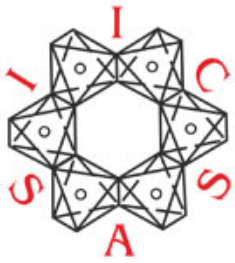
Ústav anorganickej chémie SAV



Správa o činnosti organizácie SAV za rok 2020

Bratislava
január 2021

Obsah

1. Základné údaje o organizácii

1.1. Kontaktné údaje

Názov: Ústav anorganickej chémie SAV
Riaditeľ: doc. Ing. Miroslav Boča, DrSc.
Zástupca riaditeľa: doc. Ing. Miroslav Hnatko, PhD.
Vedecký tajomník: doc. Ing. Zoltán Lenčéš, PhD.
Predseda vedeckej rady: RNDr. Jana Madejová, DrSc.
Člen Snemu SAV: doc. Ing. Miroslav Hnatko, 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: Rozpočtová od roku 0

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	73	37	36	9	7	70	57.46	40.18	0
Vedeckí pracovníci	43	27	16	7	2	41	35.2	34.93	0
Odborní pracovníci VŠ (výskumní a vývojoví zamestnanci[1])	9	6	3	2	1	8	5.77	4.25	0
Odborní pracovníci VŠ (ostatní zamestnanci[2])	6	2	4	0	2	6	4.38	1	0
Odborní pracovníci ÚS	11	2	9	0	1	11	9.8	0	0
Ostatní pracovníci	4	0	4	0	1	4	2.31	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 31.12.2020 (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 31.12.2020 (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 31.12.2020)

Rodová skladba	Pracovníci s hodnosťou				Vedeckí pracovníci v stupňoch		
	DrSc.	CSc./PhD.	prof.	doc.	I.	II.a.	II.b.
Muži	6	22	4	5	6	13	8
Ženy	2	14	0	1	2	7	7

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	5.2	3	3.0	5	4.2	5	5.0	3	2.0	0	0.0	3	1.8	3	2.5
Ženy	2	2.0	0	0.0	1	0.6	4	4.0	3	3.0	3	3.0	0	0.0	3	3.2	0	0.0

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

Tabuľka 1d Priemerný vek zamestnancov organizácie k 31.12.2020

	Kmeňoví zamestnanci	Vedeckí pracovníci	Riešitelia projektov
Muži	45.8	46.2	46.7
Ženy	47.1	44.9	47.4
Spolu	46.4	45.7	46.9

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

Ústav anorganickej chémie SAV v roku 2020 nezaznamenal žiadne zásadné zmeny v organizačnej štruktúre. Udialo sa iba niekoľko drobných personálnych zmien súvisiacich s prirodzenou obmenou z dôvodu veku.

Prepočítaný počet pracovníkov v roku 2020 je na úrovni 57,46 FTE, čo stav porovnateľný s rokom 2019 (57,38). Do tohto počtu vstupujú aj zamestnanci platení z projektov APVV a jeden štipendista v programe IF MC. V roku 2020 bol priemerný vek všetkých pracovníkov ústavu 46,4 roka a priemerný vek vedeckých pracovníkov 45,7. Vzhľadom na to, že nedochádza k plynulej generačnej výmene, postupne sa zvyšuje aj priemerný vek zamestnancov. V roku 2020 sa podarilo zamestnať jednu mladú vedeckú pracovníčku, krátko po obhájení PhD. Zamestnávanie mladých schopných post-doktorandov na ústave je jednou z hlavných priorít, avšak nevieme ju v požadovanej miere naplniť. Motivácia mladých pracovníkov pre zotrvanie na ústave sa realizuje predovšetkým prostredníctvom poskytnutia možnosti zvyšovania ich kvalifikácie (stupeň IIb, IIa a Ia). Zvyšovanie kvalifikácie vedeckých pracovníkov má logicky za následok zvýšený tlak na mzdový fond. Tento fakt doteraz nebol pri tvorbe rozpočtu, hlavne mzdových fondov ústavov, zohľadnený.

2. Vedecká činnosť

2.1. Domáce projekty

Tabuľka 2a Domáce projekty riešené v roku 2020

ŠTRUKTÚRA PROJEKTOV	Počet		Čerpané financie (€)					
			A				B	
	A	B	Zo zdrojov SAV		Z iných zdrojov		Zo zdrojov SAV	Z iných zdrojov
			Spolu	Pre organi-záciu	Spolu	Pre organi-záciu		
1. Projekty VEGA	9	3	97375	97375	-	-	9107	-
2. Projekty APVV	11	7	-	-	357643	264721	-	74826
3. Projekty OP ŠF	0	1	-	-	-	-	-	51953
4. Projekty SASPRO	0	0	-	-	-	-	-	-
5. Iné projekty (FM EHP, ŠPVV, Vedecko-technické projekty, ESF, na objednávku rezortov a pod.)	0	0	-	-	-	-	-	-

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

Tabuľka 2b Domáce projekty podané v roku 2020

Štruktúra projektov	Miesto podania	Organizácia je nositeľom projektu	Organizácia sa zmluvne podieľa na riešení projektu
1. Účasť na nových výzvach APVV r. 2020	-	3	2
2. Projekty výziev OP ŠF podané r. 2020	Bratislava		
	Regióny		

Názov projektu: Roztavené a tuhé fluoridy: reakcie, štruktúra a materiálové vlastnosti (oxo)-(fluóro)-hlinitanov pre elektronické aplikácie
Evidenčné číslo projektu: APVV-20-0330
Akronym: MOELE
Podávateľ projektu: ÚACH SAV
Partner/i: Fyzikálny ústav SAV
Stav: podaný

Názov projektu: Nanoštrukturované, funkčne navrstvené a bio-inšpirované 3D implantáty na báze titánu
Evidenčné číslo projektu: APVV-20-0322
Akronym: NanobioFit
Podávateľ projektu: ÚACH SAV
Partner/i: Trenčianska univerzita Alexandra Dubčeka v Trenčíne
Stav: podaný

Názov projektu: Mikrovlnná syntéza a rýchle zhutňovanie funkčných materiálov na báze delafozitu.
Evidenčné číslo projektu: APVV-20-0405
Akronym: FUNDELAF
Podávateľ projektu: ÚACH SAV
Partner/i: Fakulta chemickej a potravinárskej technológie STU Bratislava, Ústav materiálov a mechaniky strojov SAV
Stav: podaný

Názov projektu: Smerom k nanotechnológiám využívajúcim bioaktívne častice/molekuly v boji proti mikrobiálnym biofilmom.
Evidenčné číslo projektu: APVV-20-0308
Akronym: NIPOFABs
Podávateľ projektu: Prírodovedecká fakulta UK Bratislave,
Partner/i: ÚACH SAV
Stav: podaný

Názov projektu: Bentonit: strategická surovina Slovenska - inovatívne hodnotenie zdrojov a ich kvality pre jej efektívne využívanie
Evidenčné číslo projektu: APVV-20-NEWPROJECT-20410
Akronym: BENTONIT - 3V
Podávateľ projektu: Univerzita Komenského v Bratislave, Prírodovedecká fakulta
Partner/i: ÚACH SAV, Ústav vied o Zemi SAV, Stavebná fakulta STU Bratislava
Stav: podaný

2.2. Medzinárodné projekty

2.2.1. Medzinárodné projekty riešené v roku 2020

Tabuľka 2c Medzinárodné projekty riešené v roku 2020

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 7. RP EÚ a Horizont 2020	1	0	-	-	46953	46953	-	-
2. Projekty ERA.NET, ESA, JRP	0	1	-	-	-	-	-	10000
3. Projekty COST	0	0	-	-	-	-	-	-
4. Projekty EUREKA, NATO, UNESCO, CERN, IAEA, IVF, ERDF a iné	0	0	-	-	-	-	-	-
5. Projekty v rámci medzivládnych dohôd	0	0	-	-	-	-	-	-
6. Bilaterálne projekty MAD	1	0	-	-	-	-	-	-
7. Bilaterálne projekty ostatné	4	0	44996	44996	-	-	-	-
8. Podpora MVTS z národných zdrojov okrem SAV (APVV a iné)	0	0	-	-	-	-	-	-
9. Iné projekty	0	0	-	-	-	-	-	-

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

2.2.2. Medzinárodné projekty Horizont 2020 podané v roku 2020

Tabuľka 2d Počet projektov Horizont 2020 v roku 2020

	A	B
Počet podaných projektov Horizont 2020	1	3

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

Názov projektu: Sodium-Ion and sodium Metal BAtteries for efficient and sustainable next-generation energy storage
Evidenčné číslo projektu: 963542
Akronym: SIMBA
Podávateľ projektu: Technische Universität Darmstadt, Nemecko
Partner/i: University of Birmingham (UK), University of Warwick (UK), Uppsala University (Sweden), Karlsruhe Institute of Technology (Germany), Commissariat à l'énergie atomique et aux énergies alternatives (France), Institute for Energy Technology (Norway), Fraunhofer-Institut für Solare Energiesysteme, Munich (Germany), Johnson Matthey PLC (UK), Elkem ASA (Norway), Yunasko-Ukraine LLC (Ukraine), Saft Groupe S.A. (France), Altris AB (Sweden), TES-Recupyl SAS (France), Uniresearch BV (the Netherlands), ÚACH SAV
Stav: schválený

Názov projektu: Deep Plasma-Pulse Geo-Drilling – Advanced drilling and well completion techniques for cost reduction in geothermal energy
Evidenčné číslo projektu: (H2020-LC-SC3-2018-2019-2020; LC-SC3-RES-18-2020)
Akronym: DEEP-PPGD
Podávateľ projektu: Uppsala Universitet, Švédsko
Partner/i: Dividend Industries AB (Švédsko), Technische Universitat Wien (Rakúsko), VUNAR, a.s. (Slovensko), ÚACH SAV (Slovensko)
Stav: neschválený

Názov projektu: Decarbonising energy systems of geographical Islands
Evidenčné číslo projektu:(H2020-LC-SC3-ES-4-2018-2020)
Akronym: Energy Tandem
Podávateľ projektu: Uppsala Universitet, Švédsko
Partner/i: East Alfa Pipe (Švédsko), Nemo-Q International AB (Švédsko), Dividend Industries AB, (Švédsko), Stora Hoggarn (Švédsko), Aland University (Fínsko), Technische Universitat Wien (Rakúsko), ÚACH SAV (Slovensko), VUNAR, a.s. (Slovensko)
Stav: neschválený

Názov projektu: Heat Capacities of fluorozirconate componds
Evidenčné číslo projektu: (SFERA3; SURPF2001310039)
Akronym: HECA
Podávateľ projektu: ÚACH SAV
Partner/i: ENEA - Casaccia Research Center, Rome, Italy
Stav: schválený

Údaje k domácim a medzinárodným projektom sú uvedené v Prílohe B.

2.2.3. Zámery na čerpanie štrukturálnych fondov EÚ v ďalších výzvach

2.3. Najvýznamnejšie výsledky vedeckej práce (maximálne 1000 znakov + 1 obrázok; bibliografický údaj uvádzajte rovnako ako v zozname publikačnej činnosti, vrátane IF)

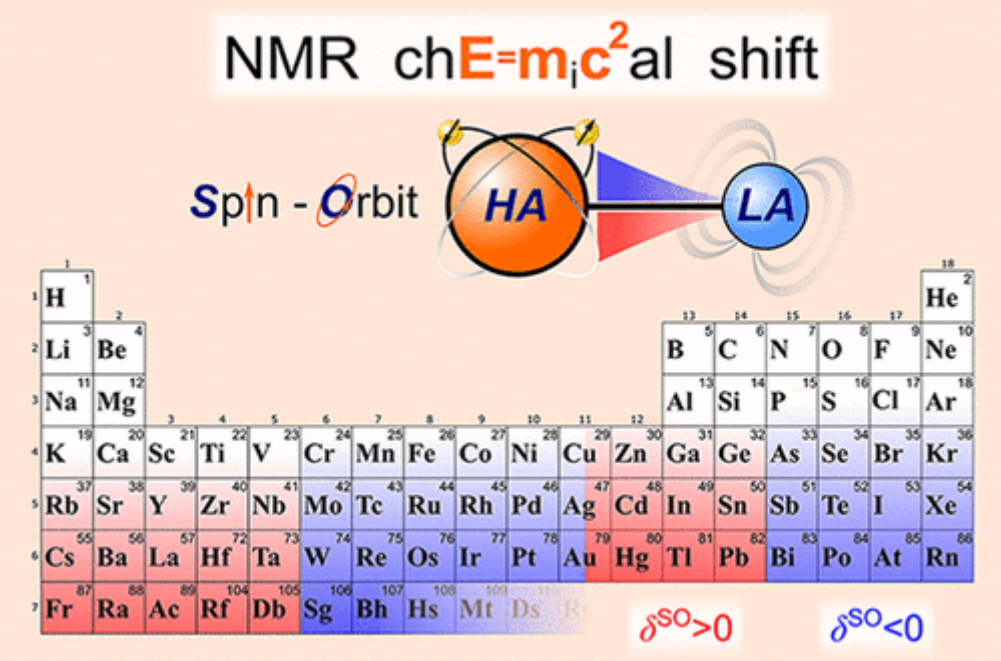
2.3.1. Základný výskum

Nový fundamentálny koncept NMR posunov v látkach obsahujúcich ťažké prvky.

Autori z ÚACH SAV: S. Komorovský

V spolupráci s kolegami zo zahraničia sme sformulovali nový fundamentálny koncept NMR spektroskopie. Vďaka tomuto objavu sme uzavreli ďalšiu etapu vo výskume NMR posunov čo nás viedlo k publikovaniu sumárneho článku v prestížnom časopise Chemical Reviews. Ide o zavŕšenie trojročného výskumu s výstupom troch publikácií [*J. Chem. Theory Comput.* **13**, 3586 (2017); *J. Chem. Theory Comput.* **14**, 3025 (2018); *Chem.*

Rev. **120**, 7065 (2020)]. Cieľom tohto objaveného fundamentálneho konceptu je len na základne chemickej štruktúry danej látky určiť či bude mať ľahký prvok (H, C, N, …) priamo naviazaný na ťažký prvok (napr. Ir, Pt, Au, Hg, …) pozitívny alebo negatívny NMR posun. Pri formulovaní nového konceptu sme okrem kvantovej teórie zahrnuli do našich úvah aj Einsteinovu špeciálnu teóru relativity, ktorá je v prípade prítomnosti ťažkých prvkov v zlúčeninách nevyhnutnou súčasťou celého problému. NMR spektroskopia je výnimočná experimentálna technika, ktorá má široké uplatnenie nielen vo vedeckých kruhoch, ale aj v priemysle či medicíne. Vďaka tomu má náš príspevok široké potenciálne uplatnenie, ako napríklad pri dizajne nových liekov proti rakovine, či pri študovaní šírenia uniknutého jadrového odpadu do prostredia.



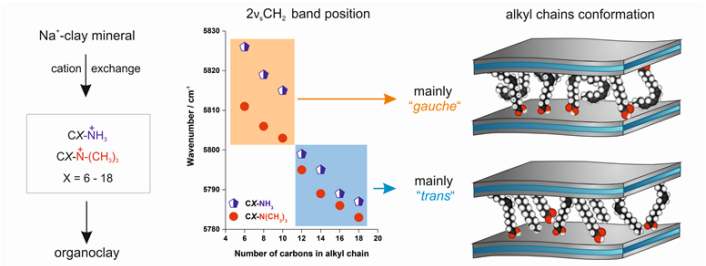
Publikácia

VÍCHA, Jan - NOVOTNÝ, Jan - KOMOROVSKÝ, Stanislav - STRAKA, Michal** - KAUPP, Martin** - MAREK, Radek**. Relativistic heavy-neighbor-atom effects on NMR shifts: Concepts and trends across the periodic table. In Chemical Reviews, 2020, vol.120, p. 7065-7103. (2019: 52.758 - IF, Q1 - JCR, 20.847 - SJR, Q1 - SJR).

Vplyv štruktúry organického katiónu a teploty na usporiadanie alkylamóniových katiónov v medzivrstvových priestoroch montmorillonitu

Autori z ÚACH SAV: J. Madejová, Ľ. Jankovič, M. Slaný

Anorganicko-organické kompozitné materiály na báze ílových minerálov (organoíly) patria v súčasnosti medzi intenzívne študované systémy. Ich vlastnosti závisia na výbere ílového minerálu a organického katiónu (surfaktantu). Poznatky o usporiadaní surfaktantov v medzivrstviach ílových minerálov sú dôležitým krokom pre optimalizáciu vlastností organoílov pre ich priemyselné využitie. Pomocou RTG, IČ a ^{13}C NMR spektroskopie sa študoval vplyv dĺžky alkylového reťazca, štruktúry koncovej skupiny a teploty na usporiadanie alkylamóniových katiónov (C*X*-N$(CH_3)_3$ *vs* C*X*-NH_3; C*X* = počet atómov uhlíka v alkylovom reťazci, *X* =6 - 18) v organo-montmorillonite (O-Mt). Ukázalo sa, že s narastajúcou dĺžkou alkylového reťazca klesá počet neusporiadaných *gauche* a stúpa počet usporiadaných *trans* konformérov. V dôsledku rôznych väzieb medzi koncovou skupinou katiónu a bazálnymi atómami kyslíka sa v prípade „-NH_3“ surfaktantov vyskytovalo vyššie zastúpenie *gauche* konformérov ako v prípade „-N$(CH_3)_3$ “surfaktantov. S narastajúcou teplotou (až do 205°C) usporiadanosť alkylových reťazcov klesala. Na druhej strane, O-Mt schladený na -196°C vykazoval dominantne *trans* konforméry.



Príprava O-Mt (a), polohy CH_2 pásov v spektrách meraných v blízkej IČ oblasti (b), konformácie alkylových reťazcov (c)

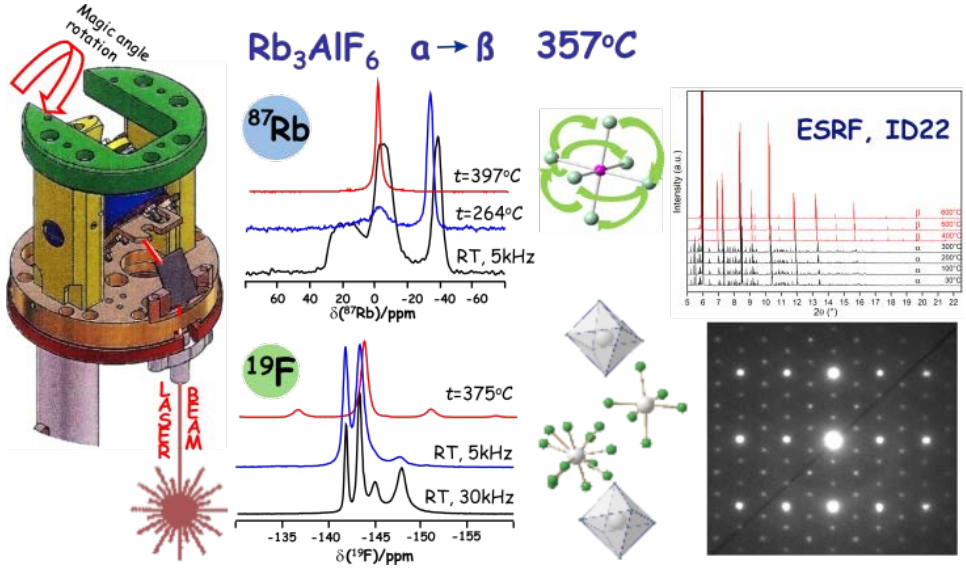
Publikácia

MADEJOVÁ, Jana** - JANKOVIČ, Ľuboš - SLANÝ, Michal - HRONSKÝ, Viktor. Conformation heterogeneity of alkylammonium surfactants self-assembled on montmorillonite: Effect of head-group structure and temperature. In Applied Surface Science, 2020, vol. 503, no., p. 144125-1-144125-11. (2019: 6.182 - IF, Q1 - JCR, 1.230 - SJR, Q1 - SJR, karentované - CCC).

Štruktúra rubídneho kryolitu, Rb_3AlF_6

Autori z ÚACH SAV: F. Šimko, M. Korenko, Z. Netriová

Štruktúra rubídneho kryolitu, Rb_3AlF_6, a rozpúšťanie Al_2O_3 s následnou tvorbou elektro aktívnych látok je hlavnou úlohou potenciálneho využitia Rb_3AlF_6 pri elektrolytickej výrobe hliníka. Preto sa uskutočnila štruktúrna charakterizácia danej komplexnej zlúčeniny. Pomocou synchrotronovej práškovej štruktúrnej analýzy spojenej s viacjadrovou solid state NMR spetroskopiou v tuhom stave, doplnených o TEM analýzy a DFT výpočty sa dokázala prítomnosť dvoch rozdielnych polymorfných foriem Rb_3AlF_6.



Usporiadaná α-fáza, existujúca pri izbovej teplote, kryštalizuje v priestorovej grupe *Fddd* s parametrami základnej bunky a = 37.26491(1) Å, b = 12.45405(4) Å, c = 17.68341(6) Å. Je súčasťou malej skupiny zlúčenín s ne-kooperatívnym nakláňaním okatédrických jednotiek v ich štruktúre. Použitie *In-situ* vysokoteplotnej MAS NMR analýzy bolo výhodne pre sledovanie chemických zmien v štruktúre Rb_3AlF_6 so zvyšujúcou sa teplotou. Pri vyššej teplote (nad 600°C) sa určila prítomnosť vysokoteplotnej, polymorfnej *β*-fázy, ktorá existuje ako kubická, dvojitá-perovskitická štruktúra s priestorovou grupou.

Publikácia

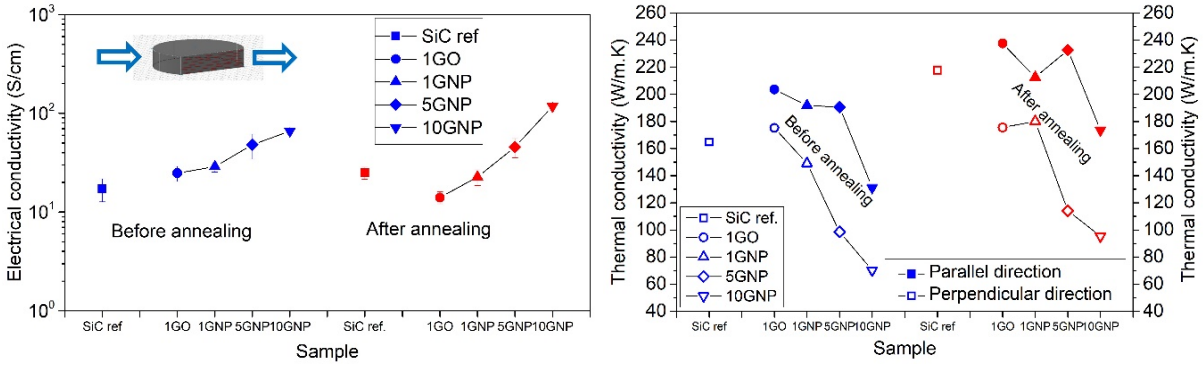
RAKHMATULLIN, Aydar** - ŠIMKO, František** - VERON, Emmanuel - ALLIX, Mathieu - MARTINEAU-CORCOS, Charlotte - FITCH, Andy - FAYON, Franck - SHAKHOVOY, Roman A. - OKHOTNIKOV, Kirill - SAROU-KANIAN, Vincent - KORENKO, Michal - NETRIOVÁ, Zuzana - POLOVOV, Ilya B. - BESSADA, Catherine. X-ray

diffraction, NMR studies, and DFT calculations of the room and high temperature structures of rubidium cryolite, Rb_3AlF_6. In Inorganic Chemistry, 2020, vol. 59, no. 9, p. 6308-6318. (2019: 4.825 - IF, Q1 - JCR, 1.349 - SJR, Q1 - SJR, karentované - CCC)

Kompozitné materiály SiC-grafén s vysokou tepelnou a elektrickou vodivosťou

Riešitelia z UACH SAV: O. Hanzel, Z. Lenčéš, P. Šajgalík

Boli pripravené hutné kompozitné materiály na báze SiC s prídavkom 1, 5 a 10 hm. % grafénových nanoplatničiek (GNPs) alebo 1 hm. % oxidu grafénu (GO). Kompozitné materiály boli spekané metódou Rapid hot press pri teplote 2000°C, tlaku 50 MPa, po dobu 30 minút v dusíkovej atmosfére. Niektoré z takto pripravených kompozitov boli tepelne žíhané pri teplote 1800 °C po dobu 6 h v pretlaku dusíka (3 MPa). Elektrická vodivosť referenčného SiC (σ = 17 S/cm) postupne rástla so zvyšujúcim sa obsahom grafénu až na hodnotu σ = 67 S/cm (SiC s 10 hm. % GNPs). Výnimočné zvýšenie elektrickej vodivosti až na hodnotu σ = 118 S/cm bolo dosiahnuté žíhaním spekaného kompozitného materiálu. Žíhanie spekaných kompozitov malo taktiež výrazne pozitívny vplyv aj na tepelnú vodivosť, najvyššia tepelná vodivosť pri izbovej teplote bola nameraná v smere rovnobežnom na grafénové roviny pre žíhané kompozity s 5 hm. % GNPs (λ = 233 W/m.K) a 1 hm. % GO (λ = 238 W/m.K).



Elektrická a tepelná vodivosť kompozitných materiálov SiC-GNPs a SiC-GO meraná v smere kolmom a rovnobežnom na uloženie grafénových vrstiev.

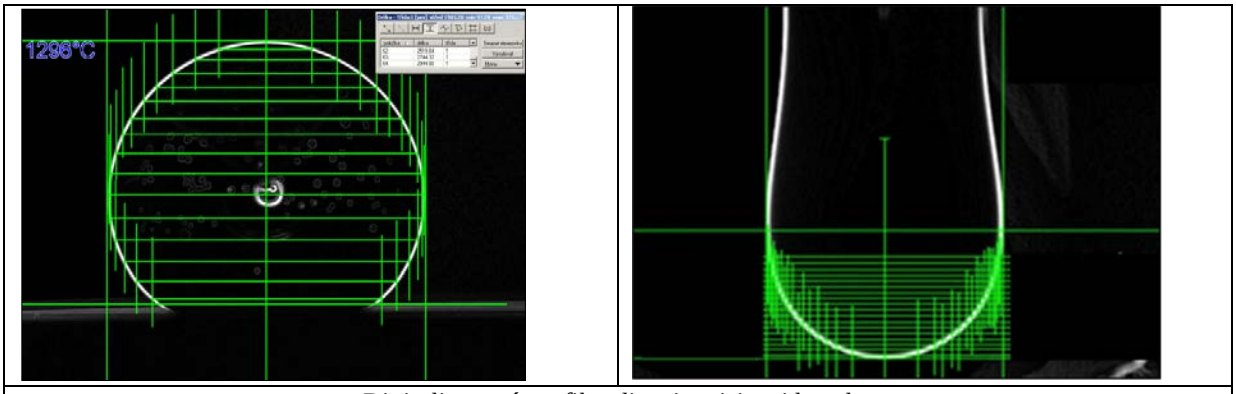
Publikácia

HANZEL, Ondrej** - LENČÉŠ, Zoltán - KIM, Young-Wook - FEDOR, Ján - ŠAJGALÍK, Pavol. Highly electrically and thermally conductive silicon carbide-graphene composites with yttria and scandia additives. In Journal of the European Ceramic Society, 2020, vol. 40, no. 2, p. 241-250. (2019: 4.495 - IF, Q1 - JCR, 1.164 - SJR, Q1 - SJR, karentované - CCC).

Identifikácia povrchovo aktívnych zložiek sklotvorných tavenín pomocou termodynamického modelu

Autori z ÚACh SAV: M. Chromčíková, M. Liška

Povrchovo aktívne zložky sú vo všeobecnosti definované ako zložky homogénnej kvapalnej sústavy, ktoré znižujú jej povrchové napätie a sústreďujú sa na fázovom rozhraní. V prípade viaczložkových oxidových skiel však zložkami nie sú jednotlivé oxidy, ale ich zlúčeniny zastúpené v rovnovážnych množstvách. Tieto informácie poskytuje vhodný termodynamický model – v našom prípade model Šachmatkina a Vediščevy (SVTDM). V práci sa určili povrchovo aktívne zložky skiel sústavy $15(Na_2O, K_2O)\cdot 10(CaO, ZnO)\cdot 75(ZrO_2, SiO_2)$ na základe negatívnej korelácie medzi povrchovým napätím (meraným analýzou profilu visiacej a sediacej kvaky) a rovnovážnou koncentráciou zložiek SVTDM.



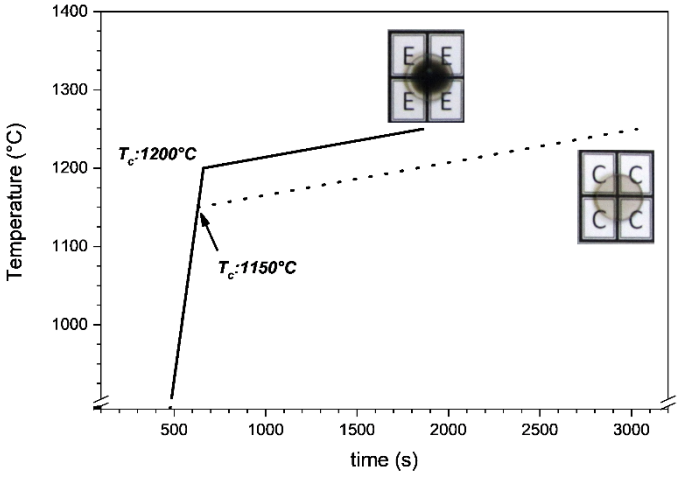
Digitalizovaný profil sediacej a visiacej kvapky.

Publikácia:
CHROMČÍKOVÁ, Maria – HRUŠKA, Branislav – SVOBODA, Roman – LIŠKA, Marek – NOWICKA, Aleksandra – BRUNEEL, Els –De BUYSSER, Klaartje, Identification of surface active components in glass forming melts by thermodynamic model, Journal of Non-Crystalline Solids 551 (2021) 120415

Vplyv kritickej teploty pri spekaní $MgAl_2O_4$ keramiky s použitím pulzného elektrické prúdu (SPS)

Autori z ÚACh SAV: D. Galusek, H.F. El-Maghraby

Napriek úsiliu zredukovať kontamináciu uhlíkom pri spekaní transparentných keramických materiálov na báze spinelu $MgAl_2O_4$ metódou SPS, zostáva uhlík hlavnou príčinou zafarbenia vzoriek, a straty ich priehľadnosti. V rámci spolupráce s CEITEC Brno sme vyvinuli metódu dvojstupňového SPS, ktorá zabraňuje kontaminácii uhlíkom spienlu počas SPS. Pri tejto metóde dôjde pri dosiahnutí kritickej teploty T_c k zníženiu rýchlosti ohrevu zo 100 na 2,5 ºC/min. S využitím termodynamického modelu sa podarilo objasniť vplyv kritickej teploty na kontamináciu uhlíkom. Výsledky potvrdili, že pri SPS dochádza v materiáli pri vysokých rýchlostiach ohrevu k tvorbe horúcich zón, ktoré urýchľujú vyparovanie uhlíka a jeho reakciu s $MgAl_2O_4$, čoho výsledkom je zafarbenie vzorky. Kontamináciu uhlíkom je možné minimalizovať, ak sa vysoké rýchlosti ohrevu aplikujú len do kritickej teploty 1150 ºC, čím je možné pripraviť transparentnú spinelovú keramiku pri relatívne nízkych teplotách spekania.



Časovo-teplotný režim pri dvojstupňovom SPS pri Tc= 1150°C a 1200°C a fotografie pripravených vzoriek

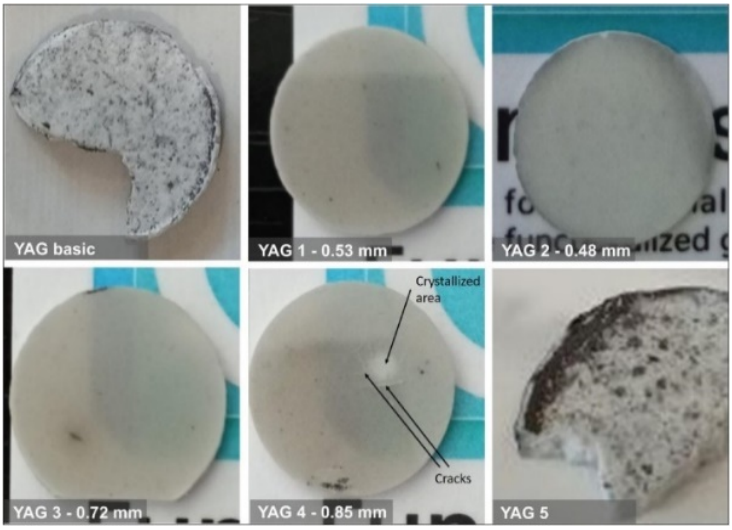
Publikácia:
TALIMIAN, Ali** - POUCHLÝ, Václav - EL-MAGHRABY, Hesham F. M. Aldelrehim - MACA, Karel - GALUSEK, Dušan. Transparent magnesium aluminate spinel: Effect of critical temperature in two-stage spark plasma sintering. In Journal of the European Ceramic Society, 2020, vol. 40, no. 6, p. 2417-2425. (2019: 4.495 - IF, Q1 - JCR, 1.164 - SJR, Q1 - SJR, karentované - CCC).

2.3.2. Aplikačný typ

Zhutnenie sklenených mikrogúľ so zložením yttrito-hlinitého granátu pomocou spekania vo viskóznom toku za prítomnosti plazmy

Riešitelia z ÚACH SAV: M. Monika, D. Galusek

Ytrito-hlinité granátové (Yttrium aluminium garnet – YAG $Y_3Al_5O_{12}$) materiály (vo forme monokryštálov, sklo-keramiky a keramiky) sú vhodným kandidátom optických aplikácií ako napr. lasery, displeje a optické senzory. Práca sa sústredí na prípravu hutných vzoriek skla v zložení hlinito-ytritého granátu (YAG), ktoré má vysokú tendenciu ku kryštalizácii a zároveň vysokú kryštalizačnú rýchlosť a preto je jeho príprava veľmi náročná.
Vzorky boli zhutňované pomocou spekania za prítomnosti plazmy (SPS) pričom sa optimalizovala rýchlosť ohrevu, tlak a teplota. Výsledky poukazujú na to, že sklo s vysokou tendenciu ku kryštalizácii je veľmi citlivé na **čas** zhutňovania pod tlakom (čo je spojené s max. teplotou zhutňovania). Pomocou metódy spekania vo viskóznom toku sa podarilo pripraviť hutné, amorfné, translucentné vzorky (celková transmisia meraná pri 550 nm je 4.8 %) pri teplote pod 910°C, bez izotermickej výdrže.



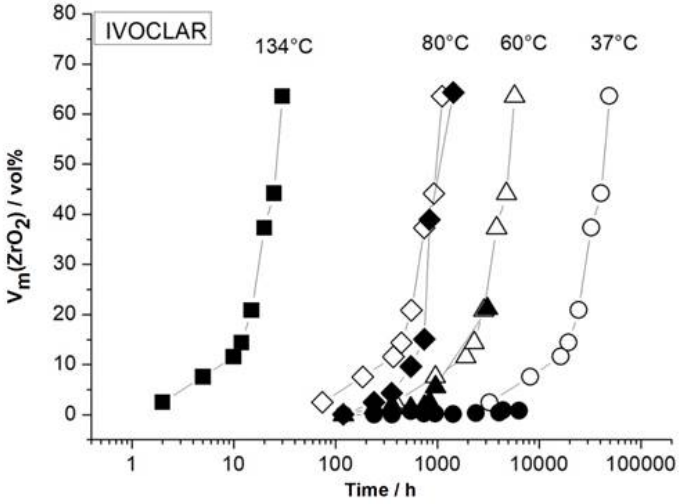
Publikácie:
MICHÁLKOVÁ, Monika** - KRAXNER, Jozef - MICHÁLEK, Martin - GALUSEK, Dušan. Preparation of translucent YAG glass/ceramic at temperatures below 900 °C. In Journal of the European Ceramic Society, 2020, vol. 40, no. 7, p. 2581-2585. (2019: 4.495 - IF, Q1 - JCR, 1.164 - SJR, Q1 - SJR, karentované - CCC).
MICHÁLKOVÁ, Monika** - KRAXNER, Jozef - PARCHOVIANSKÝ, Milan - KLEMENT, Róbert - POUCHLÝ, Václav - MACA, Karel - GALUSEK, Dušan. Viscous flow spark plasma sintering of glass microspheres with YAG composition and high tendency to crystallization, J. Eur. Ceram. Soc. 41 (2021) 1537–1542. (4.495 – IF2019).

2.3.3. Medzinárodné vedecké projekty

Korózia a nízko-teplotná degradácia 3Y-TZP dentálnej keramiky
Riešitelia z ÚACH SAV: H. El-Maghraby, D. Galusek

Vďaka svojim vynikajúcim vlastnostiam sa ytriom stabilizovaná tetragonálna zirkoničitá keramika (Y-TZP) považuje za vhodný materiál pre pokročilé dentálne aplikácie. Dlhodobá povrchová stabilita týchto materiálov vo vlhkom prostredí je však stále predmetom diskusie. V práci sa skúmali dve komerčné a jedna v laboratóriu pripravená 3Y-TZP keramika. Stabilita a trvanlivosť materiálov sa hodnotila z hľadiska ich správania voči dlhodobej korózii pri nízkom pH (do 265 dní) a pri nízkej teplote (tzv. nízkoteplotná degradácia - LTD). Rozsah korózie a LTD sa sledoval stanovením obsahu monoklinickej fázy oxidu zirkoničitého na povrchoch testovanej keramiky röntgenovou difrakciou. Získané výsledky ukazujú, že pri koróznych testoch pri nízkej teplote dochádza k vylúhovaniu ytria z testovaných 3Y-TZP materiálov. Množstvá vylúhovaného ytria sú však

hlboko pod hygienickými limitmi, a nepozoroval sa ani vplyv vylúhovania ytria na citlivosť skorodovaných vzoriek voči LTD.



Vzťah medzi obsahom monoklinickej fázy a časom expozície pri rôznych teplotách pre komerčný dentálny materiál IVOCLAR: porovnanie nameraných údajov (plné symboly) s hodnotami odhadnutými pomocou MAJ modelu (prázdne symboly) s využitím stanovených aktivačných energií transformačného procesu.

Publikácie

NOWICKA, Aleksandra** - EL-MAGHRABY, Hesham - ŠVANČÁRKOVÁ, Anna - GALUSKOVÁ, Dagmar - REVERON, Helen - GREMILLARD, L. - CHEVALIER, J. - GALUSEK, Dušan. Corrosion and low temperature degradation of 3Y-TZP dental ceramics under acidic conditions. In Journal of the European Ceramic Society, 2020, vol. 40, no. 15, p. 6114-6122. (2019: 4.495 - IF, Q1 - JCR, 1.164 - SJR, Q1 - SJR, karentované - CCC).

2.4. Publikačná činnosť (zoznam je uvedený v prílohe C)

Tabuľka 2e Štatistika vybraných kategórií publikácií

PUBLIKAČNÁ A EDIČNÁ ČINNOSŤ	Počet v r. 2020/ doplnky z r. 2019
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)	**1 / 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)	**2 / 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)	**77 / 0**
10. Vedecké práce registrované vo Web of Science Core Collection alebo Scopus (ADMA, ADMB, ADNA, ADNB)	**5 / 1**
11. Vedecké práce v ostatných domácich časopisoch (ADFA, ADFB)	**0 / 0**
12. Vedecké práce v ostatných zahraničných časopisoch (ADEA, ADEB)	**0 / 0**
13. Vedecké práce v domácich recenzovaných zborníkoch (AEDA)	**0 / 0**
14. Vedecké práce v zahraničných recenzovaných zborníkoch (AECA)	**0 / 0**
15. Publikované príspevky na domácich vedeckých konferenciách (AFB, AFD)	**0 / 0**
16. Publikované príspevky na zahraničných vedeckých konferenciách (AFA, AFC)	**2 / 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 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. 2019 (zdroj JCR) *Počet článkov / doplnky*	44 / 0	29 / 0	1 / 0	5 / 0	79 / 0
Podľa SJR z r. 2019 (zdroj Scimago) *Počet článkov / doplnky*	50 / 0	17 / 0	14 / 0	1 / 1	82 / 1

Tabuľka 2g Ohlasy

OHLASY	Počet v r. 2019/ doplnky z r. 2018
Citácie vo WOS (1.1, 2.1)	1417 / 15
Citácie v SCOPUS (1.2, 2.2)	28 / 8
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	25
Prednášky a vývesky na národných vedeckých podujatiach	34

2.6. Vyžiadané prednášky

Ak boli príspevky publikované, sú súčasťou prílohy C, kategória (AFC, AFD, AFE, AFF, AFG, AFH)

2.6.1. Vyžiadané prednášky na medzinárodných vedeckých podujatiach

ASHER J. – HRICOVINI M. – HRICOVINI M. Photochemical properties of quinazolinone- derivative Schiff's bases: Anti-syn isomerisation across the N-N bond. In XIIIth Workshop on Modern Methods in Quantum Chemistry, Mariapfarr, Rakúsko, 1. – 6. marec 2020.

BOHÁČ, P. – CZÍMEROVÁ, A. – SASAI, R. – BUJDÁK, J. Photophysical properties of hybrid systems based on layered silicates and cyanine dyes. In ICMS-2020. 3rd International Conference on Material Science, 4. – 6. marec 2020, Tripura University, India.

KOMOROVSKÝ, S. Relativistic DFT calculations of spectroscopic parameters for paramagnetic species: theoretical and practical considerations. In XIIIth Workshop on Modern Methods in Quantum Chemistry, Mariapfarr, Rakúsko, 1. – 6. marec 2020.

LENČÉŠ Z. - RADWAN M. – PETRISKOVÁ P. – CZÍMEROVÁ A. – ŠAJGALÍK P. Transparent/translucent $MgAl_2O_4$ and MgAlON-based phosphors for solid state lighting and photocatalytic applications. In 44th International Conference & Exposition on Advanced Ceramics & Composites, 26 – 31. január 2020 Daytona Beach, Florida, USA,

MALKINA O. L. – KOMOROVSKY S. – MALKIN V. G. Beyond the Dirac vector model: why one-bond NMR spin-spin coupling can be negative. In XIIIth Workshop on Modern Methods in Quantum Chemistry, Mariapfarr, Rakúsko, 1. – 6. marec 2020.

BUJDÁK, J. Resonance energy transfer in hybrid systems of layered nanoparticles and laser dyes.

- ICMS-2020. 3rd International Conference on Material Science, 4. – 6. marec 2020, Tripura University, India. 6. marec 2020
- Recent Trends in Condensed Matter Physics, School of Physical Sciences, Indian Association for the Cultivation of Science, 2. – 3. marec 2020, CV Raman Hall, IACS, Kolkata, 2. marec 2020

2.6.2. Vyžiadané prednášky na národných vedeckých podujatiach

2.6.3. Vyžiadané prednášky na významných vedeckých inštitúciách

2.7. Patentová a licenčná činnosť na Slovensku a v zahraničí v roku 2020

2.7.1. Vynálezy, na ktoré bol v roku 2020 udelený patent

a) na Slovensku

b) v zahraničí

2.7.2. Vynálezy prihlásené v roku 2020

a) na Slovensku
b) v iných krajinách ako prioritná prihláška
c) PCT
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 2020
b) udelené v roku 2020

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 2020 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
Galusek Dušan	VEGA	1
Hnatko Miroslav	VEGA	2
Lenčéš Zoltán	VEGA	5
Madejová Jana	VEGA	1
Tatarko Peter	APVV	1
	VEGA	1

2.9. Účasť na spracovaní hesiel do encyklopédie Beliana

Počet autorov hesiel: 0

2.10. Recenzovanie publikácií a príspevkov vo vedeckých časopisoch

Tabuľka 2j Počet recenzovaných monografií, článkov, zborníkov

Meno pracovníka	Knižné monografie		Príspevky v časopisoch			Zborníky	
	Domáce	Zahra-ničné	WoS, SCOPUS	Iné databázy	Ostatné	Domáce	Zahra-ničné
Boča Miroslav	0	0	2	0	0	0	0
Boháč Peter	0	0	2	0	0	0	0
Bučko Tomáš	0	0	3	0	0	0	0
Bujdák Juraj	0	0	11	0	0	0	0
Galusek Dušan	0	0	6	0	0	0	0
Jankovič Ľuboš	0	0	2	0	0	0	0
Komorovský Stanislav	0	0	1	0	0	0	0
Lenčéš Zoltán	0	0	3	0	0	1	0
Madejová Jana	0	0	9	0	0	0	0

Najafzadehkhoee Aliasghar	0	0	1	0	0	0	0
Pálková Helena	0	0	2	0	0	0	0
Pavlík Viliam	0	0	4	1	0	0	0
Scholtzová Eva	0	0	3	0	0	0	0
Tatarko Peter	0	0	17	0	0	0	0
Spolu	**0**	**0**	**66**	**1**	**0**	**1**	**0**

2.11. Iné informácie k vedeckej činnosti.

Počet časopiseckých karentovaných publikácií registrovaných v databáze WOS a Scopus v roku 2020 dosiahol číslo 77. 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. Na rok 2020 je tento počet 40,97 a na jedného pracovníka pripadá 1,88 karentovanej publikácie. Po prirátaní deviatich doktorandov s plnou kapacitou (traja ďalší doktorandi s kapacitou pod 0,3 vzhľadom na ich neskorší dátum nástupu na štúdium neboli zarátaní) sa počet VŠ zamestnancov zvýši na 49,97 a počet publikácií na jedného pracovníka klesne na 1,54. V porovnaní s predchádzajúcim rokom je nárast publikačných výstupov pomerne významný. Cieľom aj naďalej ostáva dosiahnuť dve publikácie na počet zamestnancov s univerzitným titulom zapojených do výskumných projektov, čo odpovedá štandardu vyspelých vedeckých pracovísk s podobným zameraním. Priemerný impakt faktor CCC časopisov, v ktorých boli práce uverejnené, bol 4,17, pokiaľ vlani to bolo 3,69 (treba mať na pamäti, že údaje sú zo záverečných správ, v ktorých sa nachádzajú aj doplnky publikácií za predchádzajúci rok 2019, ktorým ešte neboli priradené kompletné bibliografické údaje v čase spracovávania podkladov do záverečných správ). Okrem CCC publikácií, vedeckí pracovníci ÚACH sa podieľali ako autori alebo spoluautori na troch kapitolách, ktoré vyšli v zahraničných nakladateľstvách.
Citovanosť (vo všetkých dostupných databázach WOS – 1425, SCOPUS – 36) na vedeckého pracovníka (34,9) je 41,86 citácií, čo predstavuje pokles v porovnaní s rokom 2019. Pracovníci ústavu predniesli 7 pozvaných prednášok na významných svetových konferenciách. Tento stav bol samozrejme ovplyvnený pandémiou.
V roku 2020 sa S. Komorovský stal jedným zo spoluautorov práce, ktorá bola publikovaná v prestížnom vedeckom časopise ACS Chemical Review vydávanom spoločnosťou American Chemical Society (IF vyšší ako 52). Tento publikačný výstup bol vybraný do prezentácie predsedu SAV ako jeden z TOP výsledkov do koncoročného rozhovoru pre TASR.

3. Doktorandské štúdium, iná pedagogická činnosť a budovanie ľudských zdrojov pre vedu a techniku

3.1. Údaje o doktorandskom štúdiu

Tabuľka 3a Počet doktorandov v roku 2020

Forma	Počet k 31.12.2020				Počet doktorandov po doktorandskej skúške		Počet ukončených doktorantúr v r. 2020					
							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	7	5	1	2	4	1	0	0	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	7	5	1	2	4	1	0	0	0	0	0	0
Súhrn	12		3		5		0		0		0	

Uvádzajte len doktorandov organizácie ako externej vzdelávacej inštitúcie.
Riadok „Spolu“ je súčtom troch riadkov nad ním. Každá bunka v „Súhrn“ je súčtom dvoch buniek nad ňou. V stĺpci „Počet doktorandov po doktorandskej skúške“ sa uvádza počet doktorandov, ktorí počas roku 2020 boli aspoň 1 deň doktorandami po doktorandskej skúške. Sú číselne zahrnutí aj v predchádzajúcich stĺpcoch.

3.2. Zmena formy doktorandského štúdia

Tabuľka 3b 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

3.3. Zoznam doktorandov, ktorí ukončili doktorandské štúdium úspešnou obhajobou

Tabuľka 3c Menný zoznam ukončených doktorandov v roku 2020 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

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

Tabuľka 3d Menný zoznam ukončených doktorandov v roku 2020 úspešnou obhajobou v nadštandardnej dĺžke štúdia

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

		na DŠ				

3.5. Uplatnenie absolventov doktorandského štúdia

Tabuľka 3e Prehľad uplatnenia absolventov doktorandského štúdia

Počet absolventov PhD. štúdia v roku 2020 (obhajoba leto 2020)	**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**
0	0	0	0	0

Zoznam interných a externých doktorandov je uvedený v prílohe A.

3.6. Medzinárodné doktorandské štúdium

Tabuľka 3f Počet študentov v medzinárodných programoch doktorandského štúdia

Cotutelle	**Co-direction**	**Iné**	**Zahraniční doktorandi štátne občianstvo/počet**
0	0	0	IND/2, TUR/2, DEU/1, ESP/1, GRC/1, PAK/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.

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

Tabuľka 3g 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**	**Doktorandské štúdium uskutočňované na** (univerzita/vysoká škola a fakulta)
fyzika	13	Prírodovedecká fakulta UK v Bratislave
chemické inžinierstvo a technológie	16	FCHPT STU v Bratislave
chemické inžinierstvo a technológie	16	TnUAD v Trenčíne
chémia	17	FCHPT STU v Bratislave
chémia	17	Prírodovedecká fakulta UK v Bratislave

Tabuľka 3h 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. (anorganická chémia)	doc. Ing. Miroslav Boča, DrSc. (Fakulta chemickej a potravinárskej technológie STU)	Ing. Ondrej Hanzel, PhD. (IIa)
doc. Ing. Miroslav Boča, DrSc. (anorganická technológia a materiály)	doc. Ing. Miroslav Boča, DrSc. (Trenčianska univerzita Alexandra Dubčeka v Trenčíne)	RNDr. Veronika Silliková, PhD. (PhD., Prírodovedecká fakulta UK)
doc. Ing. Miroslav Boča, DrSc. (odbor v zahraničí)	prof. Ing. Dušan Galusek, DrSc. (Fakulta špeciálnej techniky TnUAD)	
prof. RNDr. Juraj Bujdák, DrSc. (anorganická chémia)	prof. Ing. Dušan Galusek, DrSc. (Fakulta zdravotníctva TnUAD)	

prof. RNDr. Juraj Bujdák, DrSc. (fyzikálna chémia)	prof. Ing. Dušan Galusek, DrSc. (Trenčianska univerzita Alexandra Dubčeka v Trenčíne)	
prof. Ing. Dušan Galusek, DrSc. (anorganická technológia a materiály)	prof. Ing. Marek Liška, DrSc., Dr.h.c. (Fakulta chemické technologie VŠCHT, Praha, ČR)	
prof. Ing. Dušan Galusek, DrSc. (nanomateriály)	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. Zoltán Lenčéš, PhD. (anorganická technológia a materiály)	prof. RNDr. Pavol Šajgalík, DrSc. (Hutnícka fakulta TUKE)	
doc. Ing. Zoltán Lenčéš, PhD. (anorganická chémia)	prof. RNDr. Pavol Šajgalík, DrSc. (Slovenská technická univerzita v Bratislave)	
doc. Ing. Zoltán Lenčéš, PhD. (odbor v zahraničí)	prof. RNDr. Pavol Šajgalík, DrSc. (Trenčianska univerzita Alexandra Dubčeka v Trenčíne)	
prof. Ing. Marek Liška, DrSc., Dr.h.c. (anorganická technológia a materiály)	prof. RNDr. Pavol Šajgalík, DrSc. (Univerzita Komenského v Bratislave)	
prof. Ing. Marek Liška, DrSc., Dr.h.c. (fyzika kondenzovaných látok a akustika)	prof. RNDr. Pavol Šajgalík, DrSc. (Univerzita Pavla Jozefa Šafárika v Košiciach)	
RNDr. Jana Madejová, DrSc. (anorganická technológia a materiály)	prof. RNDr. Pavol Šajgalík, DrSc. (Univerzita sv. Cyrila a Metoda v Trnave)	
Dr. Oľga Malkin, DrSc. (teoretická a počítačová chémia)	prof. RNDr. Pavol Šajgalík, DrSc. (Vysoké učení technické, Brno)	
Dr. Vladimír Malkin, DrSc. (chemická fyzika)		
Dr. Vladimír Malkin, DrSc. (teoretická a počítačová chémia)		

3.8. Údaje o pedagogickej činnosti

Tabuľka 3i Prednášky a cvičenia vedené v roku 2020

PEDAGOGICKÁ ČINNOSŤ	Prednášky		Cvičenia a semináre	
	doma	v zahraničí	doma	v zahraničí
Počet prednášateľov alebo vedúcich cvičení	4	0	2	0
Celkový počet hodín v r. 2020	73	0	45	0

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

Tabuľka 3j 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**	3
3.	**Počet pracovníkov, ktorí pôsobili ako školitelia doktorandov (PhD.)**	13
4.	**Počet školených doktorandov (aj pre iné inštitúcie)**	28

5.	**Počet oponovaných dizertačných a habilitačných prác**	9
6.	**Počet pracovníkov, ktorí oponovali dizertačné a habilitačné práce**	5
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**	4
9.	**Počet pracovníkov, ktorí pôsobili ako členovia komisií, resp. oponenti v inauguračnom alebo habilitačnom konaní na vysokých školách**	2

3.9. Iné dôležité informácie k pedagogickej činnosti

Ústav anorganickej chémie SAV po skúsenostiach z predchádzajúceho roka opäť vynaložil aj vlastnú iniciatívu pre získanie nových doktorandov. Témy boli zverejnené na troch medzinárodných portáloch. Celkovo išlo o 22 tém v štyroch študijných programoch – Anorganická chémia, Fyzikálna chémia a Chemická fyzika v spolupráci s PriF UK a Anorganická technológia a materiály v spolupráci s FCHPT STU. Piati zo šiestich záujemcov sa zúčastnili prijímacích pohovorov. Zo štyroch úspešných uchádzačov nakoniec traja študenti nastúpili a boli zapísaní do prvého ročníka doktorandského štúdia na PriF UK v programoch Anorganická chémia a Fyzikálna chémia. Študenti doktorandského štúdia a mladí vedeckí pracovníci do 35 rokov sa každoročne zúčastňujú Súťaže mladých pracovníkov do 35 rokov na ÚACH SAV. Súťaž bola v septembri 2020 vyhlásená, 14 účastníkov zaslalo abstrakty, ale vzhľadom na pandemickú situáciu v naplánovanom čase konania, sa termín konania súťaže posunul na priaznivejšie obdobie.
V dôsledku pandémie bola zrušená aj každoročná prax študentov PriF UK na ÚACH SAV. Študentka bakalárskeho štúdia na Katedre chémie UMB prejavila záujem o dobrovoľnú letnú prax na ÚACH, v rámci ktorej sa postupne oboznámila s niektorými metódami používanými pri výskume na oddelení taveninových sústav a oddelení hydrosilikátov.

4. Medzinárodná vedecká spolupráca

4.1. Medzinárodné vedecké podujatia

4.1.1. Medzinárodné vedecké podujatia, ktoré organizácia SAV organizovala v roku 2020 alebo sa na ich organizácii podieľala, s vyhodnotením vedeckého a spoločenského prínosu podujatia

XIIIth Workshop on Modern Methods in Quantum Chemistry, Mariapfarr, Rakúsko, 40 účastníkov, 01.03.-06.03.2020
25 prednášok, posterová sekcia, účastníci z Nemecka, Slovenska, Českej republiky, Nórska, Dánska, Rakúska

4.1.2. Medzinárodné vedecké podujatia, ktoré usporiada organizácia SAV v roku 2021 (anglický a slovenský názov podujatia, miesto a termín konania, meno, telefónne číslo a e-mail zodpovedného pracovníka)

17th Conference on High Temperature Materials Chemistry (HTMC XVII), Horný Smokovec, Slovenská republika, 06. -11. 06. 2021, (Miroslav Boča, 02/59410400, uachboca@savba.sk)

14th International Conference on Solid State Chemistry Trenčín, Slovenská republika, 13. -17. 06. 2021, (Dušan Galusek, 032/7400590, dusan.galusek@tnuni.sk)

4.1.3. Počet pracovníkov v programových a organizačných výboroch medzinárodných konferencií

Tabuľka 4a Programové a organizačné výbory medzinárodných konferencií

Meno pracovníka	Programový	Organizačný	Programový i organizačný
Galusek Dušan	3	0	0
Komorovský Stanislav	0	1	0
Malkin Oľga	0	0	1
Malkin Vladimír	0	1	0
Šajgalík Pavol	0	1	0
Tatarko Peter	1	0	0
Spolu	4	3	1

4.2. Členstvo a funkcie v medzinárodných orgánoch

4.2.1. 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 Society on Glass Science and Technology (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)

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)
Society of Glass Technology (funkcia: člen)
TC03 (funkcia: člen)

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)

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

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)

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

Tabuľka 4b Experti hodnotiaci medzinárodné projekty

Meno pracovníka	Typ programu/projektu/výzvy	Počet hodnotených projektov
Tatarko Peter	Latvian Council of Science / 2020 cooperation programs in science and technology (Latvia – Ukraine; Latvia – Belarus)	6
	Latvian Council of Science / Call for fundamental and applied research projects 2020	3
	Latvian Council of Science / Individual Scientist Project Proposals for Fundamental and Applied Research	4

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

V roku 2020, v dôsledku pandémie nebolo možné uskutočniť naplánované pracovné cesty. Boli pozastavené aj návštevy zahraničných kolegov na našom pracovisku.

Prehľad údajov o medzinárodnej mobilite pracovníkov organizácie je uvedený v Prílohe E.
Prehľad a údaje o medzinárodných projektoch sú uvedené v kapitole 2 a Prílohe B.

5. Koncepcia dlhodobého rozvoja 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. Správnosť tohto smerovania dokumentuje pozícia ústavu, ktorý je hodnotený na popredných priečkach vo všetkých procesoch hodnotenia v SAV.

5.1. Odporúčania z posledného pravidelného hodnotenia organizácií SAV (akreditácie)

Uvádzame odporúčania, ktoré sme dostali od hodnotiaceho panela.

- The numbers of publications in highly cited international journals should be further increased.
- More university lectures could help to increase the interest of PhD students in the subject.
- The institute should aim at more funding at the EU level.
- Further possible connections to commercial applications should be explored.

Ako vidno sú to pomerne všeobecné formulácie. Aj napriek tomu sú tieto odporúčania podrobne rozpracované v akčnom pláne spolu s cieľovými hodnotami v rôznych časových horizontoch v závislosti od problematiky.

5.2. 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.

5.3. Aktualizácia Akčného plánu organizácie v roku 2020

Diskusie o akčnom pláne ústavu považuje za obojstranný problém. Navyše 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 ústavu, na strane druhej očakávame aj aktivity zo strany P SAV na podnety ústavu/ústavov. Ako príklad možno uviesť absenciu projektového oddelenia. Netreba tento problém rozpisovať, lebo všetci vieme aká má byť jeho úloha, ako má fungovať atď. Treba ho iba zriadiť.

Akčný plán ÚACH bol vypracovaný k 1.10.2017. Prvý komentár a úpravy boli k 1.2.2019. Následný komentár plánujeme k 31.12.2021; skorší termín nemá opodstatnenie.

6. Spolupráca s univerzitami/vysokými školami a inými subjektmi v oblasti vedy a techniky, okrem aktivít uvedených v kap. 2, 3, 4

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", pričom v máji 2020 bola podpísaná nová Zmluva o spolupráci medzi FCHPT a ÚACH SAV na uskutočňovaní doktorandských študijných programov. Pracovníci ÚACh viedli na FChPT v roku 2020 dvoch doktorandov. Doc. Ing. Miroslav Boča, DrSc. je navyše externým členom VR FCHPT STU.

Názov univerzity/vysokej školy a fakulty: Fakulta materiálov, metalurgie a recyklácie TUKE
Oblasť spolupráce: vedecká spolupráca, účasť na Bc. a Mgr. výuke
Sídlo spoločného pracoviska (ak je vytvorené):
Začiatok spolupráce: 2000
Zhodnotenie: V spolupráci s touto fakultou je ústav zapojený do pedagogického procesu. Prof. RNDr. P. Šajgalík, DrSc. je členom vedeckej rady fakulty.

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: Spolupráca je zameraná na výchovu mladých doktorandov so zameraním na pokročilé žiaruvzdorné keramické materiály. Prof. RNDr. P. Šajgalík, DrSc. a doc. Ing. Z. Lenčéš, PhD. sú školiteľmi špecialistami doktorandov.

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". Spoločne sa riešia projekty VEGA a APVV. Prof. RNDr. J. Bujdák, DrSc. má hlavný úväzok na fakulte a čiastkový na ÚACh SAV. Prof. RNDr. J. Bujdák, DrSc. je interným členom VR ústavu a RNDr. Jana Madejová, DrSc. externým členom VR PriF UK. Pracovníci ÚACh viedli na PriF UK v priebehu roka 2020 desiatich doktorandov.

Názov univerzity/vysokej školy a fakulty: Trenčianska univerzita Alexandra Dubčeka v Trenčíne
Oblasť spolupráce: vedecká spolupráca, účasť na Mgr. a PhD. výuke
Sídlo spoločného pracoviska (ak je vytvorené):
Začiatok spolupráce: 1997
Zhodnotenie: Okrem spoločného pracoviska s TnU AD (Centrum kompetencie skla Vitrum Laugaritio) rieši ÚACh SAV 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 vysokoškolského štúdia v odbore "Chemické technológie" a doktorandského štúdia v odbore "Anorganická technológia". Od roku 2019 má ÚACh SAV s TnU AD rámcovú dohodu o spolupráci pri uskutočňovaní doktorandského študijného programu v odbore 5.2.19 Anorganická technológia a materiály.

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: Vedecká spolupráca pri analýzach povrchov kovových materiálov upravených elektrochemickým leštením. Skúmanie vlastností takto pripravených materiálov a spoločné publikácie. Na základe dohody o spolupráci prišla Dr. Anna Kityk cez Národný štipendijný program a v roku 2020 pokračovala v 8-mesačnom výskumnom pobyte (09/2019-04/2020).

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-La2O3, Al2O3-La2O3-ZrO2, Al2O3-Y2O3. Skúmanie vlastností pripravených materiálov a spoločné publikácie.Vedecká spolupráca pri príprave amorfných a polykryštalických materiálov sol-gel metódami v systémoch Al2O3-La2O3, Al2O3-La2O3-ZrO2, Al2O3-Y2O3.

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. Na ÚACh pokračovala vo svojom štúdiu jedna doktorandka z VŠB Ostrava. 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. Doc. Ing. Miroslav Hnatko, PhD. je školiteľom špecialistom doktorandky Ing. T. Fenclovej z danej fakulty.

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
Oblasť spolupráce: vedecká spolupráca
Sídlo spoločného pracoviska (ak je vytvorené): Banská Bystrica
Začiatok spolupráce: 2018
Zhodnotenie: Podaný spoločný projekt vo výzve OPVaI-VA/DP/2018/1.2.1-05

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

Názov inštitúcie: VÚNAR, a.s.
Oblasť spolupráce: vedecká spolupráca
Sídlo spoločného pracoviska (ak je vytvorené): Nové Zámky
Začiatok spolupráce: 2018
Zhodnotenie: Podaný spoločný projekt vo výzve OPVaI/DP/2018/1.2.1-05

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

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

6.4. Iné typy spoločných aktivít s inštitúciami mimo SAV

7. Aplikácia výsledkov výskumu v spoločenskej a hospodárskej praxi

7.1. Výsledky výskumu organizácie aplikované v praxi

7.2. Kontraktový – zmluvný výskum (vrátane zahraničných kontraktov)

Názov/účel kontraktového výskumu: Výskum a vývoj pokročilých žiaruvzdorných materiálov na báze Al-Si-O-C-N a Zr-O-C-N
Zadávateľ výskumného kontraktu: RHI AG Leoben, Rakúsko
Začiatok spolupráce: 2017
Ukončenie spolupráce: 2020
Finančný prínos pre organizáciu (€): 3000

Názov/účel kontraktového výskumu: Elektrická vodivosť/ electrical conductivity
Zadávateľ výskumného kontraktu: Rio Tinto Aluminium Pechiney, Francúzsko
Začiatok spolupráce: 2020
Ukončenie spolupráce: trvá
Finančný prínos pre organizáciu (€): 10500

Názov/účel kontraktového výskumu: Mapping of the key alumina characteristics for optimal dissolution perfomance
Zadávateľ výskumného kontraktu: Rio Tinto Aluminium Pechiney, Francúzsko
Začiatok spolupráce: 2020
Ukončenie spolupráce: trvá
Finančný prínos pre organizáciu (€): 70000

7.3. Iné formy aplikácie výsledkov výskumu v spoločenskej a hospodárskej praxi

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

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
Ing. Michal Korenko, PhD.	Komisia pre námietky pri verejnom obstarávaní	externý člen
doc. Ing. Zoltán Lenčéš, PhD.	Sektorová rada inovácií, Národná sústava povolaní	člen
RNDr. Jana Madejová, DrSc.	Komisia pre obhajoby doktorských dizertačných pác v odbore anorganická chémia - 01402	predseda
prof. RNDr. Pavol Šajgalík, DrSc.	Výskumná agentúra SR	člen
	Pandemická komisia MZ SR	člen
	Rada predsedov pracovných skupín pre prioritné oblasti aplikovaného výskumu a experimentálneho vývoja	predseda
	Komisia ministra školstva pre udeľovanie Ceny ministra školstva	člen
	Technologická agentúra SR	člen
	Slovenská komisia pre vedecké hodnosti (SKVH)	podpredseda
	Rada vlády pre vedu, techniku a inovácie	podpredseda
	Komisia MŠ pre prioritné oblasti aplikovaného výskumu a experimentálneho vývoja v SR - materiálový výskum a nanotechnológie	člen pracovnej skupiny

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. Vedecko-organizačné a popularizačné aktivity

9.1.Vedecko-popularizačná činnosť

Tabuľka 9a Súhrnné počty vedecko-popularizačných činností organizácie SAV

Typ	Počet	Typ	Počet	Typ	Počet
prednášky/besedy	5	tlač	1	TV	0
rozhlas	0	internet	7	exkurzie	0
publikácie	0	multimediálne nosiče	0	dokumentárne filmy	0
iné	1				

9.2. Vedecko-organizačná činnosť

Tabuľka 9b Vedecko-organizačná činnosť

Názov podujatia	Domáca/ medzinárodná	Miesto	Dátum konania	Počet účastníkov
XIIIth Workshop on Modern Methods in Quantum Chemistry	medzinárodná	Mariapfarr, Rakúsko	01.03.-06.03.2020	40

9.3. Účasť na výstavách

Názov výstavy: Európska noc výskumníkov
Miesto konania: online
Dátum: 27.11.2020
Zhodnotenie účasti: Vzhľadom na pandemickú situáciu sa tento tradične organizovaný festival vedy uskutočnil len v online priestoroch. Cieľovou skupinou projektu sú predovšetkým deti v školskom veku, pričom dôraz je kladený na zvýšenie ich záujmu o štúdium prírodných vied a technických smerov na vysokých školách. Zameranie výskumu v rámci oddelení, ale aj na ústave tentokrát prezentovali vo forme prednášok a ukážkou experimentov naši kolegovia: P. Boháč, M. Pribus, M. Slaný.

9.4. Účasť v programových a organizačných výboroch národných konferencií

Tabuľka 9c Programové a organizačné výbory národných konferencií

Meno pracovníka	Programový	Organizačný	Programový i organizačný
Bujdák Juraj	1	0	0
Madejová Jana	0	0	1
Pálková Helena	0	0	1
Spolu	1	0	2

9.5. 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)
ChemistrySelect (Wiley-VCH) (funkcia: člen redakčnej rady)

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: associate 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)

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)

9.6. Činnosť v domácich vedeckých spoločnostiach

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)

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: člen predstavenstva, vedecký tajomník)

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

doc. Ing. Miroslav Hnatko, PhD.
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 sklárska spoločnosť (funkcia: člen)

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

Mgr. Stanislav Kedžuch, PhD.
Slovenská chemická spoločnosť (funkcia: člen predsedníctva)

Ing. Michal Korenko, PhD.
Slovenská chemická spoločnosť (funkcia: predseda revíznej komisie)
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)

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

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

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 ílová spoločnosť (funkcia: člen)

Ing. Anna Prnová, PhD.

Slovenská silikátová vedecko-technická spoločnosť (funkcia: člen)
Slovenská sklárska spoločnosť (funkcia: člen)

Ing. Jaroslav Sedláček, PhD.
Slovenská silikátová vedecko-technická spoločnosť (funkcia: člen)

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

Ing. Michal Slaný, PhD.
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)

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

9.7. Iné dôležité informácie o vedecko-organizačných a popularizačných aktivitách

10. Činnosť knižnično-informačného pracoviska

10.1. Knižničný fond

Tabuľka 10a Knižničný fond

Knižničné jednotky spolu		7629
z toho	knihy a zviazané periodiká	7629
	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		13
v tom	kúpou	13
	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“.*

10.2. Výpožičky a služby

Tabuľka 10b 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		50

10.3. Používatelia

Tabuľka 10c Používatelia

Registrovaní používatelia	

Návštevníci knižnice spolu (bez návštevníkov podujatí)	

10.4. Iné údaje

Tabuľka 10d Iné údaje

On-line katalóg knižnice na internete (1=áno, 0=nie)	0
Náklady na nákup knižničného fondu v €	1165,03

10.5. Iné informácie o knižničnej činnosti

11. Aktivity v orgánoch SAV

11.1. Členstvo vo Výbore Snemu SAV

11.2. Členstvo v Predsedníctve SAV a vo Vedeckej rade SAV

prof. RNDr. Pavol Šajgalík, DrSc.
- Predseda SAV
- predseda VR SAV

11.3. Členstvo vo vedeckých kolégiách SAV

doc. Ing. Miroslav Boča, DrSc.
- VK SAV pre chemické vedy (člen)
RNDr. Jana Madejová, DrSc.
- VK SAV pre chemické vedy (člen)
prof. RNDr. Pavol Šajgalík, DrSc.
- VK SAV pre chemické vedy (člen)

11.4. Členstvo v komisiách SAV

doc. Ing. Miroslav Boča, DrSc.
- Komisia SAV pre vyhodnocovanie medzinárodných projektov (člen)
Ing. Michal Korenko, PhD.
- Komisia pre hodnotenie grantov doktorandov SAV (člen)

11.5. Členstvo v orgánoch VEGA

doc. Ing. Miroslav Boča, DrSc.
- Komisia VEGA č. 3 pre chemické vedy, chemické inžinierstvo a biotechnológie (podpredseda)
prof. Ing. Dušan Galusek, DrSc.
- Komisia VEGA č. 7 pre strojárstvo a príbuzné odbory informačných a komunikačných technológií a materiálové inžinierstvo (člen)
doc. Ing. Zoltán Lenčéš, PhD.
- Komisia VEGA č. 7 pre strojárstvo a príbuzné odbory informačných a komunikačných technológií a materiálové inžinierstvo (člen)
Dr. Oľga Malkin, DrSc.
- -Komisia VEGA č. 3 pre chemické vedy, chemické inžinierstvo a biotechnológie (člen)

12. Hospodárenie organizácie

12.1. Výdavky organizácie

Tabuľka 12a Výdavky organizácie (skutočnosť k 31. 12. 2020 v €)

Typ organizácie (RO,PO)		**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	**2 273 421**	**1 711 096**	**496 096**	**66 229**	**75**
z toho: mzdy (610)	1 204 467	1 010 761	157 747	35 959	84
vedecká výchova štipendiá (640)	87 660	87 660			100
poistné a príspevok do poisťovní (620)	405 458	336 698	55 080	13 680	83
tovary a služby (630)	485 787	275 977	193 220	16 590	57
transfery partnerom projektov (640)	90 049		90 049		
2. Kapitálové výdavky					
z toho: obstarávanie kapitálových aktív					
kapitálové transfery					

12.2. Zdroje financovania organizácie

Tabuľka 12b Zdroje financovania organizácie (skutočnosť k 31. 12. 2020 v €)

Typ organizácie (RO,PO)		**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)	**363 637**			**2 541**	
z toho: VEGA	106 482			687	
MVTS výskumné projekty	54 996			1 854	
MVTS podpora					
SASPRO/MOREPRO					
Vydávanie časopisov					
Vedecká výchova (štipendiá)	87 660				
OTAS (630)	114 499				
2. ŠF EÚ vr. fin. zo ŠR	**75 930**		**38 623**	**13 770**	
3. medzinárodné grantové projekty	**2 316**		326		
z toho: H2020					
4. iné štátne a verejné zdroje (spolu)	**437 469**		**119 124**	**41 310**	**90 049**
z toho: APVV	437 469		119 124	41 310	90 049

podpora z kapitoly MŠVVaŠ SR (stimuly)					
5. ostatné zdroje	**55 250**				
z toho: príjmy z prenájmu					
príjmy z podnikateľskej činnosti					
príjmy z expertnej činnosti a služieb	55 250				

13. Nadácie a fondy pri organizácii SAV

14. Iné významné činnosti organizácie SAV

V roku 2020 na ústave prebehli rozsiahle rekonštrukčné práce odpadov na budove. Žiaľ, v tejto súvislosti treba upozorniť na nesystematický prístup k plánovaniu prác ale aj k ich vykonávaniu. Podobný problém sprevádzal aj rekonštrukciu rozvodov vody, kedy do dnešného dňa riaditelia dotknutých ústavov nemajú k dispozícii zakreslenie skutočného stavu. Problémy, ktoré vznikali počas prác boli zo strany kompetentných riešené povrchne, narýchlo a bez záujmu, a dokonca možno povedať aj nezodpovedne.
V rámci projektu CEMEA, ktorý sa začal riešiť v priebehu roka 2019 prebehli búracie práce dreveného pavilónu. Na danom mieste je naplánovaná výstavba novej budovy. Momentálne sa stále čaká na vyhodnotenie verejného obstarania zhotoviteľa.

15. Vyznamenania, ocenenia a ceny udelené pracovníkom organizácie v roku 2020

15.1. Domáce ocenenia

15.1.1. Ocenenia SAV

15.1.2. Iné domáce ocenenia

Galusek Dušan
Cena ministerky školstva vedy, výskumu a športu SR za vedu a techniku
Oceňovateľ: Ministerstvo školstva vedy, výskumu a športu SR
Opis: Vedecko-výskumný tím roka, vedúci tímu.

Galusek Dušan
Vedec roka
Oceňovatelia: Centrum vedecko-technických informácií, Slovenská akadémia vied, Zväz slovenských vedecko-technických spoločností ZSVTS
Opis: Ocenenie v kategórii „Osobnosť medzinárodnej vedecko-technickej spolupráce“

15.2. Medzinárodné ocenenia

16. Poskytovanie informácií v súlade so zákonom č. 211/2000 Z. z. o slobodnom prístupe k informáciám v znení neskorších predpisov (Zákon o slobode informácií)

17. Problémy a podnety pre činnosť SAV

Zásadný problém, ktorý narastá niekoľko rokov a v roku 2020 sa prejavil bez náznakov zlepšenia, je absurdný nárast administratívnych nárokov na všetkých úrovniach. Dominuje im oblasť verejného obstarávania. Pre potreby naplnenia legislatívnych povinností ústavu v oblasti verejného obstarávania je jeden plný úväzok pre administratívneho pracovníka málo, ale mzdové prostriedky ústavu neumožňujú rozšírenie administratívy. Výsledkom je, že potrebnú aktivitu vykonáva približne 5 vedeckých pracovníkov, nad rámec alebo na úkor svojich odborných aktivít. Táto situácia je absolútne neúnosná. Deklarovaná snaha P SAV pomôcť organizáciám v tejto situácii je vítaná.
Príkladom absurdnej administratívnej povinnosti je sledovanie výdavkov na nákup výpočtovej techniky v samostatnej kapitole. Výsledkom je požiadavka presne definovať sumu vyčlenennú na túto aktivitu s tým, že akékoľvek schvalovanie trvá 2-3 mesiace! To znamená, že posledný nákup z projektov môže byť realizovaný možno v septembri, aby sa stihol celý schvaľovací proces.
Ďalším problémom presahujúcim možnosti riešenia jednotlivej organizácie, je prístup agentúry APVV k otázke čerpania nepriamych nákladov. Tento prístup zásadným spôsobom obmedzuje fungovanie organizácie, pričom jednostranná interpretácia zákona zo strany APVV nie je konfrontovaná iným nezávislým zdrojom.
Treba spomenúť aj problematiku ohľadne GDPR. Zavedenie tejto smernice komplikuje fungovanie ústavu na všetkých úrovniach od napr. organizovania konferencií, cez používanie výpočtovej techniky, až po napr. zverejňovanie telefónnych čísel na webe. Problémy spojené s touto problematikou ochromujú v mnohých oblastiach fungovanie vedeckej inštitúcie.

Správu o činnosti organizácie SAV spracoval(i):

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

Schválila vedecká rada organizácie SAV dňa 28.1.2021

Riaditeľ organizácie SAV	**Predseda vedeckej rady**
.....	.....
doc. Ing. Miroslav Boča, DrSc.	RNDr. Jana Madejová, DrSc.

Prílohy

Príloha A - Zoznam zamestnancov a doktorandov organizácie k 31.12.2020

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.	45	0.45
5.	RNDr. Jana Madejová, DrSc.	100	1.00
6.	Dr. Oľga Malkin, DrSc.	100	1.00
7.	Dr. Vladimír Malkin, DrSc.	100	1.00
8.	prof. RNDr. Pavol Šajgalík, DrSc.	55	0.55
Samostatní vedeckí pracovníci			
1.	doc. Ing. Tomáš Bučko, PhD.	25	0.25
2.	Ing. Ondrej Hanzel, PhD.	100	1.00
3.	doc. Ing. Miroslav Hnatko, PhD.	100	1.00
4.	doc. Ing. Mária Chromčíková, PhD.	100	1.00
5.	Mgr. Ľuboš Jankovič, PhD.	100	1.00
6.	Mgr. Stanislav Komorovský, PhD.	100	1.00
7.	Ing. Michal Korenko, PhD.	100	1.00
8.	Ing. Blanka Kubíková, PhD.	100	1.00
9.	doc. Ing. Zoltán Lenčéš, PhD.	100	1.00
10.	Ing. Monika Michálková, PhD.	60	0.60
11.	Ing. Helena Pálková, PhD.	100	1.00
12.	Ing. Viliam Pavlík, PhD.	100	1.00
13.	Ing. Anna Prnová, PhD.	100	1.00
14.	Ing. Jaroslav Sedláček, PhD.	100	1.00
15.	Ing. Eva Scholtzová, CSc.	100	1.00
16.	Ing. František Šimko, PhD.	100	1.00
17.	Mgr. Peter Švančárek, PhD.	100	1.00
18.	Ing. Peter Tatarko, PhD.	100	1.00
19.	Mgr. Monika Tatarková, PhD.	100	1.00
20.	Ing. Štefan Varga, CSc.	100	1.00
Vedeckí pracovníci			
1.	James Richard Asher, PhD	100	1.00
2.	Mgr. Peter Boháč, PhD.	100	1.00
3.	Mgr. Roman Bystrický, PhD.	20	0.20
4.	doc. RNDr. Edmund Dobročka, CSc.	20	0.20
5.	Mgr. Valéria Kureková, PhD.	100	0.00
6.	Ing. Jarmila Mlynáriková, PhD.	100	1.00
7.	Ing. Zuzana Netriová, PhD.	100	1.00
8.	Mgr. Jan Novotný, PhD.	80	0.27
9.	Mgr. Marek Pribus, PhD.	100	1.00
10.	RNDr. Veronika Silliková, PhD.	100	0.33
11.	Ing. Michal Slaný, PhD.	100	1.00
12.	Mgr. Tímea Šimonová, PhD.	100	1.00
13.	Ing. Peter Škorňa, PhD.	100	1.00
14.	Ing. Jana Valúchová, PhD.	100	1.00
15.	Ing. Zuzana Vasková, PhD.	100	0.00
Odborní pracovníci s VŠ vzdelaním (výskumní a vývojoví zamestnanci)			
1.	Ing. Martin Barlog	28	0.28
2.	Ing. Eva Hadzimová	100	0.00
3.	Ing. Michal Hičák	55	0.55
4.	Ing. Iveta Macková	100	1.00

5.	Ing. Eva Mikšíková	125	1.25
6.	Dr. Aliasghar Najafzadehkhoee	100	0.49
7.	Ing. Jozef Priščák	100	1.00
8.	MSc. Hakan Ünsal	20	0.20
9.	Mgr. Pavol Weiner	100	1.00
Odborní pracovníci s VŠ vzdelaním (ostatní zamestnanci)			
1.	Ing. Rastislav Haška	100	1.00
2.	Ing. Ingrid Hierwegová	5	0.05
3.	Ing. Elena Krippelová	100	1.00
4.	Mgr. Martina Pakanová	100	1.00
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.	Slavomír Daniš	100	1.00
4.	Jarmila Heinleinová	100	1.00
5.	Miriam Hnatková	100	1.00
6.	Anna Jurová	100	1.00
7.	Zdena Kapišinská	35	0.35
8.	Anna Kovárová	100	1.00
9.	Alexandra Dominika Rigáňová	125	1.25
10.	Mária Strempeková	100	1.00
11.	Alexandra Tonkovičová	100	1.00
Ostatní pracovníci			
1.	Anna Jurová	20	0.20
2.	Ingrida Kutašovičová	100	0.58
3.	Ing. Iveta Macková	20	0.20
4.	Terézia Pírová	100	1.00

Zoznam zamestnancov, ktorí odišli v priebehu roka

	Meno s titulmi	Dátum odchodu	Ročný prepočítaný úväzok
Samostatní vedeckí pracovníci			
1.	Mgr. Stanislav Kedžuch, PhD.	31.3.2020	0.30
Ostatní pracovníci			
1.	Margita Hudáková	30.4.2020	0.33

Zoznam doktorandov

	Meno s titulmi	Škola/fakulta	Študijný odbor
Interní doktorandi hradení z prostriedkov SAV			
1.	MSc. Ramu Ambati	Univerzita Komenského v Bratislave	4.1.15 anorganická chémia
2.	Ing. Martin Barlog	Slovenská technická univerzita v Bratislave	5.2.19 anorganická technológia a materiály
3.	MSc. Sanam Bashir	Univerzita Komenského v Bratislave	4.1.15 anorganická chémia
4.	MSc. Alper Guneren	Univerzita Komenského v Bratislave	4.1.15 anorganická chémia
5.	Ing. Michal Hičák	Prírodovedecká fakulta UK	4.1.15 anorganická chémia
6.	MSc. Dhiya Krishnan	Univerzita Komenského v Bratislave	4.1.18 fyzikálna chémia
7.	Florian Andreas Lemken	Univerzita Komenského v Bratislave	4.1.11 chemická fyzika
8.	Daniel Moreno Rodriguez	Slovenská technická univerzita v Bratislave	5.2.19 anorganická technológia a materiály
9.	Mgr. Debora Pastvová	Univerzita Komenského v Bratislave	4.1.11 chemická fyzika

10.	Mgr. Patrícia Petrisková	Univerzita Komenského v Bratislave	4.1.15 anorganická chémia
11.	Eva Skoura	Univerzita Komenského v Bratislave	4.1.15 anorganická chémia
12.	MSc. Hakan Ünsal	Univerzita Komenského v Bratislave	4.1.15 anorganická 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 %)
1.	RNDr. Veronika Silliková, PhD.	25.8.2020	1.9.2020	100

Zoznam emeritných vedeckých zamestnancov

	Meno s titulmi

Príloha B - Projekty riešené v organizácii

Medzinárodné projekty

Programy: Medziakademická dohoda (MAD)

1.) Vývoj nových pokročilých keramických kompozitov pre vesmírne aplikácie *(Development of new advanced ceramic composites for aerospace industry)*

Zodpovedný riešiteľ:	Peter Tatarko
Trvanie projektu:	1.1.2018 / 31.12.2020
Evidenčné číslo projektu:	2/0116/17
Organizácia je koordinátorom projektu:	áno
Koordinátor:	Ústav anorganickej chémie SAV
Počet spoluriešiteľských inštitúcií:	1 - Česko: 1
Čerpané financie:	-

Dosiahnuté výsledky:
Hlavné vedecké aktivity boli orientované na štúdium ablačnej odolnosti novo-vyvinutých vysokoteplotných keramických kompozitov (UHTC) na báze ZrB2-25 obj.%SiC s prídavkom rôzneho druhu (Eu_2O_3, Yb_2O_3, Lu_2O_3) a rôzneho množstva (2, 5, 10 hmot.%) prísad oxidov vzácnych zemín. Ablačná odolnosť týchto materiálov bola hodnotená pomocou kyslíkovo-acetylénového plameňa do teplôt cca 2600°C, pričom prvá séria experimentov bola venovaná definícií najvhodnejších parametrov skúšky (rozmer vzoriek, vzdialenosť medzi plameňom a vzorkou, prietok plynov, čas, a pod.). Príprava materiálov, ako aj skúšky odolnosti proti ablácií boli realizované a ÚACH, pričom množstvo ablatovaného materiálu bolo stanovené na partnerskom pracovisku Ústavu fyziky materiálu AVČR v Brne.
Okrem toho, bola spolupráca orientovaná na hodnotenie mechanických vlastností textúrovanej keramiky na báze TiB_2, ako aj štúdium vplyvu nanotrubičiek a nanodoštičiek nitridu bóru na zhúževnatenie krehkých sklenených matríc.

Výstupy:
- TATARKO, Peter** - GRASSO, Salvatore - KOVALČÍKOVÁ, Alexandra - MEDVEĎ, Dávid - DLOUHÝ, Ivo - REECE, Michael J. Highly textured and strongly anisotropic TiB2 ceramics prepared using magnetic field alignment (9T). In Journal of the European Ceramic Society, 2020, vol. 40, no., p. 1111-1118. (2019: 4.495 - IF, Q1 - JCR, 1.164 - SJR, Q1 - SJR). ISSN 0955-2219. Typ. ADCA
- DLOUHÝ, Ivo** - TATARKO, Peter - BERTOLLA, Luca - CHLUP, Zdeněk. Nano-fillers (nanotubes, nanosheets): Do they toughen brittle matrices? In Procedia Structural Integrity, 2019, vol. 23, p. 431-438. ISSN 2452-3216. Typ: ADMB

Programy: Bilaterálne - iné

2.) Štruktúry a biokompozity pre regeneráciu tkanív *(Scaffolds and biocomposites for tissue regeneration)*

Zodpovedný riešiteľ:	Dušan Galusek
Trvanie projektu:	1.1.2019 / 31.12.2021
Evidenčné číslo projektu:	SAS-MOST JRP 2018/02
Organizácia je koordinátorom projektu:	áno
Koordinátor:	Ústav anorganickej chémie SAV
Počet spoluriešiteľských inštitúcií:	2 - Taiwan: 2
Čerpané financie:	SAV: 24996 €

Dosiahnuté výsledky:
Projekt sa v druhom roku zameral na skúmanie synergického efektu spoločného dopovania B a Co, v matrici bioaktívneho skla 45S5 (BG) vyrobeného procesom tavenia. V porovnaní s jednoduchým B alebo Co dopingom viedli vzorky s dvojitým dopovaním k výraznejšiemu zvýšeniu sekrécie vaskulárneho endoteliálneho rastového faktora z buniek ST-2. Výsledky potvrdzujú synergický účinok B a Co ako ko-

dopingových prvkov v 45S5 BG na angiogenézu. Terapeutické anorganické ióny B a Co sa ďalej študovali na bioaktívnych sklenených nanočasticiach pripravených sol-gél metódou. Takto pripravené nanočastice sa použili ako dopujúce látky pre vlákna z polykaprolaktónu (PCL) pripraveného elektrospinovacím procesom. Vláknité kompozity demonštrovali potenciál duálneho uvoľňovania iónov na zvýšenie angiogenézy s potenciálnym využitím v mäkkých tkanivách. V rámci projektu sa tiež skúmali možnosti používania metódy odlievania pások (tape casting) ako alternatívy pre prípravu 3F biokatívnych štruktúr. Individuálne sklenené pásky z borátového bioaktívneho skla 1393B3 s rôznymi pórovitosťami sa pripravili odlievaním pásky a spekaním viskóznym tokom pri teplote 550 - 600 ° C. Tvorba hydroxyapatitu (HCA) počas testov in vitro v simulovanej telesnej tekutine (SBF) potvrdila vplyv pórovitosti na rýchlosť degradácie a tvorbu HCA s významným znížením rýchlosti degradácie v hutných páskach.

Publikácie

1. CHEN, Si** - MICHÁLEK, Martin - GALUSKOVÁ, Dagmar - MICHÁLKOVÁ, Monika - ŠVANČÁREK, Peter - TALIMIAN, Ali - KAŇKOVÁ, Hana - KRAXNER, Jozef - ZHNEG, Kai - LIVERANI, Liliana - GALUSEK, Dušan - BOCCACCINI, Aldo**. Multi-targeted B and Co co-doped 45S5 bioactive glasses with angiogenic potential for bone regeneration. In Materials Science and Engineering C: Materials for Biological Applications, 2020, vol. 112, p. 110909-1-110909-9. (2019: 5.880 - IF, Q1 - JCR, 1.149 - SJR, Q1 - SJR). ISSN 0928-4931. Dostupné na: https://doi.org/10.1016/j.msec.2020.110909 Typ: ADCA
2. SENGUPTA, Susanta** - MICHÁLEK, Martin** - LIVERANI, Liliana - ŠVANČÁREK, Peter - BOCCACCINI, Aldo - GALUSEK, Dušan. Preparation and characterization of sintered bioactive borate glass tape. In Materials Letters, 2021, vol. 282, p. 128843-1-128843-4. ISSN 0167-577X. Dostupné na: https://doi.org/10.1016/j.matlet.2020.128843 Typ:
3. CHEN, Si** - GALUSKOVÁ, Dagmar - KAŇKOVÁ, Hana - ZHENG, Kai - MICHÁLEK, Martin - LIVERANI, Liliana - GALUSEK, Dušan - BOCCACCINI, Aldo**. Electrospun PCL fiber mats incorporating multi-targeted B and Co Co-doped bioactive glass nanoparticles for angiogenesis. In Materials, 2020, vol. 13, no. 18, p. 4010-1-4010-15. (2019: 3.057 - IF, Q2 - JCR, 0.647 - SJR, Q2 - SJR). ISSN 1996-1944. Dostupné na: https://doi.org/10.3390/ma13184010 Typ: ADCA
4. Yu-Jen Chou, Henni Setia Ningsih, and Shao-Ju Shih, “Preparation, characterization and investigation of antibacterial silver-zinc co-doped ?-tricalcium phosphate by spray pyrolysis,” Ceramics International 46, 16708-16715 (2020)

Conference Publications

1. CHEN, Si - KRAXNER, Jozef - GALUSEK, Dušan - MICHÁLEK, Martin. Porosity evolution of the 45S5 bioactive glass porous microspheres by adjusting the alkali activation conditions. In Processing and properties of advanced ceramics and glasses - Joint annual meeting of the Silicate Scientific-Technological Society & FunGlass Symposium, 18. - 20. 11. 2020, online : Conference Proceedings - Book of Extended Abstracts. - Trenčín, Slovenská republika: FunGlass Centre for Functional and Surface Functionalized Glass, 2020, p.38-39. ISBN 978-80-570-2636-5. Typ: AFH
2. KURTULDU, Fatih - MUTLU, Nurshen - MICHALEK, Martin - LIVERANI, Liliana - GALUSEK Dusan - BOCCACCINI, Aldo. Cerium and gallium containing mesoporous bioactive glass nanoparticles for biomedical application. In Processing and properties of advanced ceramics and glasses - Joint annual meeting of the Silicate Scientific-Technological Society & FunGlass Symposium, 18. - 20. 11. 2020, online : Conference Proceedings - Book of Extended Abstracts. - Trenčín, Slovenská republika: FunGlass - Centre for Functional and Surface Functionalized Glass, 2020, p.38-39. ISBN 978-80-570-2636-5. Typ: AFH
3. NINGISH Henni Setia - GALUSEK Dušan, TUAN, Wei-Hsing – SHIH, Shao-Ju, “Evaluation of antibacterial activity and cell viability of silver-zinc and silver-copper co-doped beta-tricalcium phosphate”, 2020 KIT-NTUST-CNU Trilateral Workshop on Materials Engineering-Online, Taiwan, December 10 (2020)

3.) Percepcia spinovej interakcie na pokročilej úrovni *(Spin Coupling Advanced Level Perception)*

Zodpovedný riešiteľ:	Oľga Malkin
Trvanie projektu:	1.2.2020 / 31.12.2022
Evidenčné číslo projektu:	SK-FR-19-0001
Organizácia je koordinátorom projektu:	áno
Koordinátor:	Ústav anorganickej chémie SAV
Počet spoluriešiteľských inštitúcií:	1 - Francúzsko: 1
Čerpané financie:	0

Dosiahnuté výsledky:

Bola navrhnutá nová koncepcia viacerých dráh interakcie NMR medzi jadrovými spinmi v zložitých

systémoch. Boli vyvinuté a testované kvantovo-chemické nástroje na identifikáciu jednotlivých dráh.

4.) Vysokoteplotné karbidy pre aplikácie v extrémnych podmienkach *((Ultra-high temperature carbides for extreme environment applications)*

Zodpovedný riešiteľ:	Peter Tatarko
Trvanie projektu:	1.1.2019 / 31.12.2020
Evidenčné číslo projektu:	SK-SRB-18-0022
Organizácia je koordinátorom projektu:	áno
Koordinátor:	Ústav anorganickej chémie SAV
Počet spoluriešiteľských inštitúcií:	1 - Srbsko: 1
Čerpané financie:	0

Dosiahnuté výsledky:
V súlade s plánom projektu boli výskumné aktivity venované štúdiu vplyvu elektrického prúdu na spekanie keramických materiálov na báze B_4C-TiB_2. Za najdôležitejší výsledok možno považovať objasnenie "in-situ" tvorby grafénových nanoplatničiek na hraniciach zŕn B4C počas spekania. Rovnako bolo stanovené, že prísada 10 obj.% TiB2 viedla k výraznému zlepšeniu mechanických vlastností B4C materiálov. Tieto pozitívne výsledky budú publikované v nasledujúcom období.
Spolupráca s partnerským pracoviskom bola orientovaná aj na využitie pyrochlórnej fázy $Yb_2Zr_2O_7$ na zlepšenie vysokoteplotných mechanických vlastností materiálov na báze ZrB_2-SiC. Táto fáza bola syntetizovaná na srbskom pracovisku, pričom jej využitie pri spekaní diboridovej keramiky bolo realizované na ÚACH.

Výstupy:
- ÜNSAL, Hakan - VALENZA, Fabrizio - MATOVIČ, Branko - KOVALČÍKOVÁ, Alexandra - TATARKO, Peter. Wetting and reactive melt infiltration of transition metal disilicides during the development of ultra-high temperature ceramic matrix composites. In Processing and properties of advanced ceramics and glasses - Joint annual meeting of the Silicate Scientific-Technological Society & FunGlass Symposium, 18. - 20. 11. 2020, online: Conference Proceedings - Book of Extended Abstracts. - Trenčín, Slovenská republika: FunGlass - Centre for Functional and Surface Functionalized Glass, 2020, p. 36-37. ISBN 978-80-570-2636-5.(Processing and Properties of Advanced Ceramics and Glasses - Joint annual meeting of the Silicate Scientific-Technological Society & FunGlass Symposium) Typ: AFH
- ÜNSAL, Hakan - SHEPA, Ivan - HANZEL, Ondrej - MÚDRA, Erika - DUSZA, Ján - TATARKO, Peter. The effect of field assisted sintering parameters on processing of in-situ formed B4C-TiB2 ceramics. In 13th Conference for young scientists in ceramics, October 16-19, 2019, Novi Sad, Serbia: programme and book of abstracts. - Novi Sad, Serbia : Faculty of Technology, University of Novi Sad, 2019, p. 102. ISBN 978-86-6253-104-9.(Conference for young scientists in ceramics. CYSC-2019). Typ: AFG.

5.) Vývoj nových vysokoteplotných kompozitných materiálov s keramickou matricou so zvýšenou oxidačnou/ablačnou odolnosťou pre vesmírne aplikácie *(Development of new ultra-high temperature ceramic matrix composites with improved oxidatio/ablation properties for aerospace industry)*

Zodpovedný riešiteľ:	Peter Tatarko
Trvanie projektu:	1.11.2017 / 31.10.2020
Evidenčné číslo projektu:	MVTS 41090027
Organizácia je koordinátorom projektu:	áno
Koordinátor:	Ústav anorganickej chémie SAV
Počet spoluriešiteľských inštitúcií:	0
Čerpané financie:	-
	Podpora medzinárodnej spolupráce z národných zdrojov: 20000 €

Dosiahnuté výsledky:
Riešenie tohto projektu priamo nadväzuje, resp. dopĺňa riešenie projektu H2020 CeramCom (viď nižšie). Okrem nižšie uvedených aktivít, boli výskumné aktivity orientované na štúdium oxidačnej odolnosti materiálov na báze ZrB2-SiC s cieľom optimalizovať množstvo prísady SiC, ako aj definovať najvhodnejšiu prísadu oxidu prvku vzácnych zemín a jej množstvo. Na základe týchto štúdií bolo zvolené optimálne chemické zloženie, ktoré sa potom v ďalšom kroku (v rámci riešenia projektu H2020) zaviedlo do pórovitých

keramických materiálov spevnených uhlíkovými vláknami (Cf/SiC).
Počas riešenia projektu sa tiež preskúmala možnosť zvýšenia mechanických vlastností diboridovej keramiky (na báze TiB2) tvorbou textúrovanej mikroštruktúry využitím silného magnitického poľa v spolupráci s Queen Mary University of London.

Výstupy:
- TATARKO, Peter** - VALENZA, Fabrizio - ÜNSAL, Hakan - KOVALČÍKOVÁ, Alexandra - SEDLÁČEK, Jaroslav - ŠAJGALÍK, Pavol. Design of Lu2O3-reinforced Cf/SiC-ZrB2-ZrC ultra-high temperature ceramic matrix composites: Wetting and interfacial reactivity by ZrSi2 based alloys. In Journal of the European Ceramic Society, 2020, in press; (2019: 4.495 - IF, Q1 - JCR, 1.164 - SJR, Q1 - SJR). ISSN 0955-2219. Typ. ADCA
- KOVÁČOVÁ, Zuzana** - OROVČÍK, Ľubomír - SEDLÁČEK, Jaroslav - BAČA, Ľuboš - DOBROČKA, Edmund - KITZMANTEL, M. - NEUBAUER, Erich. The effect of YB4 addition in ZrB2-SiC composites on the mechanical properties and oxidation performance tested up to 2000 °C. In Journal of the European Ceramic Society, 2020, vol. 40, p. 3829-3843. (2019: 4.495 - IF, Q1 - JCR, 1.164 - SJR, Q1 - SJR). ISSN 0955-2219. Typ. ADCA
- TATARKO, Peter** - GRASSO, Salvatore - KOVALČÍKOVÁ, Alexandra - MEDVEĎ, Dávid - DLOUHÝ, Ivo - REECE, Michael J. Highly textured and strongly anisotropic TiB2 ceramics prepared using magnetic field alignment (9T). In Journal of the European Ceramic Society, 2020, vol. 40, no., p. 1111-1118. (2019: 4.495 - IF, Q1 - JCR, 1.164 - SJR, Q1 - SJR). ISSN 0955-2219. Typ. ADCA

Programy: ERANET

6.) Multifunkčné hrubé povlaky keramika-grafén pre perspektívne aplikácie *(Multifunctional ceramic/graphene thick coatings for new emerging applications)*

Zodpovedný riešiteľ:	Zoltán Lenčéš
Trvanie projektu:	1.1.2018 / 31.12.2020
Evidenčné číslo projektu:	
Organizácia je koordinátorom projektu:	nie
Koordinátor:	Institute for Technical Physics and Materials Science, Centre for Energy Research, Hungarian Academy of Sciences (MTA EK)
Počet spoluriešiteľských inštitúcií:	3 - Nemecko: 1, Maďarsko: 1, Slovensko: 1
Čerpané financie:	EU: 10000 €

Dosiahnuté výsledky:
V rámci riešenia projektu boli pripravené kompozitné prášky na báze SiC so spekacími prísadami Y2O3 a Al2O3 a s rôznym prídavkom (0, 5 a 15 hm. %) grafénových nanoplatničiek (GNPs) pomocou metódy vymrazovacej granulácie. Následne boli z týchto kompozitných práškov postupným lisovaním do grafitovej formy vytvorené asymetrické vrstevnaté materiály s usporiadaním vrstiev 0-5-15 % GNPs a symetrické vrstevnaté materiály s usporiadaním vrstiev 15-5-0-5-15 % GNPs, ktoré boli spekané metódou rapid hot press (RHP) pri teplote 1800°C, vo vákuu po dobu 5 minút a pri rôznych tlakoch (7, 30, 40, 50 MPa). Relatívna hustota pripravených 3- a 5-vrstvových kompozitov bola vyššia ako 97 %, s výnimkou vzoriek, ktoré boli spekané pri najnižšom tlaku.
Na takto pripravených hutných materiáloch bola vykonaná mikroštruktúrna analýza a boli merané funkčné vlastnosti (konkrétne elektrická vodivosť a tepelná difuzivita) v kolmom smere vzhľadom na usporiadanie grafénových platničiek a usporiadanie jednotlivých vrstiev. Taktiež bol skúmaný vplyv prídavku grafénu, vplyv tlaku počas spekania a usporiadania jednotlivých vrstiev na funkčné vlastnosti materiálov (elektrická a tepelná vodivosť). Elektrická vodivosť 3-vrstvových kompozitných materiálov sa zvyšovala s rastúcim obsahom grafénu v jednotlivých vrstvách a taktiež s rastúcim tlakom počas spekania z 588 na 1442 S/m v prípade merania na strane vrstvy s 15 hm. % GNP, v prípade merania na strane vrstvy SiC bez prídavku grafénu elektrická vodivosť rástla z 12 na 122 S/m so zvyšujúcim sa tlakom počas spekania (zo 7 na 50 MPa). Elektrická vodivosť 5-vrstvových symetrických kompozitných materiálov sa zvyšovala z 513 na 867 S/m s rastúcim tlakom počas spekania a teda aj rastúcou hutnosťou. Tieto výsledky dokazujú, že použitie metód vymrazovacej granulácie a spekania v rapid hot presse umožňuje získať hutné vrstevnaté kompozitné materiály SiC-grafén s vysokou elektrickou vodivosťou.
Tepelná difuzivita 5-vrstvových kompozitných materiálov sa pohybovala v rozsahu 24,7 – 27,4 mm2/s čo bolo mierne nižšie ako tepelná difuzivita 3-vrstvových kompozitných materiálov (26 – 29 mm2/s) čo bolo spôsobené ďalšími vrstvami s obsahom grafénu, ktoré vytvárajú dodatočné rozhrania keramická matrica-grafén a dodatočné defekty, ktoré spôsobujú rozptyl fonónov. Vplyv tlaku počas spekania na tepelnú difuzivitu

3- a 5-vrstvových kompozitov bol zanedbateľný.
Taktiež v rámci riešenia projektu boli merané mechanické vlastnosti (tvrdosť, elastický modul a scratch testy). Tvrdosť a elastický modul sa znižovali skokovo medzi individuálnymi vrstvami s rastúcim obsahom grafénu. Tento pokles bol spôsobený inkorporáciou mäkšej fázy do matrice SiC s vyššou tvrdosťou. Počas scratch testov bolo potvrdené, že medzi vrstvami je jasne definované rozhranie s dobrou adhéziou medzi vrstvami.

Publikácie:
- BALESTRAT, Maxime - ACOSTA, Emanoelle Diz - HANZEL, Ondrej - TESSIER-DOYEN, Nicolas - MACHADO, Ricardo - ŠAJGALÍK, Pavol - LENČÉŠ, Zoltán - BERNARD, Samuel**. Additive-free low temperature sintering of amorphous Si-B-C powders derived from boron-modified polycarbosilanes: Toward the design of SiC with tunable mechanical, electrical and thermal properties. In Journal of the European Ceramic Society, 2020, vol. 40, no. 7, p. 2604-2612. (2019: 4.495 - IF, Q1 - JCR, 1.164 - SJR, Q1 - SJR). ISSN 0955-2219.
- HANZEL, Ondrej** - LENČÉŠ, Zoltán - KIM, Young-Wook - FEDOR, Ján - ŠAJGALÍK, Pavol. Highly electrically and thermally conductive silicon carbide-graphene composites with yttria and scandia additives. In Journal of the European Ceramic Society, 2020, vol. 40, no. 2, p. 241-250. (2019: 4.495 - IF, Q1 - JCR, 1.164 - SJR, Q1 - SJR). ISSN 0955-2219.
- HNATKO, Miroslav** - HIČÁK, Michal - LABUDOVÁ, Martina - GALUSKOVÁ, Dagmar - SEDLÁČEK, Jaroslav - LENČÉŠ, Zoltán - ŠAJGALÍK, Pavol. Bioactive silicon nitride by surface thermal treatment. In Journal of the European Ceramic Society, 2020, vol. 41, no. 54, p. 1848-1858. (2019: 4.495 - IF, Q1 - JCR, 1.164 - SJR, Q1 - SJR). ISSN 0955-2219.
- KIM, Young-Wook - KULTAYEVA, Shynar - SEDLÁČEK, Jaroslav - HANZEL, Ondrej - TATARKO, Peter - LENČÉŠ, Zoltán - ŠAJGALÍK, Pavol**. Thermal and electrical properties of additive-free rapidly hot-pressed SiC ceramics. In Journal of the European Ceramic Society, 2020, vol. 40, no. 2, p. 234-240. (2019: 4.495 - IF, Q1 - JCR, 1.164 - SJR, Q1 - SJR). ISSN 0955-2219.
- KOVALČÍKOVÁ, Alexandra - TATARKO, Peter - SEDLÁK, Richard** - MEDVEĎ, Dávid - CHLUP, Zdeněk - MÚDRA, Erika - DUSZA, Ján. Mechanical and tribological properties of TiB2-SiC and TiB2-SiC-GNPs ceramic composites. In Journal of the European Ceramic Society, 2020, vol. 40, no. 14, p. 4860-4871. (2019: 4.495 - IF, Q1 - JCR, 1.164 - SJR, Q1 - SJR). ISSN 0955-2219.

Programy: Horizont 2020

7.) New Generation Ultra-High Temperature Ceramic Matrix Composites for Aerospace Industry
(New Generation Ultra-High Temperature Ceramic Matrix Composites for Aerospace Industry)

Zodpovedný riešiteľ:	Peter Tatarko
Trvanie projektu:	1.6.2018 / 31.5.2020
Evidenčné číslo projektu:	798651
Organizácia je koordinátorom projektu:	áno
Koordinátor:	Ústav anorganickej chémie SAV
Počet spoluriešiteľských inštitúcií:	0
Čerpané financie:	EÚ: 46953 €

Dosiahnuté výsledky:
V súlade s plánom projektu boli hlavné výskumné aktivity v záverečnej fáze projektu zamerané na tvorbu finálneho vysokoteplotného povlaku (UHTC) na báze ZrB_2-SiC-Lu_2O_3 a HfB_2-SiC-Lu_2O_3 na povrchu kompozitov s keramickou matricou (CMC), dodaných firmou Airbus Defence & Space. Dodané materiály s rozdielnou pórovitosťou boli v prvom kroku infiltrované suspenziou na báze B_4C. Následne sa na povrch materiálov naniesla vrstvička $ZrSi_2$ (resp. $HfSi_2$) s prídavkom Lu_2O_3. Po zahriatí materiálov na teplotu 1670°C (resp. 1720°C pre $HfSi_2$) došlo k roztaveniu kovovej zliatiny, pričom tavenina za pôsobenia kapilárnych síl bola infiltrovaná do kompozitu. Tam prebehli požadované reakcie s B_4C a C za vzniku požadovaného chemického UHTC zloženia v podpovrchovej oblasti CMC materiálov. Za hlavný výsledok možno považovať pochopenie vplyvu pórovitosti CMC materiálov na tvorbu homogénnej vrstvy UHTC v podpovrchovej oblasti. V prípade CMC materiálov s vyššou hustotou (a teda nižšou pórovitosťou) nedošlo k homogénnej infiltrácií roztaveného kovu, a teda ani k tvorbe homogénnej vrstvičky UHTC. Naopak, v prípade pórovitejšej matrice, homogénna UHTC vrstva bola vytvorená v materiály CMC až do vzdialenosti cca 1 mm od povrchu vzorky. Je možné teda konštatovať, že ciele projektu boli splnené v plnom rozsahu.

Výstupy:
TATARKO, Peter** - VALENZA, Fabrizio - ÜNSAL, Hakan - KOVALČÍKOVÁ, Alexandra - SEDLÁČEK, Jaroslav -

ŠAJGALÍK, Pavol. Design of Lu2O3-reinforced Cf/SiC-ZrB2-ZrC ultra-high temperature ceramic matrix composites: Wetting and interfacial reactivity by ZrSi2 based alloys. In Journal of the European Ceramic Society, 2020, in press; (2019: 4.495 - IF, Q1 - JCR, 1.164 - SJR, Q1 - SJR). ISSN 0955-2219. Typ. ADCA

Domáce projekty

Programy: VEGA

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

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
Počet spoluriešiteľských inštitúcií:	0
Čerpané financie:	SAV: 19053 €

Dosiahnuté výsledky:
V rámci projektu bola študovaná rozpustnosť oxidu lantanitého v eutektickej zmesi fluoridu lítneho a fluoridu sodného. Keďže rozpustnosť oxidov je vo všeobecnosti nízka, prídavky La2O3 do študovanej eutektickej zmesi boli nízke. Na štúdium rozpustnosti sa využili dve metódy, klasická termická analýza a STA analýza. Priebežné výsledky potvrdili nízku rozpustnosť skúmaného oxidu a rtg. práškovou difrakčnou analýzou zatuhnutých zmesí bola potvrdená tvorba a prítomnosť novej zlúčeniny LaOF.
Bola študovaná možnosť využitia rozpúšťadla Ethaline na leštenie meďnatých zliatin (AMPCO® 22 a AMPCO® 712). Experimenty ukázali, že pri elektródovom potenciály +2,5V, teplote 25°C a čase 20 min. boli dosiahnuté optimálne výsledky. Procesom elektrolytického leštenia sa dosiahli výrazné zlepšenie vzhľadu povrchov a morfológie povrchov (lesklý, bezchybný a hladký povrch po ošetrení), ktorý bol potvrdené metódami AFM a SEM. Elektrolytické leštenie rôznych druhov bronzu tiež viedlo k zmenám v zložení zliatin v povrchovej vrstve, ako bolo dokumentované EDX analýzou. Drsnosť povrchu študovaných zliatin sa znížila o 80% a 60% v porovnaní s počiatočnými hodnotami. Výsledky ukázali, že elektrolyticky leštené povrchy meďnatých zliatin vykazovali zvýšenú koróznu odolnosť, spôsobenú zmenou chemického zloženia povrchu, vyrovnaním povrchu a odstránením mikrodefektov, ktoré sú centrami korózie.

Výstupy:
KITYK, A.** - DANILOV, F.I. - PROTSENKO, V. - PAVLÍK, Viliam - BOČA, Miroslav - HALAHOVETS, Yuriy. Electropolishing of two kinds of bronze in a deep eutectic solvent (Ethaline). In Surface & Coatings Technology, 2020, vol. 397, no., p. 126060-1-126060-9. (2019: 3.784 - IF, Q1 - JCR, 0.938 - SJR, Q1 - SJR). ISSN 0257-8972.

2.) Nové anorganické fosfory na báze stechiometrických hlinitanov a kremičitanov s dlhodobou svetelnou emisiou pre optické a biomedicínske aplikácie *(Long persistent phosphors on the base of stoichiometric aluminates and silicates for optical and biomedical applications)*

Zodpovedný riešiteľ:	Dušan Galusek
Trvanie projektu:	1.1.2018 / 31.12.2021
Evidenčné číslo projektu:	1/0527/18
Organizácia je koordinátorom projektu:	nie
Koordinátor:	Trenčianska univerzita Alexandra Dubčeka v Trenčíne
Počet spoluriešiteľských inštitúcií:	0
Čerpané financie:	SAV: 4106 €

Dosiahnuté výsledky:
V rámci prvej etapy riešenia projektu bola optimalizovaná metóda prípravy nano-luminoforov na báze $SrAl_2O_4$ dopovaného Dy^{3+}, Eu^{2+} iónmi metódou spaľovacej syntéz.; Stanovený bol optimálny pomer reaktantov (oxidačného činidla vs. redukčné činidlo – močovina, kyselina citrónová) a solventu. Optimalizovanou metódou spaľovacej syntézy boli pripravené nano-luminofory s dobou dosvitu 2h. Pripravené a charakterizované boli luminofory s modifikovaným

YAG zložením dopovaných Cr3+ iónmi s emisiou v červenej spektrálnej oblasti. Detailne preštudované boli aj transparentné/translucentné materiály na báze Al2O3 dopované luminiscenčnými aktivátormi Eu3+, Cr3+, Mn2+/4+ s relatívne dlhou dobou zhášania luminiscencie.

Výstupy:
- PRNOVÁ, Anna** - VALÚCHOVÁ, Jana - PARCHOVIANSKÝ, Milan - WISNIEWSKI, Wolfgang - ŠVANČÁREK, Peter - KLEMENT, Róbert - HRIC, Ľ. - BRUNEEL, E. - GALUSEK, Dušan. Y3Al5O12-alpha-Al2O3 composites with fine-grained microstructure by hot pressing of Al2O3-Y2O3 glass microspheres. In Journal of the European Ceramic Society, 2020, vol. 40, no. 3, p. 852-860. (2019: 4.495 - IF, Q1 - JCR, 1.164 - SJR, Q1 - SJR, karentované - CCC).
- PRNOVÁ, Anna** - PLŠKO, Alfonz - VALÚCHOVÁ, Jana - KLEMENT, Róbert - CHROMČÍKOVÁ, Mária - MUTLU, Nurshen - MAJEROVÁ, Melinda - BRUNEEL, E. - GALUSEK, Dušan. Crystallization kinetics of binary Yb2O3-Al2O3 glass. In Journal of Thermal Analysis and Calorimetry, 2020, vol. 142, no. 5, p. 2141–2148. (2019: 2.731 - IF, Q2 - JCR, 0.415 - SJR, Q3 - SJR, karentované - CCC).

3.) Transparentné polykryštalické keramické materiály so submikrónovou mikroštruktúrou a luminiscenčnými vlastnosťami *(Transparent polycrystalline ceramics materials with submicrone microstructure and with luminiscent properties)*

Zodpovedný riešiteľ:	Dušan Galusek
Trvanie projektu:	1.1.2017 / 31.12.2020
Evidenčné číslo projektu:	2/0026/17
Organizácia je koordinátorom projektu:	áno
Koordinátor:	Ústav anorganickej chémie SAV
Počet spoluriešiteľských inštitúcií:	0
Čerpané financie:	SAV: 5599 €

Dosiahnuté výsledky:
Aktivity projektu boli zamerané na vývoj transparentných polykryštalických materiálov s kubickou kryštálovou mriežkou. Za najvýznamnejšie výsledky možno považovať:
-Vývoj metodiky zhutňovania sklených mikroguľôčok so zložením identickým so zložením stechiometrického $Y_3Al_5O_{12}$ (YAG) pomocou žiarového lisovania a spark plazma sintering (SPS), ktorá umožňuje prípravu vysoko hutného translucentného materiálu so zachovanou amorfnou štruktúrou, prípadne polykryštalického YAG pri teplotách na úrovni 900°C, čo je teplota o 500 – 700°C nižia, ako teploty používané na prípravu vysoko hutného YAG doteraz.
-Vývoj metodiky dvojstupňového spekania pomocou SPS, ktorá umožňuje eliminovať kontamináciu $MgAl_2O_4$ keramiky uhlíkom a tým dosiahnuť jej vysokú transparentnosť. Metóda naviac umožňuje redukovať teplotu potrebnú na úplné zhutnenie materiálu na úroveň okolo 1100°C.

Publikácie
- MICHÁLKOVÁ, Monika - KRAXNER, Jozef - MICHÁLEK, Martin - GALUSEK, Dušan. Preparation of translucent YAG glass/ceramic at temperatures below 900 °C, J. Eur. Ceram. Soc. 40 (2020) 2581–2585. doi:10.1016/j.jeurceramsoc.2019.11.011. (4.495 – IF2019).
- MICHÁLKOVÁ, Monika - KRAXNER, Jozef - PARCHOVIANSKÝ, Milan - KLEMENT, Róbert - POUCHLÝ, Václav - MACA, Karel - GALUSEK, Dušan. Viscous flow spark plasma sintering of glass microspheres with YAG composition and high tendency to crystallization, J. Eur. Ceram. Soc. 41 (2021) 1537–1542. doi:10.1016/j.jeurceramsoc.2020.10.015. (4.495 – IF2019).
- TALIMIAN, Ali** - POUCHLÝ, Václav - EL-MAGHRABY, Hesham F. M. Aldelrehim - MACA, Karel - GALUSEK, Dušan. Transparent magnesium aluminate spinel: Effect of critical temperature in two-stage spark plasma sintering. In Journal of the European Ceramic Society, 2020, vol. 40, no. 6, p. 2417-2425. (2019: 4.495 - IF, Q1 - JCR, 1.164 - SJR, Q1 - SJR, karentované - CCC)

4.) Príprava a charakterizácia granúl / mikroguličiek na báze nitridu kremičitého pre bioaplikácie *(Preparation and characterization granuls/microspheres based on silicon nitride for bioapplications)*

Zodpovedný riešiteľ:	Miroslav Hnatko
Trvanie projektu:	1.1.2018 / 31.12.2021
Evidenčné číslo projektu:	2/0152/18
Organizácia je koordinátorom projektu:	áno
Koordinátor:	Ústav anorganickej chémie SAV
Počet spoluriešiteľských inštitúcií:	0
Čerpané financie:	SAV: 9152 €

Dosiahnuté výsledky:

V súlade s harmonogramom druhej etapy sa za uplynulé obdobie podarilo určiť vplyv parametrov spekania na súbor fyzikálno- chemických a biologických vlastností Si3N4 mikroguličiek s prídavkom rôzneho podielu $Ca_3(PO_4)_2$. Bol pripravený a charakterizovaný kompozitný materiál na báze tetra-kalcium fosfátového/monetitového cementu s rôznym podielom (10-30 hm%) Si_3N_4 - $Ca_3(PO_4)_2$ mikroguličiek. Negatívnym výsledkom bol pokles pevnosti v tlaku kompozitného materiálu (o viac ako 30%) oproti referenčnej vzorke. Príčinou je okrem zvýšenia pórovitosti (okolo 20%) aj prítomnosť $Ca_3(PO_4)_2$ v mikroguličkách. Pozitívny vplyv prídavku mikroguličiek ku kalcium fosfátovému cementu bol v dobrej in vitro SBF bio-aktivite a excelentnej adhézii mikroguličiek k cementovej matrici. V kompozitných materiáloch bolo zaznamenané zrýchlenie uvoľňovania dexamethasonu, čo je predpokladom úspešného využitia v kontrolovanom rozpúšťaní liečiv.

V rámci projektu sa okrem plánovaných aktivít z oblasti nitridu kremičitého (modifikácia povrchu hutného Si_3N_4 vysokou teplotou do 2000°C), riešila aj príprava a charakterizácia ďalšieho možného kandidáta pre bio-aplikácie na báze karbidu kremičitého.

Výstupy:

- HNATKO, Miroslav** - HIČÁK, Michal - LABUDOVÁ, Martina - GALUSKOVÁ, Dagmar - SEDLÁČEK, Jaroslav - LENČÉŠ, Zoltán - ŠAJGALÍK, Pavol. Bioactive silicon nitride by surface thermal treatment. In Journal of the European Ceramic Society, 2020, vol. 41, no. 54, p. 1848-1858. (2019: 4.495 - IF, Q1 - JCR, 1.164 - SJR, Q1 - SJR). ISSN 0955-2219.
- KOVÁČOVÁ, Zuzana** - OROVČÍK, Ľubomír - SEDLÁČEK, Jaroslav - BAČA, Ľuboš - DOBROČKA, Edmund - KITZMANTEL, M. - NEUBAUER, Erich. The effect of YB4 addition in ZrB2-SiC composites on the mechanical properties and oxidation performance tested up to 2000 °C. In Journal of the European Ceramic Society, 2020, vol. 40, p. 3829-3843. (2019: 4.495 - IF, Q1 - JCR, 1.164 - SJR, Q1 - SJR). ISSN 0955-2219.
- SINGH, Meinam Annebushan - JOSHI, Kamlesh - HANZEL, Ondrej - SINGH, Ramesh Kumar - ŠAJGALÍK, Pavol - MARLA, Deepak**. Identification of wire electrical discharge machinability of SiC sintered using rapid hot pressing technique. In Ceramics International, 2020, vol. 46, no. 11, p. 17261-17271. (2019: 3.830 - IF, Q1 - JCR, 0.891 - SJR, Q1 - SJR). ISSN 0272-8842.

5.) Korózia a zvetrávanie úžitkových skiel *(Corrosion and weathering of tablewareglass)*

Zodpovedný riešiteľ:	Mária Chromčíková
Trvanie projektu:	1.1.2018 / 31.12.2021
Evidenčné číslo projektu:	1/0064/18
Organizácia je koordinátorom projektu:	nie
Koordinátor:	Trenčianska univerzita Alexandra Dubčeka v Trenčíne
Počet spoluriešiteľských inštitúcií:	0
Čerpané financie:	SAV: 2613 €

Dosiahnuté výsledky:

Vývoj metódy na identifikáciu povrchovo aktívnych zložiek na základe závislosti povrchového napätia od rovnovážnych množstiev zložiek termodynamického modelu.

6.) 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)

Zodpovedný riešiteľ:	Mária Chromčíková
Trvanie projektu:	1.1.2020 / 31.12.2023
Evidenčné číslo projektu:	2/0164/
Organizácia je koordinátorom projektu:	áno
Koordinátor:	Ústav anorganickej chémie SAV
Počet spoluriešiteľských inštitúcií:	1 - Slovensko: 1
Čerpané financie:	SAV: 640 €

Dosiahnuté výsledky:
Riešenie projektu sa zameralo na vývoj metodiky entalpických relaxácií a kinetiku kryštalizácie modelových skiel. Navrhla a validovala sa metóda prípravy bio skiel s obsahom SiO2 a P2O5 dopovaných ZnO. Preskúmala sa možnosť merania objemovej relaxácie a jej kvantifikovanie pomocou Tool-Narayanaswamy-Mazurinovym modelom a Tool-Narayanaswamy-Monyhanovym modelom. Ďalej sa optimalizovali experimentálne podmienky pre kinetiku lúženia vybraných vzoriek.

7.) Fotoluminiscenčné transparentné keramické materiály na báze oxinitridov *(Photoluminescent transparent oxynitride-based ceramics)*

Zodpovedný riešiteľ:	Zoltán Lenčéš
Trvanie projektu:	1.1.2018 / 31.12.2021
Evidenčné číslo projektu:	2/0164/18
Organizácia je koordinátorom projektu:	áno
Koordinátor:	Ústav anorganickej chémie SAV
Počet spoluriešiteľských inštitúcií:	0
Čerpané financie:	SAV: 13427 €

Dosiahnuté výsledky:
V rámci projektu boli študované luminiscenčných vlastností spinelu $MgAl_2O_4$ a MgAlONu dopovaného Cr^{3+} a lantanoidmi Eu, Ce, Sm, Er. Luminofor $MgAl_2O_4$:Cr^{3+} vykazoval emisiu po excitácii zeleným svetlom (510 nm) v tmavo-červenej oblasti viditeľného svetla s maximom pri 700 nm.
Študoval sa aj vplyv množstva lantanoidov (Eu, Ce, Sm, Er) v koncentráciách 0,25 mol%, 0,15 mol% a 0,10 mol% na luminiscenčné vlastnosti spinelu MgAlON (tuhý roztok $MgAl_2O_4$ a AlN). Vo väčšine prípadov intenzita liminiscencie stúpala so zvyšujúcim sa obsahom lantanoidu, okrem Er, kedy bola dosiahnutá max. luminiscencie pre vzorku s 0,10 mol% Er. Emisné spektrá vzoriek po excitácii 350 nm žiarením mali maximum emisie pri 470 nm (modré svetlo) pre vzorky dopované Eu, 570 nm (zeleno-žlté) pre vzorky s Ce, 450 nm (modré) pre Er a 670 nm (červené) pre Sm. V rámci riešenia projektu boli študované aj keramické podložky na báze Si_3N_4 a SiC s vysokou tepelnou vodivosťou a kontrolovanou elektrickou vodivosťou, ktoré by v prípadnej aplikácií vyvinutých luminoforov v LED znížili riziko tepelného zhášania vďaka dobrému odvodu tepla od vrstvy luminoforov zaliatych do živice alebo silikónu. Jedná sa o spoluprácu s Functional Ceramics Laboratory, Department of Materials Science and Engineering, University of Seoul, (prof. Young-Wook Kim).

Publikácie:

- LENČÉŠ, Zoltán - RADWAN, Mohamed – PETRISKOVÁ, Patrícia – CZÍMEROVÁ, Adriana - ŠAJGALÍK, Pavol. Transparent/translucent MgAl2O4 and MgAlON-based phosphors for solid state lighting and photocatalytic applications. In ICACC 2020. 44th International Conference & Exposition on Advanced Ceramics and Composites, January 26 - 31, 2020, Daytona Beach, Florida, USA: abstract book. USA: The American Ceramic Society, 2020, p. 55. AFG
- KIM, Young-Wook – KULTAYEVA, Shynar – SEDLÁČEK, Jaroslav – HANZEL, Ondrej – TATARKO, Peter – LENČÉŠ, Zoltán – ŠAJGALÍK, Pavol. Thermal and electrical properties of additive-free rapidly hot-pressed SiC ceramics. J. Eur. Ceram. Soc., 40 (2020) 234-240.
- PETRISKOVÁ, Patrícia – MONFORT, Olivier – LENČÉŠ, Zoltán – SATRAPINSKYY, Leonid – PLESCH, Gustav. Preparation of TiO2 nanotube arrays on transparent spinel for photocatalytic applications. In Conference Proceedings, Book of extended abstracts from Processing and Properties of Advanced Ceramics and Glasses 2020, Trenčín, Slovakia. Ed. Vanda Mokráňová, reviewers: J. Dusza, D. Galusek, M. Liška, M. Hnatko, P. Hvizdoš, Z. Lenčéš, F. Lofaj. Published by FunGlass – Centre for Functional and Surface Functionalized Glass, Trenčín, Nov. 18.-20. 2020, pp. 30-31. ISBN 978-80-570-2636-5.

8.) Funkcionalizácia ílových minerálov netradičnými organickými surfaktantmi *(Functionalization of clay minerals using unconventional organic surfactants)*

Zodpovedný riešiteľ:	Jana Madejová
Trvanie projektu:	1.1.2017 / 31.12.2020
Evidenčné číslo projektu:	2/0141/17
Organizácia je koordinátorom projektu:	áno
Koordinátor:	Ústav anorganickej chémie SAV
Počet spoluriešiteľských inštitúcií:	0
Čerpané financie:	SAV: 17692 €

Dosiahnuté výsledky:

V poslednom roku riešenia projektu bola publikovaná práca zameraná na sledovanie vplyvu koncovej skupiny orano-montmorillonitu a teploty na usporiadanie katiónov v medzivrstviach montmorillonitu [1]. Uskutočnila sa komplexná charakterizácia organo-montmorillonitov (O-Mt) pripravených zo sodnej formy slovenského montmorillonitu Jelšový potok a dvoch sérií alkylamóniových a alkylfosfóniových analógov organických katiónov. V prvej sérii boli použité tetrametyl-(Me4-N/P), tetrabutyl-(Bu4-N/P) a tetraoktyl-(Oc4-N/P) katióny, v druhej sérii to boli tributylalkyl katióny (Bu3-N/P-CX), ktorých štvrtá reťaz mala postupne narastajúcu dĺžku (X = 4, 8, 12, 16). Sledoval sa vplyv centrálneho atómu koncovej skupiny (N/P), dĺžky alkylového reťazca a celkovej veľkosti katiónu na štruktúrne, vibračné a termálne charakteristiky pripravených (O-Mt). Získané výsledky boli publikované v práci [2]. V rámci tejto série sa uskutočnila rozsiahla štúdia hydratácie O-Mt typu (Me4-N/P), (Bu4-N/P) a (Oc4-N/P). Výmenou anorganických katiónov za organické sa povrch montmorillonitov stáva hydrofóbny, čo má významný vplyv pri ich aplikáciách. Po skompletizovaní bude práca zaslaná do zahraničného časopisu. Dokončili a publikovali sa výsledky série beidellitov interkalovaných tetraalkylfosfóniovými katiónmi, v ktorej sa okrem experimentálnych techník uskutočnili výpočty metódou funkcionálu hustoty (DFT) zamerané na opis väzbových a štruktúrnych pomerov, vrátane jemných štruktúrnych trendov ako aj vibračných módov [3]. Pokračovalo aj riešenie úloh zameraných na interakcie ílových minerálov s fluorescenčnými farbivami. Dokončili a publikovali sa práce zamerané na štúdium prenosu energie medzi katiónovými farbivami adsorbovanými vo vrstevnatej štruktúre ílového minerálu saponitu a solvatochromizmu v hybridnom systéme kyanínové farbivo/saponit [4].

Publikácie

[1]. MADEJOVÁ, Jana** - JANKOVIČ, Ľuboš - SLANÝ, Michal - HRONSKÝ, Viktor. Conformation heterogeneity of alkylammonium surfactants self-assembled on montmorillonite: Effect of head-group structure and temperature. In Applied Surface Science, 2020, vol. 503, no., p. 144125-1-144125-11. (2019: 6.182 - IF, Q1 - JCR, 1.230 - SJR, Q1 - SJR, karentované - CCC). (2020 - Current Contents, WOS, SCOPUS). ISSN 0169-4332. Dostupné na:

[2]. MADEJOVÁ, Jana – BARLOG, Martin - JANKOVIČ, Ľuboš – PÁLKOVÁ, Helena Comparative study of alkylammonium- and alkylphosphonium-based analogues of organo-montmorillonites. Applied Clay Science 200, 105894 (2021)

[2]. JANKOVIČ, Ľuboš – ŠKORŇA, Peter – MORENO RODRIGUEZ, Daniel – SCHOLTZOVÁ, Eva –TUNEGA, Daniel Preparation, characterization and adsorption properties of tetraalkylphosphonium organobeidellites. Applied Clay Science, 105989 (2021)

[4]. BOHÁČ, Peter** - CZÍMEROVÁ, Adriana - SASAI, Ryo - BUJDÁK, Juraj. Luminescence and resonance energy transfer in the colloids of cyanine dyes and saponite modified with cationic surfactants. In Applied Clay Science, 2020, vol. 189, p. 105536-1-105536-9. (2019: 4.605 - IF, Q1 - JCR, 1.069 - SJR, Q1 - SJR, karentované - CCC). (2020 - Current Contents). ISSN 0169-1317.

9.) Vývoj pokročilých nástrojov na výpočet a interepretáciu NMR a EPR spektier systémov ťažkých prvkov *(Development of advanced tools for calculation and interpretation of NMR and EPR spectra of heavy element compounds)*

Zodpovedný riešiteľ:	Oľga Malkin
Trvanie projektu:	1.1.2017 / 31.12.2020
Evidenčné číslo projektu:	2/0116/17
Organizácia je koordinátorom projektu:	áno
Koordinátor:	Ústav anorganickej chémie SAV
Počet spoluriešiteľských inštitúcií:	0
Čerpané financie:	SAV: 14970 €

Dosiahnuté výsledky:

- REPISKÝ, Michal** - KOMOROVSKÝ, Stanislav** - KÁDEK, Marius - KONEČNÝ, Lukáš - EKSTRÖM, Ulf - MALKIN, Elena - KAUPP, Martin - RUUD, Kenneth - MALKINA, Oľga - MALKIN, Vladimír. ReSpect: Relativistic spectroscopy DFT program package. In Journal of Chemical Physics, 2020, vol. 152, no. 18, p. 184101-1-184101-36. (2019: 2.991 - IF, Q2 - JCR, 1.047 - SJR, Q1 - SJR). ISSN 0021-9606.
- KOMOROVSKÝ, Stanislav** - JAKUBOWSKA, Katarzyna - ŚWIDER, Paweł - REPISKÝ, Michal - JASZUŃSKI, Michal**. NMR spin-spin coupling constants derived from relativistic four-component DFT theory - Analysis and visualization. In Journal of Physical Chemistry A.Molecules, spectroscopy, kinetics, environment, and general theory, 2020, vol. 124, no. 25, p. 5157-5169. (2019: 2.600 - IF, Q2 - JCR, 0.749 - SJR, Q2 - SJR). ISSN 1089-5639.
- VÍCHA, Jan - NOVOTNÝ, Jan - KOMOROVSKÝ, Stanislav - STRAKA, Michal** - KAUPP, Martin** - MAREK, Radek**. Relativistic heavy-neighbor-atom effects on NMR shifts: Concepts and trends across the periodic table. In Chemical Reviews, 2020, vol.120, p. 7065-7103. (2019: 52.758 - IF, Q1 - JCR, 20.847 - SJR, Q1 - SJR). ISSN 0009-2665.

10.) 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)*

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
Počet spoluriešiteľských inštitúcií:	0
Čerpané financie:	SAV: 2388 €

Dosiahnuté výsledky:

MICHÁLKOVÁ, Monika** - KRAXNER, Jozef - MICHÁLEK, Martin - GALUSEK, Dušan. Preparation of translucent YAG glass/ceramic at temperatures below 900 °C. In Journal of the European Ceramic Society, 2020, vol. 40, no. 7, p. 2581-2585. (2019: 4.495 - IF, Q1 - JCR, 1.164 - SJR, Q1 - SJR, karentované - CCC).

11.) Porozumenie mechanizmu interakcií znečisťujúcich látok adsorbovaných na povrchu aluminosilikátových štruktúr *(Insight into the mechanism of interactions of pollutants adsorbed on the surface of aluminosilicate structures)*

Zodpovedný riešiteľ:	Eva Scholtzová
Trvanie projektu:	1.1.2019 / 31.12.2022
Evidenčné číslo projektu:	2/0021/19
Organizácia je koordinátorom projektu:	áno
Koordinátor:	Ústav anorganickej chémie SAV
Počet spoluriešiteľských inštitúcií:	0
Čerpané financie:	SAV: 6124 €

Dosiahnuté výsledky:

- SCHOLTZOVÁ, Eva** - TUNEGA, Daniel**. Prediction of mechanical properties of grafted kaolinite - A DFT study. In Applied Clay Science, 2020, vol. 193, p. 105692-1-105692-7. (2019: 4.605 - IF, Q1 - JCR, 1.069 - SJR, Q1 - SJR). ISSN 0169-1317.
- MORENO RODRÍGUEZ, Daniel - JANKOVIČ, Ľuboš - SCHOLTZOVÁ, Eva. A computational study of diuron-beidellite interactions. In Clay Minerals and Selected Industrial Minerals in Material Science, Applications and Environmental Technology, 7th Workshop of Slovak Clay Group, Demänovská dolina, Slovakia, September 7 - 9, 2020 Book of abstracts. Slovakia Slovak Clay Group, 2020, p. 31-32. ISBN 978-80-972367-4-8.
- SCHOLTZOVÁ, Eva. Theoretical study of interactions in the Mg-vermiculite as a perspective material for reinforcing of organoclay-polymer matrix. In Clay Minerals and Selected Industrial Minerals in Material Science, Applications and Environmental Technology, 7th Workshop of Slovak Clay Group, Demänovská dolina, Slovakia, September 7 - 9, 2020: book of abstracts. Slovakia: Slovak Clay Group, 2020, p. 33. ISBN 978-80-972367-4-8.
- SCHOLTZOVÁ, Eva - JANKOVIČ, Ľuboš - TUNEGA, Daniel. Montmorillonite as anti-tuberculosis rifampicin drug carrier - DFT and experimental study. In Goldschmidt Virtual Conference 2020, 21-26 June 2020, p. 2314.

12.) Fluoridové taveninové systémy s potenciálom využitia v elektrochemickej výrobe hliníka *(Fluoride melts with potential applications in electrochemical aluminum production)*

Zodpovedný riešiteľ:	František Šimko
Trvanie projektu:	1.1.2018 / 31.12.2021
Evidenčné číslo projektu:	2/0060/18
Organizácia je koordinátorom projektu:	áno
Koordinátor:	Ústav anorganickej chémie SAV
Počet spoluriešiteľských inštitúcií:	0
Čerpané financie:	SAV: 10718 €

Dosiahnuté výsledky:
Uskutočnil sa komplexný výskum dvoch polymorfných foriem Rb_3AlF_6. Určila sa ich štruktúrna charakteristika pomocou synchrotronovej práškovej štruktúrnej analýzy spojenej s viacjadrovou high field solid state NMR (SSNMR) spetroskopiou v tuhom stave, doplnených o TEM analýzy a DFT výpočty.
Fáza, existujúca pri izbovej teplote, kryštalizuje v priestorovej grupe Fddd (n°70) s parametrami základnej bunky a = 37.26491(1) A, b = 12.45405(4) A, c = 17.68341(6) A. Z porovnania NMR meraní a výpočtových analýz sa určila dynamická rotácia AlF_6 oktaédrov, ako základných jednotiek štruktúry Rb_3AlF_6. Použitie In-situ vysokoteplotnej MAS NMR analýzy bolo výhodné pre sledovanie chemických zmien v štruktúre Rb3AlF6 so zvyšujúcou sa teplotou. Pri vyššej teplote (nad 600 °C) sa určila prítomnosť vysokoteplotnej, polymorfnej ?-fázy, ktorá existuje ako kubická, dvojitá-perovskitická štruktúra s priestorovou grupou, s parametrami základnej bunky a = 8.9930(2) A. Podobným postupom pri použití In-situ vysokoteplotnej MAS NMR analýzy spojenej s DFT výpočtami sa charakterizoval séria existujúcich polymorfických fáz K_3AlF_6.

Programy: APVV

13.) Fluoridové taveniny kritických prvkov pre nekonvenčné aplikácie *(Fluoride melts of critical elements for unconventional applications)*

Zodpovedný riešiteľ:	Miroslav Boča
Trvanie projektu:	1.7.2016 / 31.8.2020
Evidenčné číslo projektu:	APVV-15-0479
Organizácia je koordinátorom projektu:	áno
Koordinátor:	Ústav anorganickej chémie SAV
Počet spoluriešiteľských inštitúcií:	0
Čerpané financie:	APVV: 20000 €

Dosiahnuté výsledky:
Boli uskutočnené komplexné analýzy dvoch fluoridových zlúčenín; na zlúčenine K2ZrF6 boli skúmané polymorfné premeny pri jej zahrievaní využitím troch experimentálnych metód. Bola pozorovaná neuveriteľná rozmanitosť tvarov polyédrov atómov zirkónia a draslíka. β-K_2ZrF_6 fáza poukazuje na zmes až štyroch fáz; pričom dve z nich ešte stále nie sú úplne jasné. Tri nové štruktúrne typy boli vytvorené *ab initio* z difrakčných dát pre formy V, VI a VII. Prekvapujúcim faktom bolo zistenie, že formy VI a VII pri vysokej teplote majú nižšiu ortorobmickú symetriu ako tetragonálna forma, ktorá existuje pri podstatne nižších teplotách. Štruktúrnou analýzou metastabilnej fázy $K_{18}Ta_5Zr_5F_{63}$ sa zistilo, že študovaná fáza je prvých príkladom fluoridovej komplexnej zlúčeniny s tantalom i zirkóniom ako centrálnymi atómami. $K_{18}Ta_5Zr_5F_{63}$ sa rozkladá po niekoľkých mesiacoch na východiskové zložky. Tieto výsledky boli potvrdené NMR, DCS a rtg. meraniami. Urýchlenie rozkladu môže nastať po tepelnom rozklade, pričom jeho výsledkom je tvorba K_3ZrF_7 fázy.

– BOČA, Miroslav** - MOLOKEEV, Maxim - RAKHMATULLIN, Aydar - KUBÍKOVÁ, Blanka - NETRIOVÁ, Zuzana. The structure of the metastable K18Ta5Zr5F63 phase. In New Journal of Chemistry, 2020, vol. 44, no. 22, p. 9264-9270. (2019: 3.288 - IF, Q2 - JCR, 0.712 - SJR, Q1 - SJR). ISSN 1144-0546.
– SMRČOK, Ľubomír - LE BAIL, Armel - BOČA, Miroslav** - RAKHMATULLIN, Aydar. Polymorphism of K2ZrF6. In Crystal Growth & Design, 2020, vol. 20, no. 6, p. 3867-3881. (2019: 4.089 - IF, Q1 - JCR, 1.004 - SJR, Q1 - SJR). ISSN 1528-7483.

14.) 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
Počet spoluriešiteľských inštitúcií:	0
Čerpané financie:	APVV: 40000 €

Dosiahnuté výsledky:
Boli skúmané fázové rovnováhy a fyzikálno-chemické vlastnosti roztaveného systému (LiF - $MgF_2)_{eut}$ - LaF_3. Fázový diagram je zložený z piatich kryštalizačných polí, v ktorých kryštalizujú jednotlivé zložky. V systéme sa netvorí žiadna nová zlúčenina. Získané výsledky zo štúdia hustotu, objemových vlastností, elektrickej vodivosti a povrchového napätia, poslúžili na porovnanie správania sa roztaveného LaF_3 v troch rôznych roztavených zmesiach, ktoré jasne dokumentujú potrebu experimentálnych analýz, aj napriek všeobecne predpokladanému podobnému správaniu sa.

– KUBÍKOVÁ, Blanka** - MLYNÁRIKOVÁ, Jarmila - WU, Shuang - MIKŠÍKOVÁ, Eva - PRIŠČÁK, Jozef - BOČA, Miroslav - KORENKO, Michal. Physicochemical investigation of the ternary (LiF+MgF2)eut + LaF3 molten system. In Journal of Chemical and Engineering Data, 2020, vol. 65, p. 4815-4826. (2019: 2.369 - IF, Q2 - JCR, 0.657 - SJR, Q1 - SJR). ISSN 0021-9568.

15.) Prevencia a eradikácia mikrobiálnych biofilmov vo vzťahu k nanomateriálom *(Prevention and eradication of microbial biofilms in relationship to nanomaterials)*

Zodpovedný riešiteľ:	Juraj Bujdák
Trvanie projektu:	1.7.2016 / 31.12.2020
Evidenčné číslo projektu:	APVV-15-0347
Organizácia je koordinátorom projektu:	nie
Koordinátor:	Prírodovedecká fakulta UK
Počet spoluriešiteľských inštitúcií:	0
Čerpané financie:	APVV: 11000 €

Dosiahnuté výsledky:
Pripravili sa materiály kompozitov vybraných polymérov, ktorých povrch bol modifikovaný s fotoaktívnymi časticami. Na modifikáciu povrchu sa využili vrstevnaté nanočastice silikátov, ktoré boli funkcionalizované pomocou fotosenzibilizátorov metylénovej modrej a floxínu B. Niektoré z pripravených materiálov sa podrobili testom, v ktorých sa vyhodnocovala prevencia a eradikácia biofilmov vybraných baktérií. Dokázali sa pomerne vysoké antimikrobiálne účinnosti jednak samotného funkcionalizovaného silikátu a rovnako aj nimi funkcionalizovaných povrchov nanokompozitov polymérov.

16.) Keramické materiály pre použitie v extrémnych podmienkach *(Ceramic materials for extreme operating conditions)*

Zodpovedný riešiteľ:	Ján Dusza
Zodpovedný riešiteľ v organizácii SAV:	Pavol Šajgalík
Trvanie projektu:	1.7.2016 / 31.12.2020
Evidenčné číslo projektu:	APV-15-0469
Organizácia je koordinátorom projektu:	nie
Koordinátor:	Ústav materiálového výskumu SAV
Počet spoluriešiteľských inštitúcií:	0
Čerpané financie:	APVV: 12000 €

Dosiahnuté výsledky:
Riešenie projektu bolo úspešne ukončené. Posledná etapa projektu bola v spolupráci s partnerskou inštitúciou (ÚMV SAV – koordinátor) zameraná na hodnotenie tribologických vlastností pripravených keramických materiálov na báze TiB_2 s prídavkom rôzneho množstva SiC a grafénových nanoplatničiek. Za najdôležitejší výsledok tejto etapy projektu možno považovať skutočnosť, že fázová a mikroštruktúrna analýza potvrdila, že hutné vzorky s dobrými mechanickými vlastnosťami možno získať len s prísadou grafénových nanodoštičiek, bez nutnosti použitia prísady SiC. Výsledky boli zosumarizované a publikované.

Výstupy:
– KOVALČÍKOVÁ, Alexandra - TATARKO, Peter - SEDLÁK, Richard** - MEDVEĎ, Dávid - CHLUP, Zdeněk - MÚDRA, Erika - DUSZA, Ján. Mechanical and tribological properties of TiB2-SiC and TiB2-SiC-GNPs ceramic composites. In Journal of the European Ceramic Society, 2020, vol. 40, no. 14, p. 4860-4871. (2019: 4.495 - IF, Q1 - JCR, 1.164 - SJR, Q1 - SJR). ISSN 0955-2219. Typ. ADCA

17.) Kompozitné vrstvy pre vysokoteplotnú protikoróznu ochranu kovov *(Advanced composite coatings for high temperature corrosion protection of metals)*

Zodpovedný riešiteľ:	Dušan Galusek
Trvanie projektu:	1.7.2016 / 31.10.2020
Evidenčné číslo projektu:	APVV-15-0014
Organizácia je koordinátorom projektu:	áno
Koordinátor:	Ústav anorganickej chémie SAV
Počet spoluriešiteľských inštitúcií:	2 - Slovensko: 2
Čerpané financie:	APVV: 11250 €

Dosiahnuté výsledky:
Predĺženie životnosti a zvýšenie stability ocelí, z ktorých sú konštruované výfukové potrubia, výmenníky tepla v spaľovniach komunálneho odpadu, zlievárenských prevádzkach a taviacich agregátoch v sklárňach je možné dosiahnuť aplikáciou vhodne zvoleného protikorózneho povlaku. V rámci projektu sa vyvinuli nové typy ochranných vrstiev - tzv. environmentálnych bariérových povlakov - pripravených z komerčne dostupných organokremičitých prekurzorov. Zvýšenie termickej stability, koróznej odolnosti, ako aj minimalizácia objemových zmien spojených s konverziou prekurzora na keramiku sa dosiahla prídavkom aktívnych a pasívnych plnív na báze oxidových keramických materiálov (YSZ, $ZrSi_2$), komerčných oxidových skiel s teplotou mäknutia optimalizovanou na teploty použitia povlakov a zabezpečujúce jeho samovyhojovacie vlastnosti, ako aj inertných vysoko stabilných hlinitanových skiel a polykryštalických prekurzorov pripravených plameňovou syntézou vo forme mikroguličiek. Pripravené povlaky zabezpečili kvalitnú ochranu povlakovaného kovového substrátu v rôznych oxidačných atmosférach pri teplotách do 1000°C, pričom v dôsledku optimalizácie koeficientu teplotnej rozťažnosti povlaku bola zabezpečená aj odolnosť pripravených vrstiev voči cyklickým zmenám teploty.

Publikácie
– PETRÍKOVÁ, I.** - PARCHOVIANSKÝ, Milan - ŠVANČÁREK, Peter - LENZ LEITE, Mateus - MOTZ, Günter - GALUSEK, Dušan: Passive filler loaded polysilazane-derived glass/ceramic coating system applied to AISI 441 stainless steel, part 1: Processing and characterization, In Int J Appl Ceram Technol. 2020;17:998–1009
– PARCHOVIANSKÝ, Milan** - PETRÍKOVÁ, I. - ŠVANČÁREK, Peter - LENZ LEITE, Mateus - MOTZ, Günter - GALUSEK, Dušan. Passive filler loaded polysilazane-derived glass/ceramic coating system applied to AISI 441 stainless steel, part 2: Oxidation behavior in synthetic air, In International Journal of Applied Ceramic Technology; Volume 17 Issue 4; https://doi.org/10.1111/ijac.13531
– PARCHOVIANSKÝ, Milan** - PARCHOVIANSKÁ, I. - ŠVANČÁREK, Peter - MOTZ, Günter - GALUSEK, Dušan. PDC Glass/Ceramic Coatings Applied to Differently Pretreated AISI441 Stainless Steel Substrates, In : Materials 2020, 13, 629; doi:10.3390/ma13030629

18.) Nové sklenené a sklokeramické fosfory na báze hlinitanov vzácnych zemín pre aplikácie v pevnolátkových energiu šetriacich svetelných zdrojoch vyžarujúcich biele svetlo (pc-LED diódy) *(Novel glass and glass-ceramic rare-earth aluminates-based phosphors for energy-savin solid state lighting*

sources emitting while light (pc-WLEDs))

Zodpovedný riešiteľ:	Dušan Galusek
Trvanie projektu:	1.8.2018 / 31.7.2022
Evidenčné číslo projektu:	APVV-17-0049
Organizácia je koordinátorom projektu:	nie
Koordinátor:	Trenčianska univerzita Alexandra Dubčeka v Trenčíne
Počet spoluriešiteľských inštitúcií:	0
Čerpané financie:	APVV: 14280 €

Dosiahnuté výsledky:
Optimalizovaná bola syntéza prekurzorových práškov (v nedopovaných aj dopovaných systémoch Y_2O_3/Yb_2O_3-Al_2O_3 s rôznym chemickým zložením) modifikovanou metódou podľa Pechiniho a proces plameňovej syntézy prípravy sklených mikroguľôčok. Pripravené sklá z pohľadu chemického zloženia vykazovali vysokú homogenitu čo bolo potvrdené SEM/EDS a RTG fluorescenčnou analýzou. Preštudované boli termické vlastnosti a kinetika kryštalizácie pripravených skiel. Najlepšie termické vlastnosti, vzhľadom na termickú stabilitu skiel, vykazovali sklá s eutektickým zložením resp. blízkosti eutektického zloženia. Následne boli pripravené sklá dopované luminiscenčne aktívnymi iónmi Ce^{3+}, $Eu^{3+/2+}$, $Mn^{2+/4+}$ a preštudované ich luminiscenčné vlastnosti. Z Ce^{3+} dopovaných sklených mikroguľočok boli žiarovým lisovaním pripravené sklo-kryštalické dvojfázové (YAG/Al_2O_3) translucentné kompakty s luminiscenčnými vlastnosťami, ktoré emitujú žlté svetlo pri excitácii NUV a modrým svetelným žiarením.

Výstupy
- DRDLÍKOVÁ, K. – DRDLÍK, D, – HADRABA, H. – KLEMENT, R. – MACA, K Optical and mechanical properties of Mn-doped transparent alumina and their comparison with selected rare earth and transient metal doped aluminas, J. Eur. Ceram. Soc. 40 (2020) 4894-4900.
- DRDLÍKOVÁ, K. - KLEMENT, Róbert - DRDLÍK, Daniel - GALUSEK, Dušan - MACA, Karel**. Processing and properties of luminescent Cr3+ doped transparent alumina. In Journal of the European Ceramic Society, 2020, vol. 40, no. 7, p. 2573-2580. (2019: 4.495 - IF, Q1 - JCR, 1.164 - SJR, Q1 - SJR, karentované - CCC).

19.) Zhodnotenie druhotných surovín pre materiály s využitím v extrémnych podmienkach *(Assessment of secondary raw materials for the preparation of materials used in extreme conditions)*

Zodpovedný riešiteľ:	Miroslav Hnatko
Trvanie projektu:	1.7.2016 / 30.6.2020
Evidenčné číslo projektu:	APVV-15-0540
Organizácia je koordinátorom projektu:	áno
Koordinátor:	Ústav anorganickej chémie SAV
Počet spoluriešiteľských inštitúcií:	0
Čerpané financie:	APVV: 19133 €

Dosiahnuté výsledky:
V priebehu realizácie projektu boli získané poznatky a dosiahnuté výsledky v oblastiach vyselektovaných na základe potenciálneho využitia druhotných surovín v predchádzajúcich rokoch.
(i) Ľahké kamenivo, t.j. kamenivo s hustotou nižšou ako 2 g.cm-3, bolo pripravené z „odpadov“ technologických prúdov oceliarenského a ferozliatinového priemyslu. Optimalizáciou syntézy pri 1250 °C v ochrannej atmosfére Ar boli pripravené agregáty s majoritným podielom SiC a „skelnej“ (sklokeramickej) fázy, ktorej prítomnosť zvýšila zhutnenie agregátov ako aj dosiahnutie vhodnej pevnosti. Hustota pripravených agregátov dosahovala hodnotu 1.253 g.cm-3 a pevnosť v tlaku 5.13 MPa. Optimalizáciou tohto prístupu bolo možné kombináciou odpadov ako druhotných surovín pripraviť materiál s pridanou hodnotou využiteľný ako ľahké kamenivo pre potenciálnu priemyselnú aplikáciu v špeciálnych betónoch.
(ii) pórovité materiály s tepelnoizolačnými vlastnosťami – z druhotných surovín pochádzajúcich zo spaľovne tuhého komunálneho odpadu a popolčeka, bolo pomocou plazmy (vitrifikáciou) pripravené sklo. Jeho aktiváciou v alkalickom prostredí došlo k tvorbe gélovej štruktúry a tým k zastabilizovaniu pórovitej štruktúry. Následným tepelným spracovaním pri nízkych teplotách (do 1000°C) boli pripravené materiály s pórovitosťou 70-80% a mechanickou pevnosťou v tlaku nad 3 MPa a pevnosťou v ohybe nad 130 MPa. Tieto hodnoty vysoko prevyšujú nároky kladené na takýto typ materiálu pre stavebné aplikácie.
(ii) keramicko-cementové kompozity – prebiehala optimalizácia procesu prípravy s cieľom zníženia

energetickej náročnosti prípravy takýchto kompozitov cestou zníženia teploty tepelného spracovania. Možnosť zníženia teploty výpalu pod 700°C je otázkou požiadaviek na finálne vlastnosti týchto materiálov. Vplyv prídavku cementu v kompozite je aj pri teplote výpalu 600°C zrejmý a v porovnaní s pevnosťou referenčnej vzorky (14 MPa) sú pevnosti kompozitov vyššie o 57%. Na druhej strane sú tieto hodnoty o 6 MPA nižšie v porovnaní s nameranou pevnosťou komerčne vyrábanej tehly (tepelné spracovanie pri teplotách nad 1200°C). Kombináciou druhotných surovín s vyšším obsahom SiO2, portlandského cementu a vhodného aktivátora bolo možné dosiahnuť zvýšenú puzolánovú aktivitu takejto zmesi a teda tvorbu hydratovaných kremičitanov, ktoré následným tepelným spracovávaním pri výrazne nižších teplotách dovoľujú pripraviť materiál s dostatočnými pevnosťami požadovanými v stavebnom priemysle. Výrazné zníženie teploty prípravy dáva predpoklad na potenciálnu aplikáciu v tomto segmente hospodárstva.

Publikácie:

- CSANÁDI, Tamás** - GALL, Marián - VOJTKO, Marek - KOVALČÍKOVÁ, Alexandra - HNATKO, Miroslav - DUSZA, Ján - ŠAJGALÍK, Pavol. Micro scale fracture strength of grains and grain boundaries in polycrystalline La-doped beta-Si3N4 ceramics. In Journal of the European Ceramic Society, 2020, vol. 40, no. 14, p. 4783-4791.
- KOVÁČOVÁ, Zuzana** - OROVČÍK, Ľubomír - SEDLÁČEK, Jaroslav - BAČA, Ľuboš - DOBROČKA, Edmund - KITZMANTEL, M. - NEUBAUER, Erich. The effect of YB4 addition in ZrB2-SiC composites on the mechanical properties and oxidation performance tested up to 2000 °C. In Journal of the European Ceramic Society, 2020, vol. 40, p. 3829-3843.
- HUJOVÁ, Miroslava** - RABELO MONICH, Patricia - SEDLÁČEK, Jaroslav - HNATKO, Miroslav - KRAXNER, Jozef - GALUSEK, Dušan - BERNARDO, Enrico. Glass-ceramic foams from alkali-activated vitrified bottom ash and waste glasses. In Applied Sciences-Basel, 2020, vol. 10, no. 16, p. 5714-1-5714-11.

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

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
Počet spoluriešiteľských inštitúcií:	0
Čerpané financie:	APVV: 9800 €

Dosiahnuté výsledky:

Prvotná etapa projektu bola zameraná na selekciu vhodných práškových zmesí na prípravu 5-zložkových vysokoentropických keramických materiálov na báze karbidov. Následne bolo štúdium venované optimalizácií homogenizácie piatich karbidických práškov (HfC, ZrC, TaC, NbC, TiC) v ekvimolárnom pomere za účelom získanie homogénnej práškovej východiskovej zmesi. Tá bola následne zhutňovaná pomocou metódy spekania za asistencie elektrického prúdu. V tejto fáze sa podrobne študoval vplyv rôznych spekacích parametrov (teplota, tlak, atmosféra, čas) na tvorbu hutného jednozložkového tuhého roztoku $(Hf_{0,2}Zr_{0,2}Ta_{0,2}Nb_{0,2}Ti_{0,2})C$ pomocou RTG a mikroštruktúrnej analýzy. V ďalšej etape budú hodnotené mechanické vlastnosti týchto materiálov.

21.) Nanokompozitné materiály na báze organo-fosfóniových smektitov a polymérov *(Nanocomposite materials based on organo-phosphonium smectites and polymers)*

Zodpovedný riešiteľ:	Ľuboš Jankovič
Trvanie projektu:	1.7.2016 / 31.12.2020
Evidenčné číslo projektu:	APVV-15-0741
Organizácia je koordinátorom projektu:	áno
Koordinátor:	Ústav anorganickej chémie SAV
Počet spoluriešiteľských inštitúcií:	1 - Slovensko: 1
Čerpané financie:	APVV: 21000 €

Dosiahnuté výsledky:

V poslednom roku riešenia projektu boli publikované výsledky (realizované v roku 2019) o vplyve koncovej skupiny organo-montmorillonitu (O-Mt) a teploty na usporiadanie katiónov v medzivrstviach montmorillonitu [1]. Po finalizácii prác zameraných na interkaláciu saponitu tetraoktyl-amóniovým (Oct4-N) a -fosfóniovým (Oct4-P) bromidom v rôznom stupni sýtenia, pričom sa sledoval vplyv katiónu na expanziu medzivrstvového priestoru, termickú a mechanickú stabilitu, ako aj na luminiscenčné vlastnosti, boli výsledky zaslané a následne aj publikované v zahraničnom časopise [2]. Dokončila sa komplexná charakterizácia organo-montmorillonitov pripravených z Na-formy montmorillonitu a dvoch sérií alkylamóniových a alkylfosfóniových katiónových analógov. V prvej sérii boli použité tetrametyl (Me4-N/P), tetrabutyl (Bu4-N/P) a tetraoktyl (Oct4-N/P) katióny, v druhej sérii to boli tributylalkyl-amóniové a -fosfóniové katióny (Bu3-N/P-CX), ktorých štvrtá reťaz mala postupne narastajúcu dĺžku (X = 4, 8, 12, 16). Sledoval sa vplyv centrálneho atómu koncovej skupiny (N/P), dĺžky alkylového reťazca a celkovej veľkosti katiónu na štruktúrne, vibračné a termické charakteristiky pripravených O-Mt [3]. Vyhodnotili výsledky série beidellitov interkalovaných tetraalkylfosfóniovými katiónmi, v ktorej sa okrem experimentálnych techník uskutočnili aj výpočty metódou funkcionálu hustoty (DFT) zamerané na opis väzbových a štruktúrnych pomerov, vrátane jemných štruktúrnych trendov ako aj vibračných módov. Práca je v tlači a bude publikovaná vo februári 2021 [4].

Publikácie

[1] MADEJOVÁ, Jana – BARLOG, Martin – SLANÝ, Michal – JANKOVIČ, Ľuboš – PÁLKOVÁ, Helena Comparative study of alkylammonium- and alkylphosphonium-based analogues of organo-montmorillonites. Applied Clay Science 200, 105894 (2021)

[2] BOHÁČ, Peter** - CZÍMEROVÁ, Adriana - SASAI, Ryo - BUJDÁK, Juraj. Luminescence and resonance energy transfer in the colloids of cyanine dyes and saponite modified with cationic surfactants. In Applied Clay Science, 2020, vol. 189, p. 105536-1-105536-9.

[3] MADEJOVÁ, Jana- JANKOVIČ, Ľuboš – SLANÝ, Michal – HRONSKÝ, Viktor Conformation heterogeneity of alkylammonium surfactants self-assembled on montmorillonite: Effect of head-group structure and temperature Applied Surface Science 503, 144125 (2020)

[4] JANKOVIČ, Ľuboš – ŠKORŇA, Peter – MORENO RODRIGUEZ, Daniel – SCHOLTZOVÁ, Eva – TUNEGA, Daniel. Tunega: Preparation, characterization and adsorption properties of tetraalkylphosphonium organobeidellites. Applied Clay Science 202, 105989 (2021)

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

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
Počet spoluriešiteľských inštitúcií:	1 - Slovensko: 1
Čerpané financie:	APVV: 9000 €

Dosiahnuté výsledky:

V prvom polroku riešenia projektu sa testovali rôzne typy ílových minerálov zo skupiny smektitov, ktoré by boli vhodné pre modifikáciu polykatiónmi. Základným kritériom bola rôznorodosť ich štruktúry, chemického zloženia a distribúcie záporného náboja vrstvy. Zo skupiny dioktaedrických smektitov to boli tri rôzne montmorillonity, spomedzi trioktaedrických smektitov sa pre experimenty projektu sa vybral hectorit a syntetický minerál saponit. Pomocou experimentálnych metód ako sú chemická a RTG analýza a infračervená spektroskopia (IČ) v strednej a blízkej oblasti sa získali sa informácie o štruktúre smektitov, obsadení centrálnych pozícií v oktaédroch, distribúcii záporného náboja. Zo sodného montmorillonitu (Na-Mt) a poly(2-metyl-2-oxazolinu) (PMeOx) sa pripravila séria organo-montmorillonitov (O-Mt). Vzorky sa charakterizovali pomocou vybraných experimentálnych metód.

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)*

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
Počet spoluriešiteľských inštitúcií:	0
Čerpané financie:	APVV: 13125 €

Dosiahnuté výsledky:

Boli vizualizované a analyzované relativistické účinky na dráhy hyperjemnej štruktúry v rade komplexov. Príslušná publikácia sa pripravuje.

F. Lemken, O.L. Malkina, S. Komorovsky, V. Malkin, "Visualization of relativistic effects on the EPR hyperfine structure pathways", 2020, in preparation.

24.) Vývoj nových teoretických nástrojov pre predikciu a interpretáciu EPR a NMR parametrov
(Developing new theoretical tools for prediction and interpretation of EPR and NMR parameters)

Zodpovedný riešiteľ:	Vladimír Malkin
Trvanie projektu:	1.7.2016 / 30.6.2020
Evidenčné číslo projektu:	APVV-15-0726
Organizácia je koordinátorom projektu:	áno
Koordinátor:	Ústav anorganickej chémie SAV
Počet spoluriešiteľských inštitúcií:	1 - Slovensko: 1
Čerpané financie:	APVV: 20100 €

Dosiahnuté výsledky:

- REPISKÝ, Michal** - KOMOROVSKÝ, Stanislav** - KÁDEK, Marius - KONEČNÝ, Lukáš - EKSTRÖM, Ulf - MALKIN, Elena - KAUPP, Martin - RUUD, Kenneth - MALKINA, Oľga - MALKIN, Vladimír. ReSpect: Relativistic spectroscopy DFT program package. In Journal of Chemical Physics, 2020, vol. 152, no. 18, p. 184101-1-184101-36. (2019: 2.991 - IF, Q2 - JCR, 1.047 - SJR, Q1 - SJR). ISSN 0021-9606.
- KOMOROVSKÝ, Stanislav** - JAKUBOWSKA, Katarzyna - ŚWIDER, Paweł - REPISKÝ, Michal - JASZUŃSKI, Michal**. NMR spin-spin coupling constants derived from relativistic four-component DFT theory - Analysis and visualization. In Journal of Physical Chemistry A.Molecules, spectroscopy, kinetics, environment, and general theory, 2020, vol. 124, no. 25, p. 5157-5169. (2019: 2.600 - IF, Q2 - JCR, 0.749 - SJR, Q2 - SJR). ISSN 1089-5639.
- VÍCHA, Jan - NOVOTNÝ, Jan - KOMOROVSKÝ, Stanislav - STRAKA, Michal** - KAUPP, Martin** - MAREK, Radek**. Relativistic heavy-neighbor-atom effects on NMR shifts: Concepts and trends across the periodic table. In Chemical Reviews, 2020, vol.120, p. 7065-7103. (2019: 52.758 - IF, Q1 - JCR, 20.847 - SJR, Q1 - SJR). ISSN 0009-2665.
- HRICOVÍNI, Michal - ASHER, James Richard - HRICOVÍNI, Miloš**. Photochemical anti-syn isomerization around the -N-N=bond in heterocyclic imines. In RSC Advances, 2020, vol. 10, no. 10, p. 5540-5550. (2019: 3.119 - IF, Q2 - JCR, 0.736 - SJR, Q1 - SJR). ISSN 2046-2069.

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

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
Počet spoluriešiteľských inštitúcií:	1 - Slovensko: 1
Čerpané financie:	APVV: 15000 €

Dosiahnuté výsledky:

V roku 2020 sa postupne ukončili pilotné experimenty, ako je výber a optimalizácia vzoriek silikátov a farbív. Začali sa aj testy zamerané na výber vhodných typov polymérov na prípravu navrhovaných systémov. Na

základe pilotných experimentov týkajúcich sa stability koloidných hybridných sústav silikátov sa vybrali vhodné materiály. Testovali sa konkrétne materiály z hľadiska chemickej modifikácie povrchov častíc, funkcionalizácie nanočastíc kremičitanov fotoaktívnymi molekulami. Podľa potreby sa navrhovali ďalšie zmeny a postupy syntéz, aby sa dosiahlo zlepšenie vlastností materiálov. Bolo potrebné pripraviť viaceré typy materiálov s rôznymi typmi luminofórov, aby sa zachovala chemická stabilita a fotoaktivita aktívnych zložiek. Rozpracovali sa viaceré postupy príprav na všetkých úrovniach – modifikácie, funkcionalizácie, prípravy kompozitov a modifikácie povrchov polymérov.

Výstupy:

- BOHÁČ, Peter** - CZÍMEROVÁ, Adriana - SASAI, Ryo - BUJDÁK, Juraj. Luminescence and resonance energy transfer in the colloids of cyanine dyes and saponite modified with cationic surfactants. In Applied Clay Science, 2020, vol. 189, p. 105536-1-105536-9. (2019: 4.605 - IF, Q1 - JCR, 1.069 - SJR, Q1 - SJR, karentované - CCC). (2020 - Current Contents). ISSN 0169-1317. Typ: ADCA
- Bujdák J. Adsorption kinetics models in clay systems. The critical analysis of pseudo-second order mechanism. Applied Clay Science, 2020, vol. 191, p. 105630-1-105630-7. (IF 2019: 4.605 - IF, Q1 – JCR).
- BARLOG, Martin - PÁLKOVÁ, Helena - BUJDÁK, Juraj. Clay minerals as carriers and luminescence enhancers of rhodamine 6G dye in the presence of two different types of surfactants. In Clay Minerals and Selected Industrial Minerals in Material Science, Applications and Environmental Technology, 7th Workshop of Slovak Clay Group, Demänovská dolina, Slovakia, September 7 - 9, 2020: book of abstracts. Slovakia: Slovak Clay Group, 2020, p. 5-6. ISBN 978-80-972367-4-8. Typ: AFH
- DU, Weichao** - SLANÝ, Michal* - WANG, Xiangyun - CHEN, Gang - ZHANG, Jie. The inhibition property and mechanism of a novel low molecular weight zwitterionic copolymer for improving wellbore stability. In Polymers : Open Access Polymer Science Journal, 2020, vol. 12, no. 3, p. 708-1-708-13. (2019: 3.426 - IF, Q1 - JCR, 0.704 - SJR, Q1 - SJR, karentované - CCC). (2020 - Current Contents). ISSN 2073-4360.
- DU, Weichao** - WANG, Xiangyun - CHEN, Gang - ZHANG, Jie - SLANÝ, Michal**. Synthesis, property and mechanism analysis of a novel polyhydroxy organic amine shale hydration inhibitor. In MINERALS-BASEL, 2020, vol. 10, no. 2, p. 128-1-128-14. (2019: 2.380 - IF, Q2 - JCR, 0.494 - SJR, Q2 - SJR, karentované - CCC). (2020 - Current Contents). ISSN 2075-163X. Typ: ADCA
- OPÁLKOVÁ ŠIŠKOVÁ, Alena** - DVORÁK, Tomáš - ŠIMONOVÁ BARANYAIOVÁ, Tímea - ŠIMON, Erik - ECKSTEIN ANDICSOVÁ, Anita - ŠVAJDLENKOVÁ, Helena - OPÁLEK, Andrej - KRÍŽIK, Peter - NOSKO, Martin. Simple and eco-friendly route from agro-food waste to water pollutants removal. In Materials, 2020, vol. 13, art. no. 5424, [21] p. (2019: 3.057 - IF, Q2 - JCR, 0.647 - SJR, Q2 - SJR, karentované - CCC). Typ: ADCA
- SCHOLTZOVÁ, Eva** - TUNEGA, Daniel**. Prediction of mechanical properties of grafted kaolinite - A DFT study. In Applied Clay Science, 2020, vol. 193, p. 105692-1-105692-7. (2019: 4.605 - IF, Q1 - JCR, 1.069 - SJR, Q1 - SJR, karentované - CCC). (2020 - Current Contents). ISSN 0169-1317. Dostupné na: https://doi.org/10.1016/j.clay.2020.105692 Typ: ADCA
- VALÁŠKOVÁ, Marta** - MADEJOVÁ, Jana - INAYAT, Amer - MATĚJOVÁ, Lenka - RITZ, Michal - MARTAUS, Alexandr - LEŠTINSKÝ, Pavel. Vermiculites from Brazil and Palabora: Structural changes upon heat treatment and influence on the depolymerization of polystyrene. In Applied Clay Science, 2020, vol. 192, p. 105639-1-105639-11. (2019: 4.605 - IF, Q1 - JCR, 1.069 - SJR, Q1 - SJR, karentované - CCC).

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

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: 9435 €

Dosiahnuté výsledky:

Sol-gel metódou boli v prvej fáze pripravené štyri práškové prekurzory v systéme Al2O3-Y2O3-ZrO2. Následne boli z týchto prekurzorov plameňovou syntézou utavené sklené mikroguľôčky. Systémy boli ocharakterizované viacerými metódami ako SEM, RTG, DSC/TG, HT RTG. Metódou žiarového lisovania sa pripravili prvé sklokeramické materiály s eutektickými mikroštruktúrami. Dosiahnuté hodnoty tvrdosti sa pohybovali v rozmedzí 15.8 – 17.1 GPa a hodnoty lomovej húževnatosti v rozmedzí: 3.7-4.3 MPa.m1/2. Boli vybrané tri zloženia pre ďalšie experimenty. V spolupráci s priemyselným partnerom boli pripravené tri vzorky

v systéme Al2O3-Y2O3 pomocou horizontálne usmernenej kryštalizácie. Ako vstupné prekurzory boli použité drvené monokryštály zafíru a práškový oxid ytritý. Vzorky sú momentálne v štádiu charakterizácie.

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

Zodpovedný riešiteľ:	Jaroslav Sedláček
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
Počet spoluriešiteľských inštitúcií:	3 - Slovensko: 3
Čerpané financie:	APVV: 3311 €

Dosiahnuté výsledky:
V počiatočných fázach projektu boli realizované aktivity na doplnenie infraštruktúry a chemikálií potrebných pre hladký priebeh výskumných aktivít v nasledujúcich rokoch, selekcia jednotlivých vstupných surovín, ich charakterizácia pomocou SEM, RTG, XPS a iných analýz. Taktiež boli realizované prvotné optimalizácie guľového mletia a homogenizácie zmesi uhlík/ kremík.

28.) Vlastnosti nových progresívnych konštrukčných materiálov v agresívnom prostredí roztavených solí *(The behaviour of new progressive construction materials in aggressive environment of molten salts)*

Zodpovedný riešiteľ:	František Šimko
Trvanie projektu:	1.7.2016 / 31.8.2020
Evidenčné číslo projektu:	APVV-15-0738
Organizácia je koordinátorom projektu:	áno
Koordinátor:	Ústav anorganickej chémie SAV
Počet spoluriešiteľských inštitúcií:	1 - Slovensko: 1
Čerpané financie:	APVV: 15000 €

Dosiahnuté výsledky:
Stanovila sa elektrická vodivosť roztavených fluoridových komplexných zlúčenín z daných komplexných systémov, a to K_3AlF_6, Rb_3AlF_6, Cs_3AlF_6 a CsF. Zistilo sa, že elektrická vodivosť roztaveného K_3AlF_6 je 2,64 $S.cm^{-1}$ pri 1000°C. Zistilo sa, že elektrická vodivosť roztaveného Rb3AlF6 je 2,06 $S.cm^{-1}$ pri 1000°C. Vodivosť roztaveného Cs_3AlF_6 pri rovnakej teplote je 1,36 $S.cm^{-1}$, pretože sa zistilo, že vodivosť CsF pri 1000°C je 2,57 $S.cm^{-1}$. Zistilo sa, že hodnoty elektrickej vodivosti neustále klesajú v smere od $K_3AlF_6 > Rb_3AlF_6 > Cs_3AlF_6$. Tento pokles vodivosti je pravdepodobne spôsobený nárastom veľkosti a hmotnosti katiónov.

29.) Vývoj žiaruvzdorných pyrochlórnych fáz pre vysokoteplotné aplikácie neoxidovej keramiky *(Development of refractory pyrochlore phases for high temperature applications of non-oxide ceramics)*

Zodpovedný riešiteľ:	Peter Tatarko
Trvanie projektu:	1.8.2018 / 30.6.2022
Evidenčné číslo projektu:	APVV-17-0328
Organizácia je koordinátorom projektu:	áno
Koordinátor:	Ústav anorganickej chémie SAV
Počet spoluriešiteľských inštitúcií:	0
Čerpané financie:	APVV: 43613 €

Dosiahnuté výsledky:
Riešenie projektu bolo zamerané prevažne na štúdium odolnosti proti ablácií materiálov na báze ZrB_2-SiC s prídavkom oxidov prvkov vzácnych zemín. Tie boli pripravené v predchádzajúcich etapách projektu, pričom celkovo bol študovaný vplyv 3 rôznych oxidov vzácnych zemín (Eu_2O_3, Yb_2O_3, Lu_2O_3) a ich rôzneho množstva (2, 5 a 10 hmot.%). Za najdôležitejší výsledok možno považovať fakt, že došlo k výraznému zlepšeniu odolnosti proti ablácií po pridaní prísad Yb_2O_3 a Lu_2O_3, pričom odolnosť sa ešte ďalej zvyšovala s rastúcim obsahom týchto prísad. Na druhej strane nebol pozorovaný výraznejší pozitívny vplyv prísady Eu_2O_3, takže

táto prísada bola vylúčená z ďalšieho štúdia. Pomocou RTG a mikroštruktúrnej analýzy bolo určené, že zvýšená odolnosť proti ablácií bola spôsobená tvorbou žiaruvzdornej pyrochlórnej fázy ($Yb_2Zr_2O_7$, resp. $Lu_2Zr_2O_7$) na oxidickom povrchu vzorky počas skúšok. Z tohto dôvodu bola nadviazaná spolupráca s University of Belgrade, ktorá zabezpečila získanie syntetizovanej pyrochlórnej fázy $Yb_2Zr_2O_7$ vo forme prášku. Ten bol potom pridaný do systému ZrB_2-SiC kde nahradil Yb_2O_3. Cieľom je štúdium vplyvu tejto prísady na ešte výraznejšie zlepšenie vysokoteplotných vlastností. V tejto etape boli tieto materiály úspešne pripravené, a ich mechanické vlastnosti, ako aj odolnosť proti oxidácií bude hodnotené v nasledujúcej etape projektu.
Časť výskumných aktivít bola tiež venovaná štúdiu možnosti zlepšenia mechanických vlastností diboridovej keramiky tvorbou textúrovanej mikroštruktúry, pričom sa využila spolupráca s Queen Mary University of London. Ako modelový systém bol zvolený TiB_2, pričom jeho textúra bola zabezpečená využitím silného magnetického poľa (9T).

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30.) Vývoj bioaktívneho nitridu kremičitého modifikáciou povrchovej vrstvy *(Development of the bioactive silicon nitride by surface modification)*

Zodpovedný riešiteľ:	Monika Tatarková
Trvanie projektu:	1.7.2019 / 31.12.2022
Evidenčné číslo projektu:	APPV-18-0542
Organizácia je koordinátorom projektu:	áno
Koordinátor:	Ústav anorganickej chémie SAV
Počet spoluriešiteľských inštitúcií:	1 - Slovensko: 1
Čerpané financie:	APVV: 52500 €

Dosiahnuté výsledky:
Hutné materiály na báze Si3N4 s rôznymi spekacími prísadami boli pripravené metódou spekania za asistencie elektrického prúdu (Field Assisted Sintering Technology – FAST) v teplotnom intervale 1600°C – 1750°C. Boli úspešne pripravené (s relatívnou hustotou nad 98%) dve série materiálov, pričom prvá pozostávala z

matrice Si_3N_4 a kombinácie spekacích prísad Al_2O_3 (2 hmot.%) a Y_2O_3 (5 hmot.%). V druhej sérií sa použili bioaktívne spekacie prísady na báze $CaSiO_3$ a bioskla. Mikroštruktúrnou a RTG analýzou sa študoval vplyv spekacieho režimu na zhutnenie materiálov, transformáciu Si_3N_4, a vývin mikroštruktúry (veľkosť zŕn, fáza na hraniciach zŕn, a pod.). Za najdôležitejší výsledok možno požadovať skutočnosť, že pre obidve série boli zvolené spekacie režimy, ktoré vedú k získaniu hutných vzoriek s požadovaným obsahom prevažne beta Si_3N_4 fázy. Vďaka tomu pripravené materiály nadobudli optimálne mechanické vlastnosti (tvrdosť, lomová húževnatosť, pevnosť), ktoré boli podrobne charakterizované v roku 2020. V nasledujúcej etape projektu budú výskumné aktivity zamerané na štúdium vplyvu kyslíkovo-acetylénového plameňa na tvorbu bioaktívnej povrchovej vrstvy.

Programy: Štrukturálne fondy EÚ Výskum a inovácie

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

Zodpovedný riešiteľ:	Eva Majková
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:	Fyzikálny ústav SAV
Počet spoluriešiteľských inštitúcií:	6 - Slovensko: 6
Čerpané financie:	MŠ: 51953 €

Dosiahnuté výsledky:
V rámci podaktivity projektu riešenej na UACH SAV, boli pripravené kompozitné materiály na báze SiC so spekacími prísadami Y_2O_3 a Al_2O_3 a s rôznym prídavkom grafénových nanoplatničiek (GNPs). Asymetrické vrstevnaté materiály s rôznym usporiadaním vrstiev, boli spekané metódou rapid hot press (RHP) pri teplote 1800°C. Elektrická vodivosť 3-vrstvových kompozitných materiálov sa zvyšovala s rastúcim obsahom grafénu v jednotlivých vrstvách a taktiež s rastúcim tlakom počas spekania z 588 na 1442 S/m.
Okrem toho boli pripravené a charakterizované materiály na báze ZrB_2-SiC s prídavkom YB4 určené predovšetkým pre vysokoteplotné aplikácie. Úspešne sa stanovila ich odolnosť voči ablácii pri teplotách vyšších ako 2000°C.
V oblasti biokeramických materiálov sme pokračovali optimalizáciou procesu prípravy pórovitých mikroguličiek na báze nitridu kremičitého s prídavkom $Ca_3(PO_4)_2$, ako aj optimalizáciou procesu modifikácie povrchu hutného Si_3N_4 s cieľom zvýšiť jeho bioaktivitu.

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Príloha C - Publikačná činnosť organizácie (generovaná z ARL)

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ADDA01 ANDREJKOVIČOVÁ, Slávka - PENTRÁK, Martin - JANKOVIČ, Ľuboš - KOMADEL, Peter. Sorption of heavy metal cations on rhyolitic and andesitic bentonites from Central Slovakia. In Geologica Carpathica, 2010, vol. 61, no. 2, p. 163-171. (2009: 0.963 - IF, Q3 - JCR, 0.605 - SJR, Q2 - SJR, karentované - CCC). (2010 - Current Contents). ISSN 1335-0552. Dostupné na: https://doi.org/10.2478/v10096-010-0008-1

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ADDA02 ČERNÁ, Andrea** - HRUŠKA, Branislav - TOKARČÍKOVÁ, Darina - CHROMČÍKOVÁ, Mária - LIŠKA, Marek. Optical microscopy, Raman spectroscopy, and AFM study of heavy weathered surface of barium crystal glass. In Chemical Papers, 2018, vol. 72, no. 9, p. 2153-2158. (2017: 0.963 - IF, Q4 - JCR, 0.306 - SJR, Q2 - SJR, karentované - CCC). (2018 - Current Contents). ISSN 0366-6352. Dostupné na: https://doi.org/10.1007/s11696-018-0464-0

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ADEA Vedecké práce v ostatných zahraničných časopisoch – impaktovaných

ADEA01 ŽIVICA, Vladimír - BALKOVIC, Svetozár - DRÁBIK, Milan. Properties of metakaolin geopolymer hardened paste prepared by high-pressure compaction. In Construction and Building Materials, 2011, vol. 25, p. 2206-2213. (2010: 1.366 - IF, Q1 - JCR, 1.345 - SJR, Q1 - SJR). (2011 - Thomson Reuters Master Journal List). ISSN 0950-0618. Dostupné na: https://doi.org/10.1016/j.conbuildmat.2010.11.004

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3. [1.1] RASAKI, S. A. - ZHANG, B. X. - GUARECUCO, R. - THOMAS, T. - YANG, M. H. Geopolymer for use in heavy metals adsorption, and advanced oxidative processes: A critical review. In JOURNAL OF CLEANER PRODUCTION. ISSN 0959-6526, 2019, vol. 213, p. 42-58., Registrované v: WOS

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ADEB Vedecké práce v ostatných zahraničných časopisoch – neimpaktovaných

ADEB01 GALUSEK, Dušan - LENČÉŠ, Zoltán - ŠAJGALÍK, Pavol - RIEDEL, Ralf. Thermal analysis study of polymer-to-ceramic conversion of organosilicon precursors. In Journal of Mining and Metallurgy : Section B: Metallurgy, 2008, vol. 44, no. 1, p. 35-38. ISSN 1450-5339. Dostupné na: https://doi.org/10.2298/JMMB0801035G

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

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2. [1.1] DIDUKH-SHADRINA, Svetlana L. - BUYKO, Olga - LOSEV, Vladimir N. Solid-phase extraction and fluorimetric determination of Zn(II) in natural water using novel adsorbent based on silica modified with polyhexamethylene guanidine and Ferron. In INTERNATIONAL JOURNAL OF ENVIRONMENTAL ANALYTICAL CHEMISTRY. ISSN 0306-7319, 2019, vol., no., pp., Registrované v: WOS

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

ADNB01 MAJEROVÁ, Melinda** - ŠKRÁTEK, Martin - PRNOVÁ, Anna - DVUREČENSKIJ, Andrej - KRAXNER, Jozef - ŠVANČÁREK, Peter - CIGÁŇ, Alexander - MAŇKA, Ján - GALUSEK, Dušan. Preparation and characterization of Ni doped Ca2Al2SiO7 glass microspheres. In MEASUREMENT 2019 : Proceedings of the 12th International Conference on Measurement. - Bratislava, Slovakia : Institute of Measurement Science, Slovak Academy of Sciences, 2019, p. 282-285. (2019 - WOS, SCOPUS). ISBN 978-80-972629-2-1. Dostupné na: https://doi.org/10.23919/MEASUREMENT47340.2019.8780069

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

AEC01 BOČA, Miroslav - KUBÍKOVÁ, Blanka - ŠIMKO, František - GEMBICKÝ, Milan - MONCOĽ, J. - JOMOVÁ, K. Different phases of fluorido-tantalates. In Molten Salts Chemistry and Technology. Eds. Marcelle Gaune-Escard, Geir Martin Haarberg. - United Kingdom : John Wiley & Sons, Ltd., 2014, p. 163-170. ISBN 978-1-118-44873-1. (MS 9)

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

AEE01 TATARKO, Peter - LOJANOVÁ, Š. - DUSZA, Ján - ŠAJGALÍK, Pavol. Influence of rare-earth sintering additives in Si3N4 based nanocomposites. In Nanocon 2009. Rožnov pod Radhoštěm, 20.-22.10.2009. - [S. n.], 2009. (Nanocon 2009)

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1. [1.1] JOJO, Ntombikazi - SHONGWE, Mxolisi Brendon - OLUBAMBI, Peter Apata - TSHABALALA, Lerato Criscelda. The effect of silicon carbide on the mechanical and thermal behavior of spark plasma sintered silicon nitride ceramics with Al2O3 and Y2O3 additives. In MATERIALS RESEARCH EXPRESS. ISSN 2053-1591, 2019, vol. 6, no. 5, pp., Registrované v: WOS

2. [1.1] LUKIANOVA, Olga - KOLESNIKOV, Dmitrii - KRASILNIKOV, Vladimir - KHMARA, Alexander - PEREVISLOV, Sergey. PROPERTIES OF PRESSURELESS SINTERED SILICON NITRIDE. In 10TH ANNIVERSARY INTERNATIONAL CONFERENCE ON NANOMATERIALS RESEARCH & APPLICATION (NANOCON 2018 (R)), 2019, vol., no., pp. 46-50., Registrované v: WOS

AFD Publikované príspevky na domácich vedeckých konferenciách

AFD01 LENČÉŠ, Zoltán - ŠAJGALÍK, Pavol - RONCARI, E. - HIRAO, K. Design of Si3N4 based layered composites for multifunctional application. In Engineering Ceramics: Multifunctional Properties-New Perspectives. - Zuerich : Trans Tech Publications, 1999, p. 173-182. ISBN 0-87849-846-x.

Citácie:

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Príloha D - Údaje o pedagogickej činnosti organizácie

Semestrálne prednášky:

Mgr. Stanislav Komorovský, PhD.
Názov semestr. predmetu: Relativistické efekty v chémii
Počet hodín za semester: 18
Názov katedry a vysokej školy: Prírodovedecká fakulta UK, Katedra anorganickej chémie

Ing. Blanka Kubíková, PhD.
Názov semestr. predmetu: Metódy chemického výskumu
Počet hodín za semester: 2
Názov katedry a vysokej školy: Prírodovedecká fakulta UK, Katedra fyzikálnej a teoretickej chémie

Ing. Blanka Kubíková, PhD.
Názov semestr. predmetu: Termická analýza
Počet hodín za semester: 39
Názov katedry a vysokej školy: Prírodovedecká fakulta UK, Katedra anorganickej chémie

doc. Ing. Zoltán Lenčéš, PhD.

Názov semestr. predmetu: Anorganická chémia 2
Počet hodín za semester: 8
Názov katedry a vysokej školy: Prírodovedecká fakulta UK, Katedra anorganickej 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

Ing. František Šimko, PhD.
Názov semestr. predmetu: Anorganická chémia 2
Počet hodín za semester: 2
Názov katedry a vysokej školy: Prírodovedecká fakulta UK, Katedra anorganickej chémie

Semestrálne cvičenia:

James Richard Asher, PhD
Názov semestr. predmetu: General and Inorganic Chemistry
Počet hodín za semester: 44
Názov katedry a vysokej školy: Prírodovedecká fakulta UK, Katedra anorganickej chémie

Semináre:

Ing. Michal Slaný, PhD.
Názov semestr. predmetu: Metódy charakterizácie anorganických látok a materiálov (Infračervená spektroskopia)
Počet hodín za semester: 1
Názov katedry a vysokej školy: Prírodovedecká fakulta UK, Katedra anorganickej chémie

Individuálna letná prax študentky z Katedry chémie UMB so zameraním na niektoré metódy využívané na charakterizáciu materiálov.

Termická analýza Z. Netriová (5 hod)
Fyzikálno-chemické metódy na charakterizáciu materiálov B. Kubíková (5 hod)
Infračervená spektroskopia M. Barlog (4 hod)
Fluorescenčná spektroskopia P. Boháč (4 hod)

Terénne cvičenia:

Individuálne prednášky:

Príloha E - Medzinárodná mobilita organizácie

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

Krajina	D r u h d o h o d y					
	MAD, KD, VTS		Medziústavná		Ostatné	
	Meno pracovníka	Počet dní	Meno pracovníka	Počet dní	Meno pracovníka	Počet dní
Počet vyslaní spolu						

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

Krajina	D r u h d o h o d y					
	MAD, KD, VTS		Medziústavná		Ostatné	
	Meno pracovníka	Počet dní	Meno pracovníka	Počet dní	Meno pracovníka	Počet dní
Počet prijatí spolu						

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

Krajina	Názov konferencie	Meno pracovníka	Počet dní
India	IACS	Peter Boháč	3
		Juraj Bujdák	3
	ICMS	Peter Boháč	4
		Juraj Bujdák	4
USA	Goldschmidt 2020	Eva Scholtzová	6
	ICACC	Zoltán Lenčéš	8
		Pavol Šajgalík	6
Spolu	**4**	**7**	**34**

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

Skratky použité v tabuľke C:

Goldschmidt 2020 - Goldschmidt
IACS - Indian Association for the Cultivation of Science
ICACC - 44th Internanal Conference and Exposition on Advanced Ceramics and Composites
ICACC - 44th International Conference and Exposition on Advanced Ceramics and Composites
ICMS - 3th Inernational Conference on Material Science

Príloha F - Vedecko-popularizačná činnosť pracovníkov organizácie SAV

Meno	Spoluautori	Typ[1]	Názov	Miesto zverejnenia	Dátum alebo počet za rok
Miroslav Boča	Michal Korenko, František Šimko	IN	Department of Molten Systems IIC SAS	https://www.youtube.com/watch?v=c_EuP1ZyTLE	2.11.2020
Miroslav Boča	Michal Korenko, František Šimko	IN	Oddelenie taveninových sústav UACH SAV	Youtube https://www.youtube.com/watch?v=j0_b1zKiitE	27.10.2020
Miroslav Boča	Michal Korenko, František Šimko	IN	Slovenskí vedci skúmajú fluoridy pre "zelenú" chémiu	Pravda	2.11.2020
Miroslav Boča	Michal Korenko, František Šimko	IN	Vedci na Ústave anorganickej chémie SAV prevádzkujú jedinečné laboratórium	Aktuality www.sav.sk	27.10.2020
Stanislav Komorovský		IN	Hlbšie porozumenie chémii ťažkých kovov	Stránka aktualít SAV	17.8.2020
Viliam Pavlík		IN	Roadshow po školách spojená s diskusiou pre verejnosť	Aktuality www.sav.sk	14.2.2020
Marek Pribus	Peter Boháč	PB	Noc Výskumníkov 2020, Veda bez hraníc	online	27.11.2020
Michal Slaný		PB	Noc Výskumníkov 2020 "Navštív svoju školu"	online	27.11.2020
Peter Tatarko		PB	Prednáška na webinári, MSCA individuálne štipendium (MSCA IF)	CVTI (online)	18.6.2020

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