 | 42,60 |
| kapitálové transfery | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 |

### 19.2. Zdroje financovania organizácie

Tabuľka 19b Zdroje financovania organizácie (skutočnosť k 31. 12. 2023 v €)

| **Typ organizácie** *(v. v. i.)* | | **Z toho kategórie** | | | |
|---|---|---|---|---|---|
| **Zdroje** | **Spolu** | **Kapitálové zdroje** | **zdroje na mzdy (610)** | **zdroje na odvody do poisťovní (620)** | **zdroje na transfery partnerom projektov** |
| **1. kapitola SAV (111)** | | | | | |
| z toho: VEGA | 126 584,00 | 0,00 | 0,00 | 884,21 | 0,00 |
| MVTS výskumné projekty | 75 000,00 | 8 500,00 | 0,00 | 2 667,99 | 0,00 |
| MVTS podpora | 4 928,00 | 0,00 | 0,00 | 0,00 | 0,00 |
| SASPRO/MOREPRO | 36 501,96 | 0,00 | 6 342,00 | 2 230,80 | 0,00 |
| Vydávanie časopisov | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 |
| Vedecká výchova (štipendiá) | 149 310,89 | 0,00 | 0,00 | 0,00 | 0,00 |
| OTAS (630) | 88 222,10 | 0,00 | 0,00 | 0,00 | 0,00 |
| **2. ŠF EÚ vr. fin. zo ŠR** | **30 015,67** | **0,00** | **9 065,00** | **3 190,85** | **0,00** |
| **3. medzinárodné grantové projekty** | **47 295,16** | **0,00** | **21 919,00** | **7 391,75** | **0,00** |
| z toho H2020 | 47 295,16 | 0,00 | 21 919,00 | 7 391,75 | 0,00 |
| **4. iné štátne a verejné zdroje (spolu)** | **453 076,40** | **0,00** | **147 422,53** | **50 932,28** | **67 763,00** |
| z toho: APVV | 453 076,40 | 0,00 | 147 422,53 | 50 932,28 | 67 763,00 |
| podpora z kapitoly MŠVVaŠ SR (stimuly) | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 |
| **5. ostatné zdroje** | **59 510,78** | **0,00** | **10 023,00** | **3 276,24** | **0,00** |
| z toho: príjmy z prenájmu | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 |
| príjmy z podnikateľskej | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 |

| | | | | | |
|---|---|---|---|---|---|
| činnosti | | | | | |
| príjmy z expertnej činnosti a služieb | 59 510,78 | 0,00 | 10 023,00 | 3 276,24 | 0,00 |

# 20. Ročná účtovná závierka

Ročná účtovná závierka

a) bola predložená na prerokovanie správnej rade dňa 12.02.2024 a správna rada sa vyjadrila dňa 19.02.2024
b) bola predložená na schválenie dozornej rade dňa 21.02.2024 a dozorná rada ju schválila dňa 22.3.2024

Ročná účtovná závierka bola uložená do registra účtovných závierok dňa 27.3.2024.

# 21. Výrok štatutárneho audítora k ročnej účtovnej závierke

## *Správa z auditu účtovnej závierky v skrátenej podobe*

***Názor***

*Uskutočnili sme audit účtovnej závierky spoločnosti Ústav anorganickej chémie SAV, v. v. i.. („Spoločnosť“), ktorá obsahuje súvahu k 31. decembru 2023, výkaz ziskov a strát za rok končiaci sa k uvedenému dátumu, a poznámky, ktoré obsahujú súhrn významných účtovných zásad a účtovných metód.*

***Podľa nášho názoru, priložená účtovná závierka poskytuje pravdivý a verný obraz finančnej situácie Spoločnosti k 31. decembru 2023 a výsledku jej hospodárenia za rok končiaci sa k uvedenému dátumu podľa zákona č. 431/2002 Z. z. o účtovníctve v znení neskorších predpisov (ďalej len „zákon o účtovníctve“).***

*Dňa 12. 3. 2023*

*Ing. Mária Sokolíková CA*
*Zodpovedný štatutárny audítor*
*Číslo licencie 807*

*Cresus, s.r.o.*
*č. lic. 281 SKAu*
*Priekopnícka 28*
*821 06 Bratislava*

# 22. Prehľad príjmov a výdavkov

**Prehľad príjmov z hlavnej činnosti (v EUR)**

| Zdroj | Názov príjmu | Schválený rozpočet | Upravený rozpočet | Skutočnosť k 31.12. bežného účtovného obdobia |
|---|---|---|---|---|
| 111 | Inštitucionálna forma podpory | 1 638 499,00 | 2 126 870,39 | 2 126 870,39 |
| 111, program 06K0G | APVV | 288 048,00 | 449 882,00 | 449 882,00 |
| 35 | Zahraničné granty | 71 200,00 | 79 375,00 | 79 375,00 |
| 11GR | Granty programov EÚ | 40 000,00 | 65 760,00 | 65 760,00 |
| 46 | Tuzemské granty a príjmy | 0,00 | 59 865,00 | 59 865,00 |
| 3AA1 | Štrukturálne fondy (CEDITEK II) | 0,00 | 20 243,83 | 20 243,83 |
| 3AA2 | Štrukturálne fondy (CEDITEK II) | 0,00 | 2 381,62 | 2 381,62 |
| 3AA1 | Štrukturálne fondy (CEMEA) | 0,00 | 3 565,92 | 3 565,92 |
| 3AA2 | Štrukturálne fondy (CEMEA) | 0,00 | 3 209,19 | 3 209,19 |
| 3P01 | Plán obnovy | 0,00 | 6 000,00 | 6 000,00 |

Hlavným zdrojom financovania ústavu sú finančné prostriedky zo štátneho rozpočtu poskytnuté zakladateľom na hlavnú činnosť ako inštitucionálna forma podpory.

**Prehľad bežných výdavkov z hlavnej činnosti (v EUR)**

| Zdroj | Názov výdavku | Schválený rozpočet | Upravený rozpočet | Skutočnosť k 31.12. bežného účtovného obdobia |
|---|---|---|---|---|
| 111 | Bežné výdavky | 1 638 499,00 | 2 126 870,39 | 2 111 310,70 |
| 131M | Bežné výdavky | 0,00 | 0,00 | 30 419,47 |
| 111, program | APVV | 288 048,00 | 447 324,89 | 447 181,82 |

| | | | | |
|---|---|---|---|---|
| 06K0G | | | | |
| 131M, program 06K0G | APVV | 0,00 | 0,00 | 5 894,58 |
| 35 | Zahraničné granty | 71 200,00 | 79 375,00 | 39 509,98 |
| 11GR | Granty programov EÚ | 40 000,00 | 65 760,00 | 65 760,00 |
| 13GR | Granty programov EÚ | 0,00 | 0,00 | 76 244,04 |
| 46 | Tuzemské granty a príjmy | 0,00 | 59 865,00 | 52 657,04 |
| 1AA1 | Štrukturálne fondy (CEDITEK II) | 0,00 | 6 637,52 | 189,16 |
| 1AA2 | Štrukturálne fondy (CEDITEK II) | 0,00 | 780,89 | 34,18 |
| 3AA1 | Štrukturálne fondy (CEDITEK II) | 0,00 | 20 243,83 | 14 046,22 |
| 3AA2 | Štrukturálne fondy (CEDITEK II) | 0,00 | 2 381,62 | 1 651,88 |
| 3AA1 | Štrukturálne fondy (CEMEA) | 0,00 | 3 565,92 | 7 418,05 |
| 3AA2 | Štrukturálne fondy (CEMEA) | 0,00 | 3 209,19 | 6 676,18 |

V zmysle Účtovnej závierky NUJ pre rok 2023 patrili medzi podstatné položky bežných výdavkov z hlavnej činnosti (nezdaňovanej):

- **mzdové náklady** vo výške 1 511 564,64 EUR *(47,89 % z celkových nákladov)*
- **zákonné sociálne a zdravotné poistenie** vo výške 519 290,42 EUR *(16,20 % z celkových nákladov)*
- **odpisy dlhodobého majetku** vo výške 439 241,24 EUR *(13,70 % z celkových nákladov)*
- **spotreba materiálu** vo výške 189 138,70 EUR *(5,90 % z celkových nákladov)*
- **vedecká výchova** vo výške 149 310,89 EUR *(4,66 % z celkových nákladov)*
- **opravy a udržiavanie** vo výške 60 468,34 EUR *(1,88 % z celkových nákladov)*
- **cestovné** vo výške 72 402,26 EUR *(2,25 % z celkových nákladov)*
- **zákonné sociálne náklady** vo výške 52 634,27 EUR *(1,64 % z celkových nákladov)*

**Prehľad kapitálových výdavkov z hlavnej činnosti (v EUR)**

| Zdroj | Názov výdavku | Schválený rozpočet | Upravený rozpočet | Skutočnosť k 31.12. bežného účtovného obdobia |
|---|---|---|---|---|
| 111 | Kapitálové výdavky (nákup prístrojov, výpočtovej techniky) | 0,00 | 8 500,00 | 8 500,00 |
| 35 | Kapitálové výdavky (nákup prístrojov, výpočtovej techniky) | 0,00 | 0,00 | 11 451,98 |

| **Prehľad príjmov a výdavkov v EUR z ďalších činnosti v zmysle § 2 ods. 1 zákona č. 243/2017 o verejnej výskumnej inštitúcii a o zmene a doplnení niektorých zákonov (ďalej „zákon o VVI“)** | **Príjmy (skutočnosť k 31.12. bežného účtovného obdobia)** | **Výdavky (skutočnosť k 31.12. bežného účtovného obdobia)** |
|---|---|---|
| činnosti podľa § 1 ods. 4 písm.a) až c) a e) zákona o VVI na základe požiadaviek orgánov verejnej správya za podmienok podľa osobitných predpisov | 0,00 | 0,00 |
| podnikateľská činnosťv rámci činností podľa § 1 ods. 4 písm.a) až c) zákona o VVI | 0,00 | 0,00 |
| vývoj a inovácie na základe požiadaviek orgánov verejnej správy a za podmienok podľa osobitných predpisov | 0,00 | 0,00 |
| vývoj a inovácie ako podnikateľská činnosť | 0,00 | 0,00 |
| vývoj a inovácie vo forme projektov podľa osobitného predpisu | 0,00 | 0,00 |

## 23. Pohyb a konečný stav majetku

| | Počiatočný stav majetku<br>k 1.1.2023 | Pohyb majetku | Konečný stav majetku<br>k 31.12.2023 |
|---|---|---|---|
| **Nadobúdacia cena** | 11 701 580,41 | + 19 951,98 | 11 721 532,39 |
| **Oprávky (kumulované odpisy)** | **k 1.1.2023** | | **k 31.12.2023** |
| | - 9 667 686,76 | | - 10 106 928,00 |
| **Zostatková cena** | 2 033 893,65 | | 1 614 604,39 |

## 24. Opatrenia na odstránenie nedostatkov v hospodárení a správa o plnení opatrení prijatých na odstránenie nedostatkov z predchádzajúceho roku

V nadväznosti na závery vykonaného vnútorného auditu č. 2/2023 a v zmysle § 21 ods. 3 písm. h) zákona č. 357/2015 Z. z. o finančnej kontrole a audite v platnom znení prijal ÚACH SAV, v. v. i. k zisteným nedostatkom nasledujúce opatrenia:

| P. č. | NEDOSTATKY | DOTKNUTÝ PREDPIS | PRIJATÉ OPATRENIE |
|---|---|---|---|
| 1. | ***Nesprávne stanovené jednotlivé zložky funkčného platu v Oznámení o výške platu*** | zákon č. 553/2003 Z. z. o odmeňovaní<br>zákon č. 243/2017 Z. z. o vvi | 1) Zorganizovať pracovné stretnutie s cieľom oboznámiť dotknutých zamestnancov o zistenom nedostatku.<br>2) Pri stanovení jednotlivých zložiek funkčného platu postupovať v súlade s platnou legislatívou. |
| 2. | ***Neúplná dokladová dokumentácia v osobných spisoch zamestnancov*** | zákon č. 553/2003 Z. z. o odmeňovaní | 1) Zorganizovať pracovné stretnutie s cieľom oboznámiť dotknutých zamestnancov o zistenom nedostatku.<br>2) Chýbajúca dokumentácia bola zistená za obdobie, v ktorom agendu spravovala už na ústave nepracujúca zamestnankyňa, takže súčasne zamestnaná pracovníčka si realizuje spätnú kontrolu predmetných dokladov s tým, aby zabezpečila potrebnú kompletnosť dokumentácie v osobných spisoch.<br>3) Dôsledné vedenie dokumentácie v osobných spisoch všetkých zamestnancov vrátane každej zmeny u každého jedného zamestnanca. |
| 3. | ***Stanovenie osobného príplatku v rozpore so zákonom o odmeňovaní*** | zákon č. 553/2003 Z. z. o odmeňovaní | 1) Zorganizovať pracovné stretnutie s cieľom oboznámiť dotknutých zamestnancov o zistenom nedostatku.<br>2) Dôsledne dodržiavať, aby každej zmene osobného príplatku – zvýšenie, zníženie alebo odobratie – predchádzal písomný návrh príslušného vedúceho zamestnanca<br>(Poznámka: Čo sa týka doby priznania osobného príplatku, zákon nezakazuje priznať osobný príplatok hneď v deň nástupu. Osobným príplatkom sa oceňujú mimoriadne osobné schopnosti zamestnanca a v prípade, že organizácia potrebuje získať na určitú odbornú pozíciu špecialistu s praxou, vie si tieto mimoriadne osobné schopnosti zamestnávateľ overiť z predložených |

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| | | | dokumentov, resp. overiť u predchádzajúcich zamestnávateľov, takže v určitých prípadoch je priznanie osobného príplatku hneď odo dňa nástupu potrebné) |
| 4. | ***Nesplnenie jedného z predpokladov výkonu práce vo verejnom záujme - bezúhonnosť*** | zákon č. 552/2003 Z. z. o výkone práce vo verejnom záujme | Pri prijímaní nových zamestnancov do pracovného pomeru dôsledne dohliadať, aby spĺňali všetky predpoklady výkonu práce vo verejnom záujme v súlade s platnou legislatívou |
| 5. | ***Ostatné zistenia pri overovaní dohôd o prácach vykonávaných mimo pracovného pomeru*** | zákon č. 311/2001 Z. z. Zákonník práce | 1) Zorganizovať pracovné stretnutie s cieľom oboznámiť dotknutých zamestnancov o zistenom nedostatku.<br><br>2) Dôsledné dodržiavanie príslušných ustanovení zákona č. 311/2001 Z. z. v súvislosti s evidenciou dohôd o prácach vykonávaných mimo pracovného pomeru – číslovanie dohôd v poradí, v akom boli uzatvorené a v súvislosti so správnym stanovením druhu práce, na ktorý sa dohoda uzatvára. |
| 6. | ***Nesprávny alebo chýbajúci údaj v mzdovom liste (odpracované hodiny na dohodu o prácach vykonávaných mimo pracovného pomeru)*** | zákon č. 595/2003 Z. z. o dani z príjmov | Zistený nedostatok bol spôsobený nedodaním potrebných údajov pri dohodách mzdovej účtovníčke. Dotknutí zamestnanci boli upozornení na nevyhnutnosť vzájomnej spolupráce a predkladania požadovaných údajov pre zabezpečenie uvádzania správnych údajov v mzdovom liste pri dohodách o prácach vykonávaných mimo pracovného pomeru. |
| 7. | ***Nesprávne vykonávanie základnej finančnej kontroly a nevykonávanie ZFK na dokladoch súvisiacich s finančnými operáciami)*** | zákon č. 375/2015 Z. z. o finančnej kontrole a audite | 1) Zorganizovať pracovné stretnutie s cieľom oboznámiť dotknutých zamestnancov o zistenom nedostatku.<br><br>2) Pre zamedzenie výskytu uvedeného nedostatku sa dopracujú nové tlačivá s uvedením všetkých údajov tak, bola ZFK realizovaná v súlade s platnou legislatívou.<br><br>3) Vykonávať základnú finančnú kontrolu v súlade s príslušnými ustanoveniami zákona č. 375/2015 Z. z. |
| 8. | ***Nezverejnenie faktúr a objednávok na webovom sídle*** | zákon č. 211/2000 Z. z. o slobodnom prístupe k informáciám | Zabezpečenie zverejňovania všetkých faktúr a objednávok na webovom sídle ústavu |
| | ***Vyplatenie príspevku na rekreáciu zamestnanca/na športovú činnosť dieťaťa*** | zákon č. 311/2001 Z. z. Zákonník práce | Pri posudzovaní jednotlivých žiadostí o príspevok na rekreáciu, ich výpočte a poskytovaní sa bude dôsledne postupovať v súlade s príslušnými ustanoveniami zákona č. 311/2001 Z. z. Zákonník práce. Pre zabezpečenie dodržania príslušnej legislatívy bude určený pre |

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| 9. | | | posudzovanie jednotlivých žiadostí ešte ďalší zamestnanec, a to z dôvodu kontroly "štyroch očí". |
| 10. | ***Vyplatenie príspevku na rekreáciu zamestnancom v nesprávnej výške*** | zákon č. 311/2001 Z. z. Zákonník práce | Pri posudzovaní jednotlivých žiadostí o príspevok na rekreáciu, ich výpočte a poskytovaní sa bude dôsledne postupovať v súlade<br>s príslušnými ustanoveniami zákona č. 311/2001 Z. z. Zákonník práce. Pre zabezpečenie dodržania príslušnej legislatívy bude určený pre posudzovanie jednotlivých žiadostí ešte ďalší zamestnanec, a to z dôvodu kontroly "štyroch očí". |
| 11. | ***Vyplatenie príspevku na rekreáciu zamestnancom z nesprávnej sumy*** | zákon č. 311/2001 Z. z. Zákonník práce | Pri posudzovaní jednotlivých žiadostí o príspevok na rekreáciu, ich výpočte a poskytovaní sa bude dôsledne postupovať v súlade s príslušnými ustanoveniami zákona č. 311/2001 Z. z. Zákonník práce. Pre zabezpečenie dodržania príslušnej legislatívy bude určený pre posudzovanie jednotlivých žiadostí ešte ďalší zamestnanec, a to z dôvodu kontroly "štyroch očí". |
| 12. | ***Vyplatenie príspevku na rekreáciu zamestnanca na ďalšie osoby*** | zákon č. 311/2001 Z. z. Zákonník práce | Pri posudzovaní jednotlivých žiadostí o príspevok na rekreáciu, ich výpočte a poskytovaní sa bude dôsledne postupovať v súlade s príslušnými ustanoveniami zákona č. 311/2001 Z. z. Zákonník práce. Pre zabezpečenie dodržania príslušnej legislatívy bude určený pre posudzovanie jednotlivých žiadostí ešte ďalší zamestnanec, a to z dôvodu kontroly "štyroch očí". |

## 25. Ďalšie údaje o hospodárení organizácie

ÚACH SAV, v. v. i. v zmysle zákona č. 243/2017 o verejnej výskumnej inštitúcii a o zmene a doplnení niektorých zákonov patrí do skupiny účtovných jednotiek, ktoré nie sú založené na účel podnikania.

Za sledované obdobie vykazuje ÚACH SAV, v. v. i. kladný výsledok hospodárenia hlavnej a podnikateľskej činnosti po zdanení spolu 7 108,56 EUR, pričom ústav nevykonáva podnikateľskú činnosť a prevažujúcim zdrojom financovania je dotácia zo štátneho rozpočtu.

Hlavným cieľom v oblasti hospodárenia bude v nasledujúcich obdobiach vykazovať kladný hospodársky výsledok, intenzívnejšie získavať pre svoju činnosť finančné prostriedky z viacerých finančných zdrojov, skvalitniť a zefektívniť využívanie všetkých dostupných finančných zdrojov a naďalej venovať osobitnú pozornosť zapájaniu sa do výziev na projekty štrukturálnych fondov EÚ, ako aj na projekty EÚ v rámci Horizont Europe.

**Výročnú správu o hospodárení organizácie zostavil(i):**

Ing. Elena Krippelová

Stanovisko správnej rady zo dňa 23.05.2024

Správna rada v zmysle § 27 ods. 1 zákona č. 243/2017 Z. z. o verejnej výskumnej inštitúcii prerokovala Výročnú správu o činnosti a hospodárení ÚACH SAV, v. v. i. za rok 2023 a schválila jej obsah.

Stanovisko vedeckej rady zo dňa 13.06.2024

Vedecká rada ÚACH SAV, v. v. i súhlasí so znením Výročnej správy o činnosti a hospodárení ÚACH SAV, v. v. i. za rok 2023.

Stanovisko dozornej rady zo dňa 25.06.2024

Dozorná rada ÚACH SAV, v. v. i súhlasí s Výročnou správou o činnosti a hospodárení ÚACH SAV, v. v. i. za rok 2023.

Miroslav Boča

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Date: 2024.07.10 09:37:45 +02'00'

doc. Ing. Miroslav Boča, DrSc.
riaditeľ

# PRÍLOHA K ČASTI B

B-1 Správa štatutárneho audítora k ročnej účtovnej uzávierke

***SPRÁVA NEZÁVISLÉHO AUDÍTORA***
***ÚSTAV ANORGANICKEJ CHÉMIE SAV, v. v. i.***
***Dúbravská cesta 5807/9***
*845 36 Bratislava*
*IČO: 00586 919, DIČ: 20208306915*

*C r e s u s ,   s.r.o*
*Lic. č. 281 SKAu*
*Priekopnícka 28*
*821 06 Bratislava*
*Kanc. Bajkalská 5/B*
*831 04 Bratislava*

*Správa z auditu účtovnej závierky*

## ***Názor***

*Uskutočnili sme audit účtovnej závierky spoločnosti **Ústav anorganickej chémie SAV**, v. v. i. („Spoločnosť“), ktorá obsahuje súvahu k 31. decembru 2023, výkaz ziskov a strát za rok končiaci sa k uvedenému dátumu, a poznámky, ktoré obsahujú súhrn významných účtovných zásad a účtovných metód.*

***Podľa nášho názoru, priložená účtovná závierka poskytuje pravdivý a verný obraz finančnej situácie Spoločnosti k 31. decembru 2023 a výsledku jej hospodárenia za rok končiaci sa k uvedenému dátumu podľa zákona č. 431/2002 Z. z. o účtovníctve v znení neskorších predpisov (ďalej len „zákon o účtovníctve“).***

*Základ pre názor*
*Audit sme vykonali podľa medzinárodných audítorských štandardov (International Standards on Auditing, ISA). Naša zodpovednosť podľa týchto štandardov je uvedená v odseku Zodpovednosť audítora za audit účtovnej závierky. Od Spoločnosti sme nezávislí podľa ustanovení zákona č. 423/2015 o štatutárnom audite a o zmene a doplnení zákona č. 431/2002 Z. z. o účtovníctve v znení neskorších predpisov (ďalej len „zákon o štatutárnom audite“) týkajúcich sa etiky, vrátane Etického kódexu audítora, relevantných pre náš audit účtovnej závierky a splnili sme aj ostatné požiadavky týchto ustanovení týkajúcich sa etiky. Sme presvedčení, že audítorské dôkazy, ktoré sme získali, poskytujú dostatočný a vhodný základ pre náš názor.*

*Zodpovednosť štatutárneho orgánu za účtovnú závierku*
*Štatutárny orgán je zodpovedný za zostavenie tejto účtovnej závierky tak, aby poskytovala pravdivý a verný obraz podľa zákona o účtovníctve a za tie interné kontroly, ktoré považuje za potrebné na zostavenie účtovnej závierky, ktorá neobsahuje významné nesprávnosti, či už v dôsledku podvodu alebo chyby.*

*Pri zostavovaní účtovnej závierky je štatutárny orgán zodpovedný za zhodnotenie schopnosti Spoločnosti nepretržite pokračovať vo svojej činnosti, za opísanie skutočností týkajúcich sa nepretržitého pokračovania v činnosti, ak je to potrebné, a za použitie predpokladu nepretržitého pokračovania v činnosti v účtovníctve, ibaže by mal v úmysle Spoločnosť zlikvidovať alebo ukončiť jej činnosť, alebo by nemal inú realistickú možnosť než tak urobiť.*

*Zodpovednosť audítora za audit účtovnej závierky*

*Našou zodpovednosťou je získať primerané uistenie, či účtovná závierka ako celok neobsahuje významné nesprávnosti, či už v dôsledku podvodu alebo chyby, a vydať správu audítora, vrátane názoru. Primerané uistenie je uistenie vysokého stupňa, ale nie je zárukou toho, že audit vykonaný podľa medzinárodných audítorských štandardov vždy odhalí významné nesprávnosti, ak také existujú. Nesprávnosti môžu vzniknúť v dôsledku podvodu alebo chyby a za významné sa považujú vtedy, ak by sa dalo odôvodnene očakávať, že jednotlivo alebo v súhrne by mohli ovplyvniť ekonomické rozhodnutia používateľov, uskutočnené na základe tejto účtovnej závierky.*
*V rámci auditu uskutočneného podľa medzinárodných audítorských štandardov, počas celého auditu uplatňujeme odborný úsudok a zachovávame profesionálny skepticizmus.*

*Okrem toho:*

- *Identifikujeme a posudzujeme riziká významnej nesprávnosti účtovnej závierky, či už v dôsledku podvodu alebo chyby, navrhujeme a uskutočňujeme audítorské postupy reagujúce na tieto riziká a získavame audítorské dôkazy, ktoré sú dostatočné a vhodné na poskytnutie základu pre náš názor. Riziko neodhalenia významnej nesprávnosti v dôsledku podvodu je vyššie ako toto riziko v dôsledku chyby, pretože podvod môže zahŕňať tajnú dohodu, falšovanie, úmyselné vynechanie, nepravdivé vyhlásenie alebo obídenie internej kontroly.*
- *Oboznamujeme sa s internými kontrolami relevantnými pre audit, aby sme mohli navrhnúť audítorské postupy vhodné za daných okolností, ale nie za účelom vyjadrenia názoru na efektívnosť interných kontrol Spoločnosti.*
- *Hodnotíme vhodnosť použitých účtovných zásad a účtovných metód a primeranosť účtovných odhadov a uvedenie s nimi súvisiacich informácií, uskutočnené štatutárnym orgánom.*
- *Robíme záver o tom, či štatutárny orgán vhodne v účtovníctve používa predpoklad nepretržitého pokračovania v činnosti a na základe získaných audítorských dôkazov záver o tom, či existuje významná neistota v súvislosti s udalosťami alebo okolnosťami, ktoré by mohli významne spochybniť schopnosť Spoločnosti nepretržite pokračovať v činnosti. Ak dospejeme k záveru, že významná neistota existuje, sme povinní upozorniť v našej správe audítora na súvisiace informácie uvedené v účtovnej závierke alebo, ak sú tieto informácie nedostatočné, modifikovať náš názor. Naše závery vychádzajú z audítorských dôkazov získaných do dátumu vydania našej správy audítora.*

- *Budúce udalosti alebo okolnosti však môžu spôsobiť, že Spoločnosť prestane pokračovať v nepretržitej činnosti.*
- *Hodnotíme celkovú prezentáciu, štruktúru a obsah účtovnej závierky vrátane informácií v nej uvedených, ako aj to, či účtovná závierka zachytáva uskutočnené transakcie a udalosti spôsobom, ktorý vedie k ich vernému zobrazeniu.*

*Štatutárny orgán je zodpovedný za informácie uvedené vo výročnej správe, zostavenej podľa požiadaviek zákona o účtovníctve. Náš vyššie uvedený názor na účtovnú závierku sa nevzťahuje na iné informácie vo výročnej správe.*

*V súvislosti s auditom účtovnej závierky je našou zodpovednosťou oboznámenie sa s informáciami uvedenými vo výročnej správe a posúdenie, či tieto informácie nie sú vo významnom nesúlade s auditovanou účtovnou závierkou alebo našimi poznatkami, ktoré sme získali počas auditu účtovnej závierky, alebo sa inak zdajú byť významne nesprávne.*

*Výročnú správu sme ku dňu vydania správy audítora z auditu účtovnej závierky nemali k dispozícii.*

*Keď získame výročnú správu, posúdime, či výročná správa Spoločnosti obsahuje informácie, ktorých uvedenie vyžaduje zákon o účtovníctve, a na základe prác vykonaných počas auditu účtovnej závierky, vyjadríme názor, či:*

*- informácie uvedené vo výročnej správe zostavenej za rok 2023 sú v súlade s účtovnou závierkou za daný rok,*

*- výročná správa obsahuje informácie podľa zákona o účtovníctve.*

*Okrem toho uvedieme, či sme zistili významné nesprávnosti vo výročnej správe na základe našich poznatkov o účtovnej jednotke a situácii v nej, ktoré sme získali počas auditu účtovnej závierky.*

*Dňa 12. 3. 2024*

*Ing. Mária Sokolíková CA*
*Zodpovedný štatutárny audítor*
*Číslo licencie 807 SKAu*

*Cresus, s.r.o.*
*č. lic. 281 SKAu*
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