Ústav anorganickej chémie SAV

Správa o činnosti organizácie SAV za rok 2019

Bratislava
január 2020

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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:

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:

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.

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	74	37	37	10	6	71	57.38	40.71	0
Vedeckí pracovníci	41	26	15	6	2	39	34.12	34.12	0
Odborní pracovníci VŠ (výskumní a vývojoví zamestnanci[1])	9	6	3	4	1	8	6.04	5.59	0
Odborní pracovníci VŠ (ostatní zamestnanci[2])	7	3	4	0	2	7	4.28	1	0
Odborní pracovníci ÚS	13	2	11	0	1	13	10.66	0	0
Ostatní pracovníci	4	0	4	0	0	4	2.28	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 31.12.2019 (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 31.12.2019 (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 31.12.2019)

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	7
Ženy	2	13	0	1	2	6	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	2	2.0	6	5.2	4	4.0	5	4.2	4	4.0	3	2.0	0	0.0	4	3.5	1	0.5
Ženy	1	1.0	0	0.0	1	0.6	5	5.0	2	2.0	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 31.12.2019

	Kmeňoví zamestnanci	**Vedeckí pracovníci**	**Riešitelia projektov**
Muži	45.9	44.7	44.8
Ženy	48.6	45.0	47.7
Spolu	47.3	44.8	45.8

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 2019 nezaznamenal žiadne zásadné zmeny v organizačnej štruktúre, avšak zaznamenali sme nezvyčajne rozsiahlu personálnu zmenu a obmenu. V priebehu roka dve pracovníčky odišli pracovať do priemyslu, traja pracovníci odišli ku koncu roka do dôchodku. Ďalšie personálne zmeny súviseli s odchodom pracovníkov zamestnaných na čiastočný úväzok. Všetkých päť pracovných pozícií na plný úväzok sa nám však podarilo nanovo obsadiť.

Prepočítaný počet pracovníkov v roku 2019 je na úrovni 57.38 FTE, čo je nižší stav v porovnaní s rokom 2018 (62,2). Do tohto počtu vstupujú aj zamestnanci platení z projektov APVV a jeden štipendista v programe IF MC. V roku 2019 bol priemerný vek všetkých pracovníkov ústavu 47,3 roka a priemerný vek vedeckých pracovníkov 44,8. Vzhľadom na to, že nedochádza k plynulej generačnej výmene, postupne sa zvyšuje aj priemerný vek zamestnancov. Napriek tomu, že zamestnávanie mladých schopných post-doktorandov na ústave je jednou z hlavných priorít, nevieme ju v požadovanej miere primerane 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. Preto vítame pripravovanú zmenu mzdovej politiky SAV.
Ústav sa od roku 2008 podieľal na realizácii 13-tich projektov financovaných zo ŠF EÚ, ktoré sú aktuálne všetky ukončené. Aj napriek tomu, administratívne zaťaženie na ich monitoring ostáva, pričom mzdové náklady na túto administráciu už nie je možné vykrývať z projektov, ale len zo mzdového fondu ústavu. Navyše, výraznú časť administratívnych výkonov preberajú aj vedeckí pracovníci.
Dňa 11.6.2019 ústav navštívili vybraní členovia predsedníctva s cieľom prerokovať akčný plán ústavu. Na stretnutí so zamestnancami ústavu odzneli z obidvoch strán pozitívne aj kritické hodnotenia.

2. Vedecká činnosť

2.1. Domáce projekty

Tabuľka 2a Domáce projekty riešené v roku 2019

ŠTRUKTÚRA PROJEKTOV	Počet		Čerpané financie (€)					
			A				B	
	A	B	Zo zdrojov SAV		Z iných zdrojov		Zo zdrojov SAV	Z iných zdrojov
			Spolu	Pre ÚACH	Spolu	Pre ÚACH		
1. Projekty VEGA	10	2	95113	95113	-	-	7599	-
2. Projekty APVV	9	4	-	-	463686	332417	-	62560
3. Projekty OP ŠF	0	1	-	-	-	-	-	9867
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 2019

Štruktúra projektov	Miesto podania	Organizácia je nositeľom projektu	Organizácia sa zmluvne podieľa na riešení projektu
1. Účasť na nových výzvach APVV	-	7	2
2. Projekty výziev OP ŠF podané r. 2019	Bratislava Regióny		7

Projekty ŠF
Názov projektu: Rozvoj a podpora výskumno-vývojových aktivít Centra pre testovanie kvality a diagnostiku materiálov v oblastiach špecializácie RIS3 SK
Evidenčné číslo projektu: NFP313010W442
Acronym: CEDITEK II
Podávateľ projektu: Trenčianska univerzita Alexandra Dubčeka v Trenčíne
Partner/i: KONŠTRUKTA – Deference, a.s., MIKON spol. s r.o., Ústav anorganickej chémie SAV, Ústav materiálového výskumu SAV
Stav: podaný - odborné hodnotenie

Názov projektu: Gama radiačná záťaž sklovláknitých izolácií a bezpečné chladenie pri ťažkých haváriách v JE (GAŤAH)

Evidenčné číslo projektu: NFP313010V573
Acronym: GATAH
Podávateľ projektu: VÚEZ, a.s.
Partner/i: Fyzikálny ústav Slovenskej akadémie vied, Trenčianska univerzita Alexadra Dubčeka, Ústav anorganickej chémie SAV, Výskumný ústav chemických vlákien, a.s.,
Stav: podaný/doplnenie

Názov projektu: Výskum veľkokapacitného skladovania energie vo forme vodíka v geologických štruktúrach
Evidenčné číslo projektu: NFP313010V569
Acronym: EnStorH2
Podávateľ projektu: Ústav o Zemi Slovenskej akadémie vied
Partner/i: NAFTA a.s., Slovenská technická univerzita v Bratislave, Univerzita Komenského v Bratislave, Univerita Pavla Jozefa Šafárika v Košiciach, Ústav anorganickej chémie SAV, Ústav geotechniky Slovenskej akadémie vied
Stav: podaný/administratívna kontrola

Názov projektu: Výskum využiteľnosti nekovových materiálov pre výrobu akumulátorov tepelenej energie a pre výrobu energetickej pilóty
Evidenčné číslo projektu: NFP313010V472
Acronym: (nie je uvedený v ITMS)
Podávateľ projektu: PREFA ALFA, a.s.
Partner/i: Slovenská technická univerzita v Bratislave, Technický a skúšobný ústav stavebný, n.o., Trenčianska univerzita Alexandra Dubčeka v Trenčíne, Ústav anorganickej chémie SAV, VUNAR a.s., ZTS INMART a.s.
Stav: podaný/administratívna kontrola

Názov projektu: Výskum efektívneho využitia plazmového pulzu pre konštrukciu nerotačného horizontálneho raziaceho systému v kryštalických horninách
Evidenčné číslo projektu: NFP313010V473
Podávateľ projektu: VUNAR a.s.
Partner/i: PREFA ALFA, a.s., Slovenská technická univerzita v Bratislave, Technický a skúšobný ústav stavebný, n.o., Ústav anorganickej chémie SAV, Ústav geotechniky Slovenskej akadémie vied, ZTS INMART a.s.
Stav: podaný/administratívna kontrola

Názov projektu: Výskum fyzikálnych, technických a materiálových aspektov rýchleho plynom chladeného reaktora IV. Generácie ALLEGRO
Evidenčné číslo projektu: NFP313010V444
Acronym: GAMA
Podávateľ projektu: VUJE, a.s.
Partner/i: Fyzikálny ústav SAV, Slovenská technická univerzita v Bratislave, Technická univerzita v Košiciach, Ústav anorganickej chémie SAV, Ústav materiálov a mechaniky strojov SAV, Ústav merania SAV, VUÉZ, a.s., YMS, a.s., Žilinská univerzita v Žiline
Stav: podaný/administratívna kontrola

Názov projektu: Materiály pre efektívnu výrobu, konverziu, transport, uskladnenie a bezpečné využívanie energie (M4E)
Evidenčné číslo projektu: NFP313010V453
Acronym: M4E
Podávateľ projektu: Univerzita Pavla Jozefa Šafárika v Košiciach
Partner/i: SPINEA Technologies s.r.o., Technická univerzita v Košiciach, Univerzita J. Seleyeho, Ústav anorganickej chémie SAV, Ústav experimentálnej fyziky SAV, Ústav geotechniky SAV, Ústav materiálovécho výskumu SAV, ZEOCEM, a.s.
Stav: podaný/administratívna kontrola

Projekty APVV – ÚACH SAV podávateľ

Názov projektu: Rozhranie fluoridová tavenina/tuhá (skelná) fáza: reakcie, štruktúra a charakterizácia (oxo)-(fluoro)-hlinitanov pre elektronické a fotonické aplikácie
Evidenčné číslo projektu: APVV-19-0301
Acronym: MISTRAL
Podávateľ projektu: ÚACH SAV
Partner/i: FÚ SAV
Stav: podaný

Názov projektu: Interakcia fluoridových taveninových systémov prvkov vzácnych zemín s oxidmi kritických prvkov v kontexte špeciálnych aplikácií.
Evidenčné číslo projektu: APVV-19-0270
Acronym: RARE
Podávateľ projektu: ÚACH SAV
Stav: podaný

Názov projektu: **Kinetika korózie a štúdium morfológie natívneho povrchu úžitkového skla pomocou vyspelých spetkrálnych metód**
Evidenčné číslo projektu: APVV-19-0014
Acronym: KIKOMO
Podávateľ projektu: ÚACH SAV (M. Chromčíková)
Partner/i: TnU AD (M. Liška)
Stav: podaný

Názov projektu: Bionanokompozitné materiály na báze organických polykatiónov a vrstevnatých silikátov
Evidenčné číslo projektu: APVV-19-0487
Acronym: BioPolSil
Podávateľ projektu: ÚACH SAV
Partner/i: ÚPo SAV
Stav: podaný

Názov projektu: Vývoj nnástrojov pre pokročilú analýzu a predikciu parametrov spektier EPR, NMR a pNMR komplexných systeémov obsahujúcich ťažké prvky
Evidenčné číslo projektu: APVV-19-0516
Acronym: DKS-pNMR
Podávateľ projektu: UACH SAV (OlgaMalkin)
Partner/i: -
Stav: podaný

<u>Projekty APVV – ÚACH SAV partner</u>

Názov projektu: Anódy pre Li-iónové batérie na báze uhlík-kremíkových kompozitov
Evidenčné číslo projektu: APVV-19-0491
Acronym: ALICES
Podávateľ projektu: Centrum pre využitie pokročilých materiálov SAV
Partner/i: UACH SAV, FU SAV, UPo SAV, UMMS SAV,
Stav: podaný

Názov projektu: Bentonit: strategická surovina Slovenska - inovatívne hodnotenie zdrojov a ich kvality pre jej efektívne využívanie
Evidenčné číslo projektu: APVV-19-0260
Acronym: BEN3V
Podávateľ projektu: PríF UK
Partner/i: Ústav anorganickej chémie, Ústav vied o Zemi
Stav: podaný

<u>Projekty APVV – bilaterálne</u>

Názov projektu: Rozhranie fluoridova tavenina/tuhá fáza: reakcie a štruktúra (oxo)-(fluoro)- hlinitanov pre

elektronické aplikácie
Evidenčné číslo projektu: DS-FR-19-0037 (multilaterálna výzva APVV)
Acronym: MOLIERE
Podávateľ projektu: ÚACH SAV
Partner/i: Conditions Extrémes et Matériaux: Haute Temperature et Irradiation, CNRS, France, Ústav jaderné fyziky AV ČR, v. v. i., Řež, Česká Republika
Stav: podaný

Názov projektu: Percepcia spinovej interakcie na pokročilej úrovni
Evidenčné číslo projektu: SK-FR-19-0001
Acronym: SCALP
Podávateľ projektu: ÚACH SAV (Olga Malkin)
Partner/i: -
Stav: schválený

2.2. Medzinárodné projekty

2.2.1. Medzinárodné projekty riešené v roku 2019

Tabuľka 2c Medzinárodné projekty riešené v roku 2019

ŠTRUKTÚRA PROJEKTOV	Počet		Čerpané financie (€)					
			A				B	
	A	B	Zo zdrojov SAV		Z iných zdrojov		Zo zdrojov SAV	Z iných zdrojov
			Spolu	Pre ÚACH	Spolu	Pre ÚACH		
1. Projekty 7. RP EÚ a Horizont 2020	1	0	-	-	60717	60717	-	-
2. Projekty ERA.NET, ESA, JRP	0	1	-	-	-	-	-	11502
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	1	48996	48996	-	-	-	-
8. Podpora MVTS z národných zdrojov okrem SAV (APVV a iné)	2	0	-	-	6153	6153	-	-
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 2019

Tabuľka 2d Počet projektov Horizont 2020 v roku 2019

	A	B
Počet podaných projektov Horizont 2020	1	1

A - organizácia je nositeľom projektu
B - organizácia sa zmluvne podieľa na riešení projektu
Údaje k domácim a medzinárodným projektom sú uvedené v Prílohe B.

Názov projektu: New generation of eco-friendly ionic liquids for high efficient electrochemical treatment of metals and alloys
Evidenčné číslo projektu, výzva: 886867 (MSCA-IF-2019/MSCA-IF-EF-2019)

Acronym: NGETMA
Uchádzač: Anna Kityk
Koordinátor ÚACH: M. Boča
Stav: podaný

Názov projektu: Eco-friendly composites - mine tailings based geopolymers
Program: ERA.MIN2 Acronym: ECOMINING
Podávateľ projektu: Cracow University of Technology, Poľsko
Koordinátor ÚACH: P. Tatarko
Ďalší partneri: University of Aveiro (Portugalsko), Universitatea Babe?-Bolyai Cluj-Napoca (Rumunsko), Nigde Ömer Halisdemir University Nigde (Turecko), La Pontificia Universidad Católica de Chile, Santiago (Čile), Ekologia Przedsiębiorczość Inowacje, Czestochowa (Poľsko), Przedsiębiorstwo BudowlanoProdukcyjne, Krakow, (Poľsko), Geomaterials Vaorization Innovation P.C., (Grécko), University of Patras (Grécko), Santa Catarina Extreme South University (Brazília), Slovenian National Building and Civil Engineering Institute, Ljubljana (Slovinsko)
Stav: zamietnutý

2.2.3. Zámery na čerpanie štrukturálnych fondov EÚ v ďalších výzvach

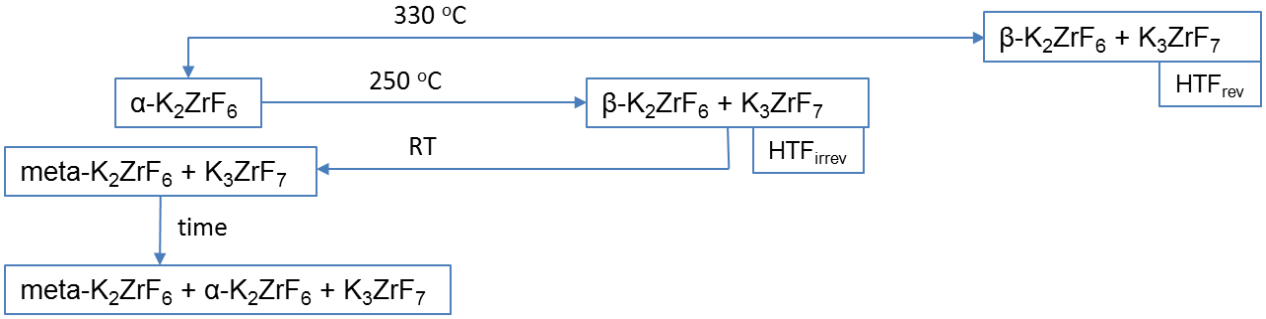
2.3. Najvýznamnejšie výsledky vedeckej práce (maximálne 1000 znakov + 1 obrázok; bibliografický údaj uvádzajte rovnako ako v zozname publikačnej činnosti, vrátane IF)

2.3.1. Základný výskum

Nezvyčajná modifikačná premena zlúčeniny K_2ZrF_6.

Riešitelia z ÚACH SAV: BOČA, Miroslav – NETRIOVÁ, Zuzana – KUBÍKOVÁ, Blanka – HRUŠKA, Branislav – LIŠKA, Marek – CHROMČÍKOVÁ, Mária – VASKOVÁ, Zuzana

Zlúčenina α-K_2ZrF_6 podlieha nezvyčajnej viacstupňovej modifikačnej premene v tuhom stave. Táto modifikačná premena môže byť reverzibilná alebo ireverzibilná vzhľadom na cieľovú teplotu. Zahrievanie K_2ZrF_6 na 250 °C spôsobuje nevratnú modifikačnú premenu. Starnutie takejto zmesi podlieha ďalšiemu procesu premien. Proces transformačných premien bol sledovaný rôznymi metódami ako DTA, DSC, ^{19}F MAS NMR, XRD, tepelnou difuzivitou ako aj Ramanavou spektroskopiu pri rôznych teplotných režimoch pričom získané spektrá boli následne analyzované pomocou Principal Component Analysis (PCA) a Multivariate Curve Resolution (MCR) metód. Štatistická analýza Ramanových spektier potvrdila ireverzibilný charakter α – HTF_{irrev} transformácie. Navyše transformácia HTF_{rev} fázy na α fázu si vyžaduje prítomnosť aj HTF_{irrev} fázy. Zaujímavosťou je aj to, že odozva monitorovania modifikačných premien rôznymi technikami vykazovala neočakávané odozvy, ktoré bolo treba interpretovať. Obrázok sumarizuje schému transformačných premien navrhnutých na základe získaných experimentálnych výsledkov.



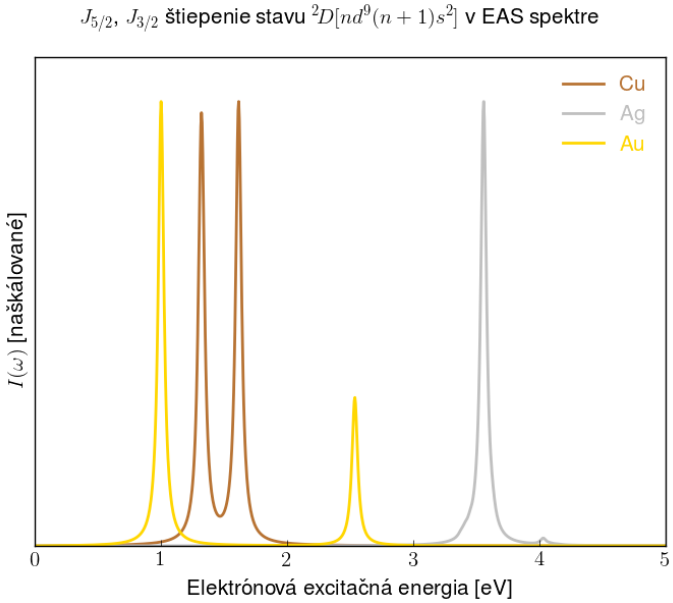
Publikácie
BOČA, Miroslav** – NETRIOVÁ, Zuzana – RAKHMATULLIN, Aydar – VASKOVÁ, Zuzana – HADZIMOVÁ, Eva – SMRČOK,

Ľubomír – HANZEL, Ondrej – KUBÍKOVÁ, Blanka. The differing responses of various techniques in measuring the phase transformations of K2ZrF6. In Journal of Molecular Liquids, 2019, vol. 287, p. 110969-1-110969-10. (4.561 – IF2018).
HRUŠKA, Branislav** – NETRIOVÁ, Zuzana – VASKOVÁ, Zuzana – BOČA, Miroslav – CHROMČÍKOVÁ, Mária – LIŠKA, Marek. High-temperature Raman study of K2ZrF6 phase transitions. In Journal of Alloys and Compounds, 2019, vol. 791, p. 45-50. (4.175 – IF2018).

Presné modelovanie elektrónových absorpčných spektier systémov s uzavretým aj otvoreným obalom.

Riešiteľ z ÚACH SAV: KOMOROVSKÝ, Stanislav

Presná predpoveď elektrónových absorpčných spektier zlúčenín obsahujúcich ťažké prvky vyžaduje správne zohľadnenie relativistických efektov. Vhodné započítanie týchto efektov je napríklad nevyhnutné pri opise fotochemických vlastností organických diód emitujúcich svetlo, pri predikcii röntgenových L-edge spektier, alebo iných javoch súvisiacich so spinovými efektami v magnetických materiáloch. V tejto práci sme vyvinuli štvorzložkovú (4c) metódu výpočtu excitačných energií v rámci časovo závislej teórie funkcionálu hustory (TDDFT). Metóda 4c-TDDFT je použitelná na systémoch obsahujúcich atómy s ľubovolným atómovým číslom a jej efektívna implementácia v našom programe ReSpect umožňuje rutinné výpočty na reálnych systémoch s až 200 atómami. Okrem toho sa metóda 4c-TDDFT dá použiť na referenčné stavy s uzavretým aj otvoreným obalom. V prípade 4c metód pre systémy s otvoreným obalom je to vôbec prvá úspešná implementácia vo svete. Tento úspech je pozoruhodný hlavne preto, že vedecká obec doteraz túto úlohu považovala za príliš náročnú. Napríklad autori článku [Mol. Phys. 111, 3741 (2013)] napísali: „… ktorého [4c-TDDFT] momentálna adaptácia je technicky príliš náročná, ak nie nemožná. ... ". Učebnicová demonštrácia metódy na systémoch s otvoreným obalom je výpočet spin-orbitálneho štiepenia $J_{5/2}$, $J_{3/2}$ inak desaťkrát degenerovaného ^{2}D stavu.



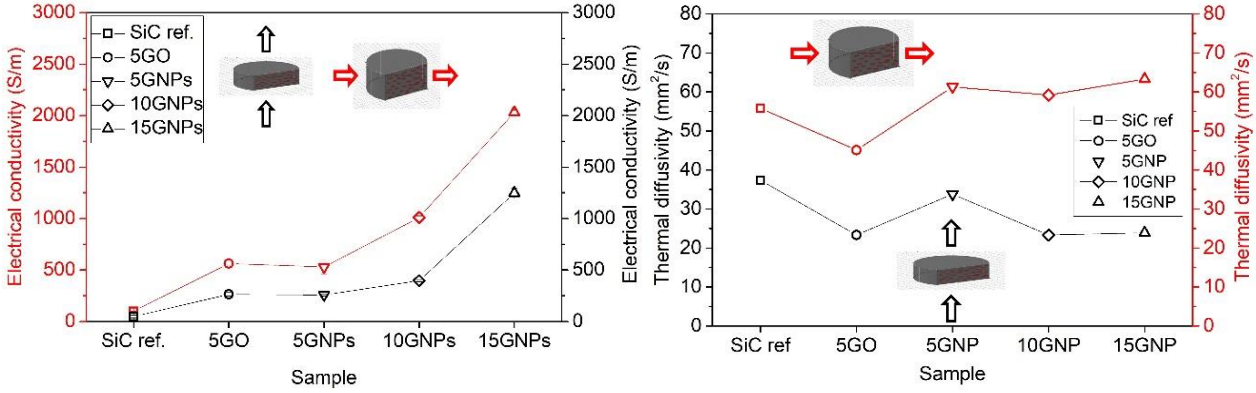
Publikácie

KOMOROVSKÝ, Stanislav – CHERRY, Peter – REPISKÝ, Michal. Four-component relativistic time-dependent density-functional theory using a stable noncollinear DFT ansatz applicable to both closed- and open-shell systems. In Journal of Chemical Physics, 2019, vol. 151, no. 18, p. 184111-1-184111-14. (2.997– IF2018).

Elektro-iskrovo obrábateľné SiC s grafénovými nanoplatničkami (GNPs) a oxidom grafénu (GO) ako elektricky vodivými fázami

Riešitelia z ÚACH SAV: HANZEL, Ondrej – ŠAJGALÍK, Pavol

Hutné kompozitné materiály na báze SiC s prídavkami Y_2O_3 a Al_2O_3 ako spekacími prísadami a s prídavkom 5 – 15 hm. % grafénových nanoplatničiek (GNPs) alebo 5 hm. % oxidu grafénu (GO) boli pripravené metódou Rapid hot press pri teplote 1800°C, pri tlaku 50 MPa po dobu 5 minút vo vákuu. Anizotropia mikroštruktúry ako dôsledok usporiadania grafénových vrstiev v smere kolmom na lisovací tlak bola potvrdená meraním elektrickej vodivosti a tepelnej difuzivity. Najvyššia hodnota elektrickej vodivosti (2031 S/m) bola dosiahnutá pri kompozite s 15 hm. % grafénových platničiek v smere rovnobežnom na grafénové roviny, zatiaľ čo v smere kolmom na orientáciu grafénových vrstiev bola elektrická vodivosť iba 1246 S/m. Rýchlosť odoberania materiálu pri elektro-iskrovom obrábaní bola pri všetkých SiC-GNP a SiC-GO kompozitoch vyššia ako 1.6 mm^3/min. Takmer dvojnásobná rýchlosť odoberania materiálu (2.8 mm^3/min) bola dosiahnutá pre kompozity obsahujúce 15 hm. %, pričom zároveň drsnosť povrchov po obrábaní klesla na 1.5 µm.



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

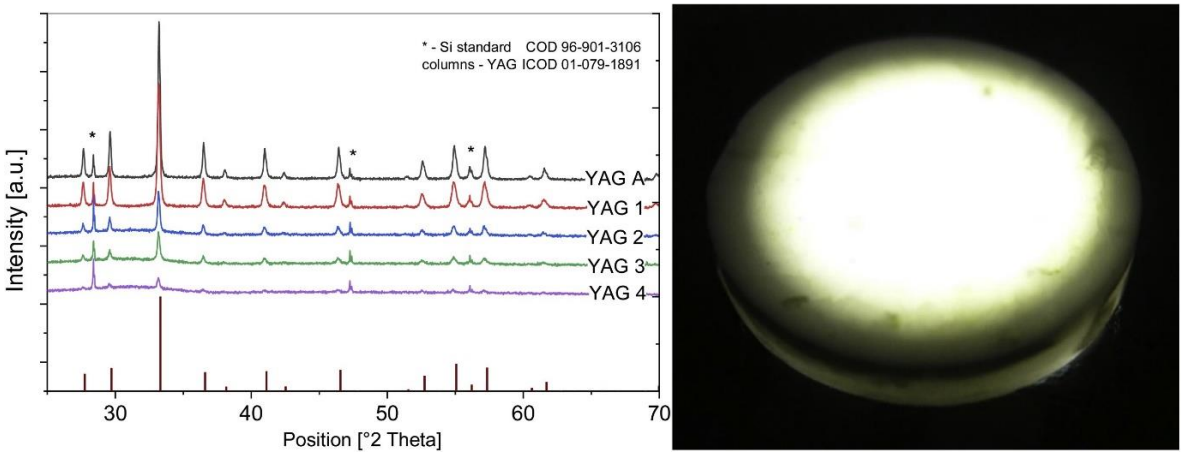
Publikácie:
HANZEL, Ondrej - SINGH, Meinam Annebushan - MARLA, Deepak - SEDLÁK, Richard - ŠAJGALÍK, Pavol. Wire electrical discharge machinable SiC with GNPs and GO as the electrically conducting filler. In Journal of the European Ceramic Society, 2019, vol. 39, no. 8, p. 2626-2633. (4.029 - IF2018).

2.3.2. Aplikačný typ

Príprava translucentnej YAG sklo/keramiky pri teplotách pod 900 °C

Riešitelia z ÚACH SAV: MICHÁLKOVÁ, Monika – GALUSEK, Dušan

Hutná translucentná sklokeramika so zložením yttrito-hlinitého granátu (YAG) sa pripravila zo sklenených mikroguľôčok so zložením YAG. Mikroguľôčky sa zhutnili do kusového materiálu v žiarovom lise spekaním viskóznym tokom. Vďaka kontrolovanej kryštalizácii bolo možné pripraviť YAG sklo-keramiku s rôznym obsahom amorfnej fázy. Po zhutnení dosahovala čistá YAG keramika relatívnu hustotu nad 94 % pri teplote iba 891 °C, zatiaľ čo sklo-keramika dosiahla relatívnu hustotu nad 99 % pri teplote 815 °C bez izotermickej výdrže. Dopovaná YAG keramika sa v súčasnosti využíva v laseroch napr. v lekárstve (konkrétne v chirurgii ako presný a šetrný spôsob rezania a odparovania tkaniva, napríklad pri operáciách očnej sietnice) alebo v oblasti spracovania kovových i nekovových materiálov.



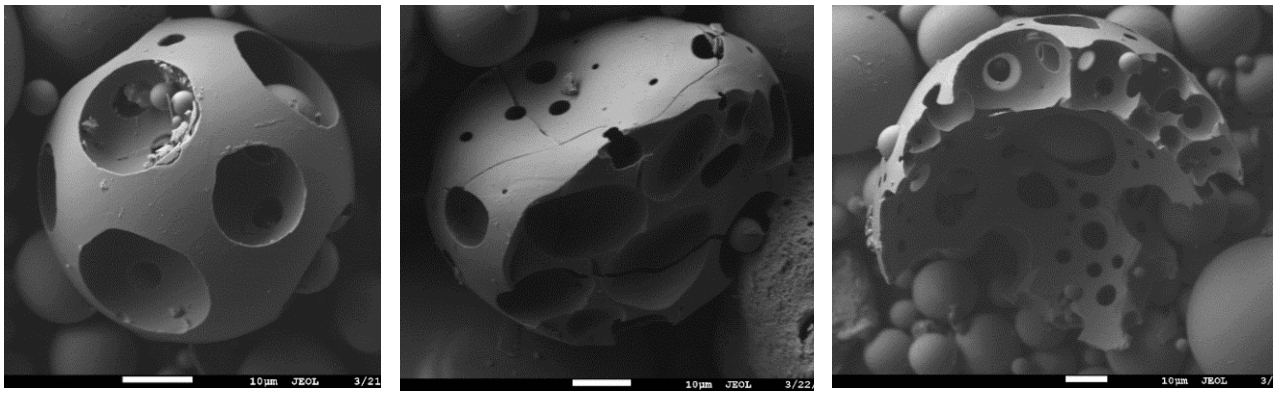
Publikácie:
MICHÁLKOVÁ, Monika - KRAXNER, J. – MICHÁLEK, M. – GALUSEK, Dušan Preparation of translucent YAG glass/ceramic at temperatures below 900 °C. Journal of the European Ceramic Society, IF: 4,029, In Press, Corrected Proof Available online 5 November 2019 https://doi.org/10.1016/j.jeurceramsoc.2019.11.011

2.3.3. Medzinárodné vedecké projekty

Pórovité bioaktívne sklenené mikroguľôčky pripravené plameňovou syntézou

Riešiteľ z ÚACH SAV: GALUSEK, Dušan

Vyvinula sa technológia nízko-nákladovej prípravy pórovitých bio-aktívnych sklenených mikroguľôčok. Sklený prášok so zložením bioskla 45S5 s nepravidelným tvarom častíc sa pripravil konvenčným tavením a následne sa povrch častíc alkalicky aktivoval. Alkalická aktivácia zabezpečila tvorbu pórov ako na povrchu mikroguľôčiek, tak aj v ich vnútri (Obrázok). Výsledné mikroguľôčky majú priemer medzi 45 a 75 µm, a nájdu uplatnenie pri regenerácii kostí v tkanivovom inžinierstve. Vďaka svojej pórovitosti môžu slúžiť aj na prepravu liečiv v ľudskom tele.



Publikácie:
KRAXNER, Jozef - MICHÁLEK, Martin - ROMERO, Acacio R. - ELSAYED, H. - BERNARDO, E. - BOCCACCINI, Aldo - GALUSEK, Dušan. Porous bioactive glass microspheres prepared by flame synthesis process. In Materials Letters, 2019, vol. 256, p. 126625-1-126625-4. (2018: 3.019 - IF, Q2 - JCR).

Optimalizácia syntézy nanokryštalického Fe_2O_3 na povrchu kompozitných pórovitých anorganických materiálov na báze ílových minerálov: využitie v katalytickej reakcii pre rozklad toluénu.

Riešitelia z ÚACH SAV:

Pórovité anorganické materiály na báze ílových minerálov, tzv. PCH predstavujú zaujímavú alternatívu k rôznych štruktúram na báze SiO_2. Cieľom práce bolo navrhnúť syntézu a optimalizovať jej podmienky a

pripraviť kompozitný materiál PCH/FeO_x s vysokou efektivitou v reakcii rozkladu toluénu. Odbúravaniu prchavých organických látok (VOC) a ich rozkladu na zlúčeniny z menším negatívnym dopadom na životné prostredie sa venuje veľká pozornosť a použitie Fe-PCH sa študovala ako lacnejšia alternatíva ku katalyzátorom na báze oxidov ušľachtilých kovov. Pripravené Fe-PCH obsahovali nanoštruktúrne formy α-Fe_2O_3 and Fe_3O_4 oxidov s rôznou distribúciou častíc, ale aj pomerom Fe-fáz v závislosti na podmienkach syntézy (koncentrácia $FeCl_3$, ktorý sa použil ako zdroj Fe^{3+}, tlak, čas impregnácie a kalcinácie). Železo v oktaedrickej koordinácii α-Fe_2O_3 bolo efektívne pre zvýšenie aktivity katalyzátora, zatiaľ čo Fe_3O_4 nanokryštály aktivitu znižovali. Práca poskytla originálne interpretácie zmien IČ spektrách v ďalekej oblasti s podporou DFT výpočtov, čím sa potvrdila prítomnosť α-Fe_2O_3 a Fe_3O_4 fáz na povrchu Fe-PCH.

Publikácie:
ZIMOWSKA, M. - GURGUL, J. - SCHOLTZOVÁ, E. - SOCHA, R.P. - PÁLKOVÁ, H. - LITYNSKA-DOBRZYNSKA, L. - MORKZYCKI, L. - LATKA, K. A precursor approach for the development of lace-like Fe2O3 nanocrystallites triggered by pressure dependent nucleation and growth of akaganeite over clay based composites for toluene combustion. In Journal of Physical Chemistry C, 2019, vol. 123, no. 43, p. 26236-26250. (4.309 - IF2018).
Spoločný projekt v rámci medziakademickej dohody medzi Poľskou akadémiou vied a SAV (Polish-Slovak joint research project under the PAS-SAS agreement 2016-2018)

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

Tabuľka 2e Štatistika vybraných kategórií publikácií

PUBLIKAČNÁ A EDIČNÁ ČINNOSŤ	Počet v r. 2019/ doplnky z r. 2018
1. Vedecké monografie a monografické štúdie vydané v domácich vydavateľstvách (AAB, ABB)	**0 / 0**
2. Vedecké monografie a monografické štúdie vydané v zahraničných vydavateľstvách (AAA, ABA)	**0 / 0**
3. Odborné monografie, vysokoškolské učebnice a učebné texty vydané v domácich vydavateľstvách (BAB, ACB, CAB)	**0 / 0**
4. Odborné monografie a vysokoškolské učebnice a učebné texty vydané v zahraničných vydavateľstvách (BAA, ACA, CAA)	**0 / 0**
5. Kapitoly vo vedeckých monografiách vydaných v domácich vydavateľstvách (ABD)	**0 / 0**
6. Kapitoly vo vedeckých monografiách vydaných v zahraničných vydavateľstvách (ABC)	**0 / 0**
7. Kapitoly v odborných monografiách, vysokoškolských učebniciach a učebných textoch vydaných v domácich vydavateľstvách (BBB, ACD)	**0 / 0**
8. Kapitoly v odborných monografiách, vysokoškolských učebniciach a učebných textoch vydaných v zahraničných vydavateľstvách (BBA, ACC)	**0 / 0**
9. Vedecké práce registrované v Current Contents Connect (ADCA, ADCB, ADDA, ADDB)	**44 / 0**
10. Vedecké práce registrované vo Web of Science Core Collection alebo Scopus (ADMA, ADMB, ADNA, ADNB)	**5 / 0**
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)	**19 / 0**
16. Publikované príspevky na zahraničných vedeckých konferenciách (AFA, AFC)	**7 / 0**
17. Vydané periodiká evidované v CCC, WoS Core Collection, SCOPUS	**0**
18. Ostatné vydané periodiká	**0**
19. Zostavovateľské práce knižného charakteru (FAI)	**2 / 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. 2018 (zdroj JCR) *Počet článkov / doplnky 2017*	31 / 0	8 / 0	7 / 0	0 / 0	46 / 0
Podľa SJR z r. 2018 (zdroj Scimago) *Počet článkov / doplnky 2017*	35 / 0	7 / 0	3 / 0	4 / 0	49 / 0

Tabuľka 2g Ohlasy

OHLASY	Počet v r. 2018/ doplnky z r. 2017
Citácie vo WOS (1.1, 2.1)	1528 / 23
Citácie v SCOPUS (1.2, 2.2)	24 / 5
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)	2 / 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	53
Prednášky a vývesky na domácich vedeckých podujatiach	38

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

BOČA M. – ŠIMURDA M. – ŠVEC P. - ŠVEC P. Jr. – JANIČKOVIČ D. – CZÍMEROVÁ A. – KUBÍKOVÁ B. –MLYNÁRIKOVÁ J. Unusual phase transformations in ternary fluoride systems. In 19th European Symposium on Fluorine Chemistry, Warszawa, Poľsko, dátum konferencie Oficyna Wydawniczo-Poligraficzna ADAM, 2019, p. 134.

BUJDÁK J. The phenomena occurring in the systems of layered silicates and organic dyes. Research Work and Collaboration Symposium: Molecules and Materials for Life, Téma: Interaction of Inorganic Clusters, Cages, and Containers with Light, Villa Lanna v Prahe, Česká republika, 19.3. 2019

BUJDÁK J. Energy transfer between dye molecules in the hybrid materials with layered silicates. Research Work and Collaboration Symposium: Molecules and Materials for Life, Téma: Interaction of Inorganic Clusters, Cages, and Containers with Light, Liblice, Česká republika, 5.12. 2019.

KOMOROVSKÝ S. - CHERRY P. - REPISKÝ M. Relativistic theory for prediction of excitation energies of both closed- and open-shell species. In CESTC 2019. 17th Central European Symposium on Theoretical Chemistry, 9. – 12. september 2019, Burg Schlaining, Rakúsko,

MALKIN O. Indirect NMR spin-spin couplings between atoms possessing lone pairs and between two hydrogen atoms: Can we learn from the latter about the former? Workshop on Modern Methods in Quantum Chemistry, Mariapfarr, Rakúsko, 11. - 15. marec 2019

MALKIN O. A mistery of a through-space indirect spin-spin coupling between two hydrogen atoms“, 19th deMon developers workshop, Frejus, Francúzsko, 26. – 30. máj 2019

MALKIN V. – MALKIN O, Visualization of EPR hyperfine structure coupling pathways, 19th deMon developers workshop, Frejus, Francúzsko, 26. – 30. máj 2019

MALKIN V. Calculations and interpretation of the EPR parameters in the framework of 2- and 4-component DFT approach, XIth EFEPR Conference (EF EPR 2019), Bratislava, 1. – 5. September 2019

PRNOVÁ A. – VALÚCHOVÁ J. – DOHNALOVÁ Ž. – HANZEL O. – KLEMENT R. – BRUNEEL E. – GALUSEK D. Preparation of Al2O3-Y2O3 glass microspheres; influence of particle size distribution on thermal behavior of prepared systems., Konference o speciálních anorganických pigmentech a práškových materiálech, 18. september 2019, Pardubice, ČR

SCHOLTZOVÁ E. - JANKOVIČ Ľ. - ŠKORŇA P. - MORENO RODRÍGUEZ D. - TUNEGA D. Insight into

the stability of beidellite intercalates. In BIT´s 7th Annual Conference of AnalytiX-2019, 12 – 14- apríl 2019, Singapore, Exploring Innovative Advances and Applications, p. 78.

ŠAJGALÍK P. Porous silicon nitride: A material for the bioactive composite implants. In ICACC 2019. 43rd International Conference & Exposition on Advanced Ceramics and Composites, January 27 - February 1, 2019, Daytona Beach, Florida, USA, 27. 1- 1.2.2019

ŠAJGALÍK P. - HNATKO M. - KAŠIAROVÁ M. - SEDLÁČEK J. - BYSTRICKÝ R. - LENČÉŠ Z. - GALUSKOVÁ D. Corrosion of silicon nitride and alumina based ceramics by molten iron. REFRA PRAGUE 2019, Prague, Česká republika

ŠAJGALÍK P. New nitrides and carbides for high temperature application. In ICCT. 7th International Conference on Chemical Technology, 15. - 17. 4. 2019, Mikulov, Česká republika

ŠAJGALÍK P. - SEDLÁČEK J. - KOVALČÍKOVÁ A. - HAN X. - ZHANG C. Ultra-high creep resistant silicon carbide ceramics. In XVI ECerS Conference, Torino, Taliansko, 16. – 20. jún 2019

ŠAJGALÍK P. Ceramic research in Slovakia: potential for R&D cooperation. In CICC-11: The Eleventh International Conference on High-Performance Ceramics, Kunming, Čína, 25. – 29. máj 2019

TATARKO P. Development of ultra-high temperature ceramics by field assisted sintering technology, 5th Conference of The Serbian Society for Ceramic Materials, June 11-13, 2019, Belgrade, Serbia

2.6.2. Vyžiadané prednášky na domácich vedeckých podujatiach

ASHER J. Photochemical properties of potential anticancer agents: Anti-syn isomerization of 2,3-disubstituted quinazolinones, INSTRUCT ULTRA, 3rd Structural Biology Meeting, Bratislava, Hotel Tatra, 14. – 15. november 2019

MALKIN, V. - MALKINA, O. Calculations and interpretation of the EPR parameters in the framework of 2- and 4-component DFT approach. In XIth EFEPR 2019 Conference: book of abstracts. - Bratislava: Vydavateľstvo SCHK, 2019, pL6, 1 p. ISBN 978-80-8208-020-2.

2.6.3. Vyžiadané prednášky na významných vedeckých inštitúciách

BARLOG M. – PÁLKOVÁ H. – BUJDÁK J. Spectral properties of hybrid sytems based on organomodified clay minerals and Rhodamine 6G, Center for Materials Nanoarchitectonics (WPI-MANA) at the National Institute for Materials Science (NIMS), Tsukuba, Japonsko, 18. júl 2019.

BOČA M. Spectroscopy, séria prednášok, School of Metallurgy, Northeastern University, Shenyang, Čína, 8. - 25. október 2019

BUJDÁK J. Photophysical phenomena occurring in hybrids of expandable phyllosilicates and organic dyes. Bayreuth, Univerzita v Bayreuth, Nemecko, 25. január 2019

HANZEL O. – LENČÉŠL Z. – KIM I.-W. – ŠAJGALÍK P. Preparation of SiC-graphene composites with high functional properties, Northwestern Polytechnical University, Xi'an, Čína, 31. máj 2019

CHROMČÍKOVÁ M. – HRUŠKA B. – LIŠKA M. Získanie hodnotných dát analýzou nevydarených termodilatometrických experimentov. Termoanalytický seminár, Brno, Česká republika, 10. november 2019

KORENKO M. Molten Salts Chemistry in Slovakia, School of Metallurgy, Northeastern University, Shenyang Čína, 6. september 2019

KUBÍKOVÁ B. Phase equilibrium of condensed systems, School of Metallurgy, Northeastern University, Shenyang, Čína, 8. október 2019

KUBÍKOVÁ B. Density and volume properties of molten systems. Fluoride molten systems: results and comparison, School of Metallurgy, Northeastern University, Shenyang, Čína, 9. október 2019

MALKIN O. – KOMOROVSKÝ S. – MALKIN V. Beyond the Dirac vector model?, Technická Univerzita v Berlíne, Nemecko, 3. december 2019

PRNOVÁ A. – VALÚCHOVÁ J. – PARCHOVIANSKY M. – KLEMENT R. – GALUSEK D. HP sintering of yttrium aluminate glasses, impact of particle size on mechanical properties, Univerzita v Gente, Belgicko, november 2019

TATARKO P. Development and Joining of Advanced Ceramics for Extreme Applications using Field Assisted Technology, Northwestern Polytechnical University, Xi'an, Čína, 3. máj 2019

TATARKO P. Field assisted processing for the development and joining of ceramics for extreme environments, Ningbo Institute of Materials Technology and Engineering (NIMTE), Chinese Academy of Sciences, Ningbo, Čína, 8. november 2019

2.7. Patentová a licenčná činnosť na Slovensku a v zahraničí v roku 2019

2.7.1. Vynálezy, na ktoré bol v roku 2019 udelený patent

a) na Slovensku
b) v zahraničí

2.7.2. Vynálezy prihlásené v roku 2019

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 2019
b) udelené v roku 2019
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 2019 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
Hnatko Miroslav	VEGA	1
Komorovský Stanislav	VEGA	1
Korenko Michal	APVV VV 2019	2
	DoktorGrant	8
Pavlík Viliam	OPVaI-VA/DP/2018/1.1.2-01	3
	OPVaI-VA/DP/2018/1.1.3-04	1
	OPVaI-VA/DP/2018/1.1.3-07	1
Tatarko Peter	MVTS: SAS-NASU	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
Bujdák Juraj	0	0	5	0	0	0	10
Galusek Dušan	0	0	6	0	0	0	0
Hanzel Ondrej	0	0	1	0	0	0	0
Hnatko Miroslav	0	0	0	0	0	8	0
Komorovský Stanislav	0	0	1	0	0	0	0
Kubíková Blanka	0	0	1	0	0	0	0
Lenčéš Zoltán	0	0	31	0	0	0	0
Madejová Jana	0	0	6	0	0	0	0
Malkin Oľga	0	0	2	0	0	0	0
Pálková Helena	0	0	2	0	0	0	0
Pavlík Viliam	0	0	5	0	0	0	0
Sedláček Jaroslav	0	0	3	0	0	0	0
Scholtzová Eva	0	0	6	0	0	0	0
Tatarko Peter	0	0	23	0	0	4	0
Tatarková Monika	0	0	2	0	0	0	0
Spolu	**0**	**0**	**98**	**0**	**0**	**12**	**10**

2.11. Iné informácie k vedeckej činnosti.

Počet časopiseckých karentovaných publikácií registrovaných v databáze WOS a SCOPUS v roku 2019 dosiahol číslo 44. 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 39,71, vrátane deviatich doktorandov (piatich s plnou kapacitou, štyria s kapacitou 0,3 pri zohľadnení dátumu ich nástupu na štúdium 1.9.2019), ktorí k 31.12. vystupovali v riešiteľských kolektívoch 45,91. Potom na jedného pracovníka pripadá 1,11 karentovanej publikácie, vrátane doktorandov – 0,96 publikácie.
Takýto stav nepovažujeme za dostatočný a cieľom naďalej ostáva dosiahnuť dve publikácie na vedeckého pracovníka ročne, ktorý zodpovedá štandardu vyspelých vedeckých pracovísk s podobným zameraním. Priemerný impakt faktor časopisov, v ktorých boli práce uverejnené, bol 3,69, pokiaľ vlani to bolo 3,41 (treba mať na pamäti, že údaje sú zo záverečných správ, v ktorých sa nachádzajú aj doplnky publikácií za predchádzajúci rok 2018, ktorým ešte neboli priradené kompletné bibliografické údaje v čase spracovávania podkladov do záverečných správ).
Citovanosť (vo všetkých dostupných databázach WOS – 1551, SCOPUS – 29) na vedeckého pracovníka (34,93) je 45,23 citácií, čo predstavuje nárast v porovnaní s rokom 2018. Pracovníci ústavu prednieslí 16 pozvaných prednášok na významných svetových konferenciách.

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 2019

Forma	Počet k 31.12.2019				Počet doktorandov po doktorandskej skúške		Počet ukončených doktorantúr v r. 2019					
							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	6	3	2	2	4	1	1	0	1	1	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	6	3	2	2	4	1	1	0	1	1	0	0
Súhrn	9		4		5		1		2		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 2019 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 2019 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 2019 úspešnou obhajobou v nadštandardnej dĺžke štúdia

Meno doktoranda	Forma DŠ	Mesiac, rok nástupu na DŠ	Mesiac, rok obhajoby	Číslo a názov študijného odboru	Meno a organizácia školiteľa	Fakulta udeľujúca vedeckú hodnosť
Ing. Michal Slaný	interné štúdium hradené z prostriedkov SAV	9 / 2014	8 / 2019	5.2.19 anorganická technológia a materiály	RNDr. Jana Madejová DrSc., Ústav anorganickej chémie SAV	Fakulta chemickej a potravinárskej technológie STU

3.5. Uplatnenie absolventov doktorandského štúdia

Tabuľka 3e Prehľad uplatnenia absolventov doktorandského štúdia

Počet absolventov PhD. štúdia v roku 2019 (obhajoba leto 2019)	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
1	1	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	DEU/1, ESP/1, GRC/1, IND/1, TUR/1

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

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)
chemická fyzika	4.1.11	Univerzita Komenského v Bratislave
anorganická chémia	4.1.15	Prírodovedecká fakulta UK
anorganická technológia a materiály	5.2.19	Slovenská technická univerzita v Bratislave

Tabuľka 3h Účasť na pedagogickom procese

Menný prehľad pracovníkov, ktorí boli menovaní do spoločných 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)	Mgr. Tímea Baranyaiová, PhD. (PhD., Prírodovedecká fakulta UK)
doc. Ing. Miroslav Boča, DrSc. (anorganická technológia a materiály)	doc. Ing. Miroslav Boča, DrSc. (Trenčianska univerzita Alexandra Dubčeka v Trenčíne)	doc. Ing. Mária Chromčíková, PhD. (doc., Trenčianska univerzita Alexandra Dubčeka v Trenčíne)
doc. Ing. Miroslav Boča, DrSc. (odbor v zahraničí)	prof. Ing. Dušan Galusek, DrSc. (Fakulta špeciálnej techniky TnUAD)	Mgr. Marek Pribus, PhD. (PhD., Prírodovedecká fakulta UK)
prof. RNDr. Juraj Bujdák, DrSc. (anorganická chémia)	prof. Ing. Dušan Galusek, DrSc. (Fakulta zdravotníctva TnUAD)	Ing. Michal Slaný, PhD. (PhD., Fakulta chemickej a potravinárskej technológie STU)
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. (Fakulta chemické technologie VŠCHT, Praha, ČR)	

doc. Ing. Miroslav Hnatko, PhD. (anorganické technológie a nekovové materiály)	prof. Ing. Marek Liška, DrSc. (Trenčianska univerzita Alexandra Dubčeka v Trenčíne)
doc. Ing. Miroslav Hnatko, PhD. (anorganická technológia a materiály)	RNDr. Jana Madejová, DrSc. (Prírodovedecká fakulta UK)
RNDr. Peter Komadel, DrSc. (anorganická chémia)	prof. RNDr. Jozef Noga, DrSc. (Fakulta prírodných vied UMB)
doc. Ing. Zoltán Lenčéš, PhD. (anorganická technológia a materiály)	prof. RNDr. Jozef Noga, DrSc. (Prírodovedecká fakulta UK)
doc. Ing. Zoltán Lenčéš, PhD. (anorganická chémia)	prof. RNDr. Pavol Šajgalík, DrSc. (Fakulta metalurgie a materiálového inženírství, Vysoká škola báňská TU)
doc. Ing. Zoltán Lenčéš, PhD. (odbor v zahraničí)	prof. RNDr. Pavol Šajgalík, DrSc. (Hutnícka fakulta TUKE)
prof. Ing. Marek Liška, DrSc. (anorganická technológia a materiály)	prof. RNDr. Pavol Šajgalík, DrSc. (Slovenská technická univerzita v Bratislave)
prof. Ing. Marek Liška, DrSc. (fyzika kondenzovaných látok a akustika)	prof. RNDr. Pavol Šajgalík, DrSc. (Trenčianska univerzita Alexandra Dubčeka v Trenčíne)
RNDr. Jana Madejová, DrSc. (anorganická technológia a materiály)	prof. RNDr. Pavol Šajgalík, DrSc. (Univerzita Komenského v Bratislave)
Dr. Oľga Malkin, DrSc. (teoretická a počítačová chémia)	prof. RNDr. Pavol Šajgalík, DrSc. (Univerzita Pavla Jozefa Šafárika v Košiciach)
Dr. Vladimír Malkin, DrSc. (chemická fyzika)	prof. RNDr. Pavol Šajgalík, DrSc. (Univerzita sv. Cyrila a Metoda v Trnave)
Dr. Vladimír Malkin, DrSc. (teoretická a počítačová chémia)	prof. RNDr. Pavol Šajgalík, DrSc. (Vysoké učení technické, Brno)
prof. RNDr. Jozef Noga, DrSc. (chemická fyzika)	
prof. RNDr. Jozef Noga, DrSc. (anorganická chémia)	
prof. RNDr. Jozef Noga, DrSc. (fyzika plazmy)	

3.8. Údaje o pedagogickej činnosti

Tabuľka 3i Prednášky a cvičenia vedené v roku 2019

PEDAGOGICKÁ ČINNOSŤ	Prednášky		Cvičenia a semináre	
	doma	v zahraničí	doma	v zahraničí
Počet prednášateľov alebo vedúcich cvičení	4	3	5	0
Celkový počet hodín v r. 2019	57	34	140	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.)**	11
4.	**Počet školených doktorandov (aj pre iné inštitúcie)**	19
5.	**Počet oponovaných dizertačných a habilitačných prác**	12
6.	**Počet pracovníkov, ktorí oponovali dizertačné a habilitačné práce**	4
7.	**Počet pracovníkov, ktorí pôsobili ako členovia komisií pre obhajoby DrSc. prác**	1
8.	**Počet pracovníkov, ktorí pôsobili ako členovia komisií pre obhajoby PhD. prác**	7
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

ÚACH SAV aj v roku 2019 vyvinul enormnú iniciatívu k získaniu nových doktorandov. V spolupráci s dvoma vysokými školami (PriF UK a FChPT STU) celkovo vypísal 19 tém v troch študijných programoch (4.1.15 Anorganická chémia, 5.2.19 Anorganické technológie a materiály a 4.1.11 Chemická fyzika.), ktoré okrem príslušných akademických informačných systémov, boli zverejnené aj na medzinárodných portáloch. Dva z týchto portálov boli samostatnou iniciatívou ÚACH SAV. Na základe úspešného prijímacieho konania Ústav anorganickej chémie prijal zo 6 kandidátov, 5 študentov, z ktorých štyria v septembri nastúpili na doktorandské štúdium na PriF UK v študijných programoch 4.1.15 Anorganická chémia a 4.1.11 Chemická fyzika. Vzhľadom na zdĺhavú procedúru súvisiacu s udelením vstupných víz, resp. s udelením prechodného pobytu, nástup piateho úspešného uchádzača sa predpokladá začiatkom roka 2020.
V akademickom roku 2018/2019 úspešne ukončil III. stupeň vysokoškolského vzdelania Ing. Michal Slaný v študijnom odbore 5.2.19 Anorganické technológie a materiály akreditovanom na FChPT STU.
Dňa 2.10. 2019 sa konala na ÚACh SAV Súťaž mladých vedeckých pracovníkov do 35 rokov za účasti 12 doktoranodv a mladých vedeckých pracovníkov z ÚACH SAV Bratislava a Tn AD Trenčín. Na prvých troch miestach sa umiestnili:

- Florian Lemken
- Tímea Baranyaiová
- Ivana Parchovianská

Špeciálna cena, finančná podpora pre účasť na konferenciu, bola udelená aj Debore Pastvovej, ako PhD študentke v prvom ročníku. Táto cena sa udeľovala po prvý krát, na návrh riaditeľa a bola určená pre súťažiacich z radov začínajúcich PhD. študentov. Zohľadňovala sa vedecká úroveň prezentácie a prejav prednášajúceho.

Do pedagogických aktivít je možné zahrnúť aj pobyt PhD. študentky Eleni Gianni z University of Patras, Grécko v rámci 3-mesačnej stáže financovanej zo SAIA. Eva Scholtzová zaúčala študentku s prácou v programe VASP.

4. Medzinárodná vedecká spolupráca

4.1. Medzinárodné vedecké podujatia

4.1.1. Medzinárodné vedecké podujatia, ktoré organizácia SAV organizovala v roku 2019 alebo sa na ich organizácii podieľala, s vyhodnotením vedeckého a spoločenského prínosu podujatia

XIIth Workshop on Modern Methods in Quantum Chemistry, Mariapfarr, Rakúsko, 45 účastníkov, 11.03.-15.03.2019, 21 prednášok, posterová sekcia, 45 účastníkov (Nemecko, Slovensko, Česká republika, Nórsko, USA, Švajčiarsko

Engineering Ceramics 2019 – Ceramics for People, Smolenice, Slovensko, 86 účastníkov, 12.05.-16.05.2019

Príprava a vlastnosti progresívnych keramických materiálov a skiel, Ráztočno, 46 účastníkov, 20.11.-22.11.2019
Odborný seminár vedeckých pracovníkov 6 inštitúcií (UACH SAV Bratislava, UMV SAV Košice, VILA Trenčín, FCHPT STU Bratislava, MUNI Brno, CEITEC Brno) s cieľom prezentácie aktuálnych vedeckých výsledkov a nadviazania spolupráce medzi pracoviskami. Na odbornom seminári odznelo 30 prednášok.

4.1.2. Medzinárodné vedecké podujatia, ktoré usporiada organizácia SAV v roku 2020 (anglický a slovenský názov podujatia, miesto a termín konania, meno, telefónne číslo a e-mail zodpovedného pracovníka)

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
Boča Miroslav	3	0	0
Galusek Dušan	1	1	0
Hanzel Ondrej	0	0	1
Hnatko Miroslav	0	0	1
Madejová Jana	1	0	0
Malkin Vladimír	0	0	1
Tatarko Peter	3	0	0
Spolu	8	1	3

4.2. Členstvo a funkcie v medzinárodných orgánoch

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

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

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)
European Society on Glass Science and Technology (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.
Česká sklárska spoločnosť (funkcia: člen výboru)
Society of Glass Technology (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)

prof. RNDr. Jozef Noga, DrSc.
International Academy of Quantum Molecular Sciences (funkcia: volený člen)
World Association of Theoretical and Computational Chemists (funkcia: člen)

Ing. Helena Pálková, 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: prezident)
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)

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	Science Fund of the Republic of Serbia / Program PROMIS	4
Lenčéš Zoltán	Medzinárodné projekty	1

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

Miroslav Boča
- School of Metallurgy, Northeastern University, Shenyang, Čína, návšteva pracoviska sa uskutočnila na základe pozvania čínskej strany. Predmetom návštevy bola séria prednášok (28 hod.) pre študentov z oblasti spektroskopie, 07. – 30. 10. 2019

Ondrej Hanzel
- Ústav fyziky materiálů, AVČR, Brno, Česká republika (21.10-25.10.2019 a 25.11-27.11.2018). Spoločný projekt, medziakademická spolupráca MAD SAV-AVČR-18-12 „Vývoj nových pokročilých eramických kompozitov pre vesmírne aplikácie“.
- Vinča Institute for Nuclear Science, Belgrade University, Belgrade, Srbsko, spoločný projekt APVV-SK-SRB-18-0022 Ultra-high temperature carbides for extreme environment, 27. - 29.10. 2019

M. Korenko
- School of Metallurgy, Northeastern University (NEU), Čína, spoločný projekt Molten fluorides for metals electrowinning, Medziakademická spolupráca medzi Ústavom anorganickej chémie SAV a NEU, 02. – 13. 09. 2019
- Seaborg Technolgies (ST), Kodaň, Dánsko, pozvanie spoločnosti ST na prediskutovanie možnej spolupráce v oblasti fluoridových tavenín pre kompaktný jadrový reaktor na báze roztavených solí vyvíjaný v ST, 28. -29. 08. 2019

B. Kubíková
- School of Metallurgy, Northeastern University, Shenyang, Čína, návšteva pracoviska sa uskutočnila na základe pozvania čínskej strany. Predmetom návštevy boli prednášky pre vybranú skupinu študentov z oblasti termickej analýzy kondenzovaných sústav a fyzikálnochemických vlastností roztavených solí, 07. – 13. 10. 2019

A. Prnová
- University of Gent, Belgicko, spoločný projekt Agreement on scientific cooperation – preparation of amorphous and polycrystalline materials (bulk and thin films) in the systems Al2O3-La2O3 and Al2O3-La2O3-ZrO2. Medziakademická spolupráca MAD medzi Ústavom anorganickej chémie SAV a Univerzitou v Gente, 10. - 24. 11. 2019

M. Michálková
- CEITEC - BUT, Brno University of Technology, Purkynova 123, Brno, Česká republika, spolupráca SAV VILA a CEITEC, projekt VEGA Transparentné polykryštalické keramické materiály so submikrónovou mikroštruktúrou a luminiscenčnými vlastnosťami, 04. - 09. 08. 2019

Peter Tatarko

- Ústav fyziky materiálů, AVČR, Brno, Česká republika (21.10-25.10.2019 a 25.11-27.11.2018). Spoločný projekt, medziakademická spolupráca MAD SAV-AVČR-18-12 „Vývoj nových pokročilých eramických kompozitov pre vesmírne aplikácie“.
- Ningbo Institute of Materials Technology and Engineering (NIMTE), Chinese Academy of Sciences, Ningbo, Čína, v rámci bilaterálneho projektu APVV-SK-CN-17-0040 Joining of advanced SiC-based ceramic materials, 06.11.-12.11.2019
- Vinča Institute for Nuclear Science, Belgrade Univerisity, Belgrade, Srbsko, spoločný projekt APVV-SK-SRB-18-0022 Ultra-high temperature carbides for extreme environment, 27. - 29. 10. 2019

Dlhodobé pobyty na zahraničných inštitúciách (3 mesiace a viac)

M. Barlog

- International Center for Materials Nanoarchitectonics (WPI-MANA) at the National Institute for Materials Science (NIMS), 14. 07 – 15. 10. 2019, štipendium pre PhD. študentov v rámci NIMS Internship Program.

Peter Boháč

- Karlsruhe Institute of Technology. Nemecko, Sandwich VP project, 01/11/2017 - 06/06/2019. Projekt sa zameral na štúdium bariér pre podzemné úložiská rádioaktívneho odpadu.

Prednášky zahraničných hostí na ÚACH SAV v roku 2019

Dr. Sergey Kuznetsov (Prokhorov General Physics Institute of the Russian Academy of Sciences, Rusko), **06. 08. 2018**

- Inorganic nanofluorides
- Synthesis and spectral-kinetic properties of potential down-conversion materials for solar cells based on Ba4Y3F17, GdF3and YF3, CaF2, SrF2, doped with Pr3+, Ce3+, Eu3+and Yb3+ions
- Estimation of Sc3+Solubility in Dodecahedral and Octahedral Sites in YSAG:Yb. Influence of the precursor powder morphology and forming conditions on the high optical transmittance of YAG:Yb ceramics

Dr. Rer. Nat. Branko Matovic (Institute of Nuclear Sciences Vinča, University of Belgrade, Srbsko, **11. 12. 2019**

- Synthesis of nanometric materials using “Ouzo effect"

Dr. Rer. Nat Dejan Zagorac (Institute of Nuclear Sciences Vinča, University of Belgrade, Srbsko) **11.12.2019**

- Materials under extreme conditions: From theory to the experiment

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 2019

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 stranu P SAV na podnety zo strany 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 31.12.2020; 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
Sídlo spoločného pracoviska (ak je vytvorené):
Začiatok spolupráce: 1990
Zhodnotenie: Na základe dodatku k zmluve o zriadení spoločného pracoviska je FChPT od roku 2008 členom konzorcia a spoluzriaďovateľom spoločného pracoviska, Centra kompetencie skla Vitrum Laugaricio – VILA. Pracovníci ÚACh viedli na FChPT v roku 2019 troch doktorandov.

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" a „Chemická fyzika". Spoločne sa riešia projekty VEGA a APVV. Prof. RNDr. J. Noga, DrSc. a prof. RNDr. J. Bujdák, DrSc. majú 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 PríF UK. Pracovníci ÚACh viedli na PríF UK v roku 2019 siedmych 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) riešil ÚACh SAV v roku 2018 v spolupráci s touto univerzitou 3 spoločné VEGA a dva spoločné APVV projekty. Prof. Ing. P. 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". V roku 2019 podpísal ÚACh SAV s TnU AD rámcovú dohodu o spolupráci pri uskutočňovaní doktorandského študijného program 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.

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. Skúmanie vlastností pripravených materiálov a spoločné publikácieMAJEROVÁ, Melinda – PRNOVÁ, Anna – PLŠKO, Alfonz – HRUŠKA, B. – VALÚCHOVÁ, Jana – KRAXNER, J. – BRUNEEL, E. – GALUSEK, Dušan. Crystallization kinetics of Ni-doped Ca2Al2SiO7 glass microspheres. In CEEC-TAC5 & Medicta2019. 5th Central and Eastern European Conference on Thermal Analysis and Calorimetry (CEEC-TAC5) and 14th Mediterranean Conference on Calorimetry and Thermal Analysis (Medicta2019): book of abstracts. – Germany: Central and Eastern European Committee for Thermal Analysis and Calorimetry, 2019, p. 479. ISBN 978-3-940237-59-0.(CEEC-TAC5 & MEDICTA 2019 : 5th Central and Eastern Eu

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 doktoranda 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: trvá
Finančný prínos pre organizáciu (€): 4700

Názov/účel kontraktového výskumu: Vývoj transparentnej keramiky a iných materiálov
Zadávateľ výskumného kontraktu: CEIT a.s.
Začiatok spolupráce: 2017
Ukončenie spolupráce: trvá
Finančný prínos pre organizáciu (€): 0

Názov/účel kontraktového výskumu: Mapping of the key alumina characteristics for optimal dissolution perfomance
Zadávateľ výskumného kontraktu: ALUMINIUM PECHINEY, Francúzsko a Hydro Aluminium AS, Nórsko
Začiatok spolupráce: 2018
Ukončenie spolupráce: 2019
Finančný prínos pre organizáciu (€): 120000

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
Mgr. Stanislav Kedžuch, PhD.	Slovenská komisia chemickej olympiády	podpredseda
Ing. Michal Korenko, PhD.	Komisia pre námietky pri verejnom obstarávaní	externý člen
RNDr. Jana Madejová, DrSc.	Komisia pre obhajoby doktorských dizertačných pác v odbore anorganická chémia - 01402	predseda
prof. RNDr. Jozef Noga, DrSc.	Akreditačná komisia SR	člen pracovnej skupiny pre oblasť výskumu Chémia, chemická technológia a biotechnológie
prof. RNDr. Pavol Šajgalík, DrSc.	Rada vlády pre vedu, techniku a inovácie	podpredseda
	Výskumná agentúra SR	člen
	Pandemická komisia MZ SR	člen
	Slovenská komisia pre vedecké hodnosti (SKVH)	podpredseda
	Rada predsedov pracovných skupín pre prioritné oblasti aplikovaného výskumu a experimentálneho vývoja	predseda
	Komisia MŠ pre prioritné oblasti aplikovaného výskumu a experimentálneho vývoja v SR - materiálový výskum a nanotechnológie	člen pracovnej skupiny
	Technologická agentúra SR	člen
	Komisia ministra školstva pre udeľovanie Ceny ministra školstva	člen

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	1	internet	0	exkurzie	2
publikácie	0	multimediálne nosiče	0	dokumentárne filmy	0
iné	0				

9.2. Vedecko-organizačná činnosť

Tabuľka 9b Vedecko-organizačná činnosť

Názov podujatia	Domáca/ medzinárodná	Miesto	Dátum konania	Počet účastníkov
6. Seminár Slovenskej ílovej spoločnosti: Ílové minerály a vybrané nerudné suroviny v materiálovom výskume, priemyselných aplikáciách a životnom prostredí.	domáca	Banská Bystrica	27.05.-28.05.2019	18
XIIth Workshop on Modern Methods in Quantum Chemistry	medzinárodná	Mariapfarr, Rakúsko	11.03.-15.03.2019	45
Engineering Ceramics 2019 – Ceramics for People	medzinárodná	Smolenice, Slovensko	12.05.-16.05.2019	86
Príprava a vlastnosti progresívnych keramických materiálov a skiel	medzinárodná	Ráztočno	20.11.-22.11.2019	46

9.3. Účasť na výstavách

Názov výstavy: Víkend so SAV
Miesto konania: Primaciálne námestie v Bratislave
Dátum: 21.6.2019
Zhodnotenie účasti:
Na podujatí sa podieľali: Silvia Belušáková, Martin Barlog, Patrícia Petrisková, Michal Slaný, Michal Hičák a Viliam Pavlík.
Všetci fanúšikovia vedy a výskumu si mohli vyskúšať experimenty, súťaže a vedomostné kvízy z rôznych oblastí prírodných a technických vied a spoločenskovedných oblastí. Pripravené boli aj odmeny a darčeky pre deti a mládež. Návštevníci mohli vidieť skutočný meteorit, magnetický vláčik, robotickú hovoriacu hlavu, atrakcie z oblasti chémie, botaniky, biológie, elektrotechniky a informatiky. Vedci predstavili vzácne archeologické a geologické nálezy. Tejto príjemnej akcie sa zúčastnili aj zamestnanci Ústavu anorganickej chémie, ktorí ponúkli návštevníkom zaujímavosti zo sveta anorganických materiálov ako sú keramika, biokeramika, ílové minerály a podobne. Podujatie vo forme popularizačného vedeckého festivalu ponúkol aj takzvanú Živú knihu. Boli to vystúpenia, prednášky a diskusie odborníkov zo SAV pre verejnosť na pripravenom pódiu.

Názov výstavy: Európska noc výskumníkov 2019
Miesto konania: Stará tržnica, Námestie SNP 484, 811 01 Bratislava–Staré Mesto
Dátum: 27.9.2019
Zhodnotenie účasti:

Za ÚACH SAV sa na podujatí podieľali: Martin Barlog, Patrícia Petrisková, Michal Slaný, Michal Hičák, Peter Škorňa, Peter Boháč, Florian Lemken, Daniel Moreno, Debora Pastvová, Marek Pribus, Hakan Ünsal Európska noc výskumníkov patrí na Slovensku medzi najvýznamnejšie vedecké a popularizačné podujatie. Mladí vedci z ÚACH prezentovali svoju vedecko-výskumnú činnosť širokej verejnosti. Ako fungujú LED diódy a na čo všetko sa používajú keramické materiály v 21. storočí sa mohli účastníci dozvedieť v stánku ÚACH. Účastníci mohli vidieť ukážku rôznych vybraných kovových materiálov, vrátane superzliatin, po vystavení vysokokorozívnemu fluoridovému prostrediu v porovnaní s pôvodnými materiálmi. To, že vrstevnaté silikáty predstavujú materiály s výnimočnými vlastnosťami vedeli už v staroveku. Prečo tomu je tak, a prečo si stále nachádzajú uplatnenie aj v materiáloch 21. storočia sa mohli účastníci dozvedieť vďaka zaujímavým experimentom. Akcia bola zameraná hlavne pre deti v školskom veku, s dôrazom na zvýšenie ich záujmu o štúdium prírodných vied a technických smerov na vysokých školách.

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
Madejová Jana	1	0	0
Pálková Helena	0	0	1
Spolu	1	0	1

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)
New Journal of Glass and Ceramics (funkcia: člen)

doc. Ing. Zoltán Lenčéš, PhD.
Journal of the Ceramic Society of Japan (funkcia: člen)

prof. Ing. Marek Liška, DrSc.
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)

9.6. Činnosť v domácich vedeckých spoločnostiach

Mgr. Silvia Belušáková, PhD.
Slovenská ílová spoločnosť (funkcia: člen)
Slovenská spektroskopická spoločnosť (funkcia: člen)

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

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

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.
Česká sklárska spoločnosť (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.
Slovenská chemická spoločnosť (funkcia: člen)
Slovenská sklárska spoločnosť (funkcia: člen)

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

prof. RNDr. Jozef Noga, DrSc.
Humboldtov klub v SR (funkcia: člen)
Slovenská akademická spoločnosť (funkcia: podpredseda)
Učená spoločnosť SAV (funkcia: predseda)

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

Ing. Viliam Pavlík, PhD.
Slovenská chemická 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)

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

Nájdi v sebe vedca:
Začiatkom apríla sa pod taktovkou občianskeho združenia All4Science konala populárno-náučná akcia ***Nájdi v sebe vedca*** zameraná na školákov piateho až ôsmeho ročníka zo ZŠ Pavla Marcelyho na Drieňovej 16 z Bratislavy. Žiaci ôsmeho ročníka navštívili Chemický ústav SAV, ktorý sa do tohto projektu zapája každoročne, a Ústav anorganickej chémie SAV, ktorý žiakov na svoje pôde privítal prvýkrát. Cieľom akcie bolo poukázať na vedu a vedcov z pohľadu súčasnosti, k čomu poslúžila úvodná prednáška prezentovaná interaktívnou formou. Žiaci dostali otázku, ako vyzerá všedný deň vedca. Odpovede boli naozaj variabilné a prednášatelia sa so žiakmi nakoniec hravou formou prepracovali k objasneniu, čo vedec na ústave naozaj robí. Ich záujem počas vysvetľovania stúpol natoľko, že prednášateľov nakoniec zahrnuli všemožnými otázkami z bežného života, napríklad či je mikrovlnka naozaj škodlivá, či máme radšej používať prírodné šampóny alebo prečo stromy rastú.
S jasnou predstavou sa po chvíli ôsmaci odobrali do laboratórií Ústavu anorganickej chémie, kde sa dozvedeli zopár zaujímavých faktov o horení kovov spolu s názornými ukážkami. Ženská časť publika rozmýšľala praktickejšie a ich nechty sa o chvíľu leskli práškovým hliníkom. Potom, ako sa ich oči rozblčali príliš hravými ohníkmi a predstavami o výbuchoch, sa všetci prišli schladiť k experimentom s tekutým dusíkom. Žiaci si mohli beztrestne rozbiť kus vyradeného zamrznutého chemického plášťa alebo starej chemickej hadice. Poučili ich tiež o osmotickom zákone a o zákone energie chemickej väzby. Najzaujímavejší bol pre nich tzv. Leidenfrostov efekt, ktorý si tí, ktorí sa nebáli, mohli vyskúšať na vlastnej koži. Všetko sa, samozrejme, odohrávalo pod dohľadom zodpovedného pracovníka. A keď už dusíka mali dosť, pozreli sa na záver na farebné spektrum vydávaného pripravenými roztokmi. Fascinujúca paleta farieb bola dosiahnutá absorpciou a premenou ultrafialového svetla na viditeľné žiarenie cez rôzne koncentrácie rodamínových farbív v anorganických emulziách montmorillonitu, ktoré prirovnávali k farbám dúhy. Na záver akcie odchádzali žiaci nadšení z experimentov aj rôznych zaujímavých informácií.

Letná škola mladých vedcov
Sedemnásť detí si v dňoch 22. až 26. júla 2019 mohlo vyskúšať aké je to byť vedcom na **letnom vedeckom tábore**, ktorý pripravili Ústav materiálov a mechaniky strojov a Ústav polymérov SAV v Bratislave. Každý deň bol plný dobrodružstva. Okrem rôznych hier a zábavy, pracovali malí vedci tímovo aj na vlastných projektoch a spoznávali Ústavy SAV. Rozdelení do skupín, si vybrali jeden zo živlov, ktorému sa potom venovali celý týždeň. Na výber mali slnko, vodu a vzduch. V nasledujúce dni skupina SLNKO pracovala na slnečných hodinách, na lome svetla v rôznych prostrediach a na zákonitostiach optiky. V skupine VODA sa pracovalo na blahodarných kozmetických prípravkoch do kúpeľa, na neviditeľnom atramente a na výrobe ekologickej lávovej lampy. Skupina VZDUCH sa pozrela na zúbok reakciám vzduchu v závislosti na teplote a tiež si malí vedci zasimulovali prácu pľúc.
Na nudu nebola príležitosť, pretože ďalší vedecký program bol bohatý a akčný aj vďaka Dr. Viliamovi Pavlíkovi z Ústavu anorganickej chémie. Na Ústave anorganickej chémie pod vedením Ing. Viliama Pavlíka, PhD., pracovali štyria mladí vedci s rôznymi materiálmi v extrémnych podmienkach. Najskôr nazreli do rôznych laboratórií a spoznali, aké prístroje a pomôcky sa v nich využívajú. Diskusiou na vedecko-popularizačnej úrovni sa dozvedeli o energiách vo vesmíre, svete atómov, hmote aj antihmote. Ďalší deň prišiel čas na experimenty. Zistili, ako vplýva nízka teplota na rôzne materiály, a to pomocou tekutého dusíka, do ktorého ich ponárali. Toto ich inšpirovalo k tomu, aby aj oni sami navrhli nejaké pokusy, ktoré by mohli spolu zrealizovať. Adam si vybral výrobu lávy, Matej si chcel vyrobiť vlastnú zliatinu a všetci sa zhodli, že chcú vyrobiť aj strelný prach. Po toľkých experimentoch sa ani nečudujeme, že na našu otázku, či by chceli niečo zmeniť na priebehu letnej školy, zaznela odpoveď: *„Aby bola dlhšia!“*

Deň otvorených dverí na ÚAC HSAV
Dňa 07.11.2017 už tradične zorganizoval Ústav anorganickej chémie SAV v rámci Týždňa vedy a techniky na Slovensku „Deň otvorených dverí ÚACH SAV“, na ktorý boli pozvaní študenti stredných ako aj vysokých

škôl zo Slovenska. Pre mladých návštevníkov boli pripravené zaujímavé prednášky „Svet moderných keramických materiálov“ ako aj „Veda a výskum na ÚACH“. Prehliadka ústavu pre študentov potom pokračovala na stanovištiach (Stlačené peklo…, Ľadová romantika..., Tajomstvá chémie..., Elektrónová streľba na živé organizmy..., Íl, ktorý nie je iba hlina..., Čiarové kódy prírody..., Inteligentné vibrácie...) vo vybraných laboratóriách, pričom mladí vedeckí pracovníci ukazovali prístroje ktoré používajú pri analýze materiálov, žiarové lisy, vymrazovací granulátor a podobne. Záujemcov informovali o praktickom využití zariadení, prípadne im názorne aj ich využitie prezentovali. Na niektorých stanovištiach im zároveň predviedli efektné a zaujímavé chemické experimenty. Návštevníkov zaujala prezentácia pripravená na skenovacom elektrónovom mikroskope, chemické experimenty a rôzne pokusy s tekutým dusíkom. Dňa otvorených dverí sa zúčastnilo približne 190 študentov z bratislavských aj mimobratislavských stredných škôl (Trnava, Liptovský Mikuláš).

10. Činnosť knižnično-informačného pracoviska

10.1. Knižničný fond

Tabuľka 10a Knižničný fond

Knižničné jednotky spolu		7616
z toho	knihy a zviazané periodiká	7616
	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		22
v tom	kúpou	22
	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)		15
v tom z r. 1	prezenčné výpožičky	15
	absenčné výpožičky	0
v tom z r. 1	odborná literatúra pre dospelých	15
	výpožičky periodík	0
MVS iným knižniciam		
MVS z iných knižníc		
MMVS iným knižniciam		
MMVS z iných knižníc		
Počet vypracovaných bibliografií		
Počet vypracovaných rešerší		58

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)
Náklady na nákup knižničného fondu v €

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. Jozef Noga, 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 (predseda)

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. 2019 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	**2 221 744**	**1 523 021**	**553 867**	**144 856**	**69**
z toho: mzdy (610)	1 080 448	897 961	132 729	49 758	83
vedecká výchova štipendiá (640)	51 189	51 189	0	0	100
poistné a príspevok do poisťovní (620)	380 308	312 309	45 140	22 859	82
tovary a služby (630)	578 530	261 562	244 729	72 239	45
transfery partnerom projektov (640)	131 269	0	131 269	0	0
2. Kapitálové výdavky	**186 895**	0	0	**186 895**	0
z toho: obstarávanie kapitálových aktív	186 895	0	0	186 895	0
kapitálové transfery	0	0	0	0	0

12.2. Zdroje financovania organizácie

Tabuľka 12b Zdroje financovania organizácie (skutočnosť k 31. 12. 2019 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)	**450 459**	0	0	2 825	0
z toho: VEGA	102 712			895	
MVTS výskumné projekty	34 996			1 930	
MVTS podpora					
SASPRO/MOREPRO					
Vydávanie časopisov					
Vedecká výchova (štipendiá)	51 189				
OTAS (630)	261 562				
2. ŠF EÚ vr. fin. zo ŠR	**9 867**		**7 312**	**2 555**	
3. medzinárodné grantové projekty	**60 717**	0	**30 601**	**10 695**	0
z toho H2020	60 717		30 601	10 695	
4. iné štátne a verejné zdroje (spolu)	**544 000**		**125 417**	**42 585**	**131 269**

z toho: APVV	544 000	125 417	42 585	131 269
podpora z kapitoly MŠVVaŠ SR (stimuly)				
5. ostatné zdroje	**21 800**			
z toho: príjmy z prenájmu				
príjmy z podnikateľskej činnosti				
príjmy z expertnej činnosti a služieb	21 800			

13. Nadácie a fondy pri organizácii SAV

14. Iné významné činnosti organizácie SAV

V roku 2019 na ústave prebehli rozsiahle rekonštrukčné práce, pričom boli kompletne zrekonštruované štyri laboratória spolu s ôsmimi kanceláriami. Okrem toho v réžii Ú SAV prebiehala rekonštrukcia rozvodov studenej a teplej vody. Obidve akcie boli náročné ako na čas, tak aj na súvisiace aspekty, napr. administratívne (verejné obstarávanie), v prípade rekonštrukcie rozvodov vody trojnásobné rokovanie s Ú SAV a P SAV. V každom prípade treba oceniť ústretovosť orgánov SAV pri riešení súvisiacich problémov. V blízkej dobe sa plánuje rekonštrukcia odpadov na budove, ktorá už začala v bloku A. 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 čaká na vyhodnotenie verejného obstarania zhotoviteľa.

15. Vyznamenania, ocenenia a ceny udelené pracovníkom organizácie v roku 2019

15.1. Domáce ocenenia

15.1.1. Ocenenia SAV

Hanzel Ondrej
Súťaž mladých vedeckých pracovníkov SAV do 35 rokov
Oceňovateľ: Predsedníctvo SAV
Opis: 2. miesto v rámci II. Oddelenia vied SAV

Malkin Oľga
Ocenenia SAV za špičkové publikácie, kategóriia Nature Index publikácie
Oceňovateľ: Predsedníctvo SAV

Opis: za pracu M. Dračínský, M. Buchta, M. Buděšínský, J. Vacek-Chocholoušová, O. L. Malkina, I. Stará andI. Starý, "Dihydrogen contacts observed by through-space indirect NMR coupling", Chem. Sci. 9 (2018), DOI: 10.1039/C8SC02859A Chem. Sci., 2018,9, 7437-7446

15.1.2. Iné domáce ocenenia

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 2019 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. P SAV bolo v riešení problému ústretové a zorganizovalo príslušné školenia ako aj kontakt s firmami, ktoré môžu jednotlivým organizáciám pomôcť pri riešení obrovského počtu problémov. Iným ústretovým krokom zo strany predsedníctva bolo napr. poskytnutie vzorovej pracovnej zmluvy alebo vzorovej smernice o používaní IT technológií. Privítame pokračovanie v tomto trende aj s ďalšími dokumentami, ktoré sú v zásade rovnaké pre všetky inštitúcie SAV a vyžadujú sa od každej z nich. Bude určite lacnejšie, ak takéto dokumenty budú vypracované iba raz pre všetky organizácie oproti situácii, keď si takéto dokumenty/smernice dajú vypracovať organizácie jednotlivo.

Správu o činnosti organizácie SAV spracoval(i):

Ing. Helena Pálková, PhD., 02/59410485

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

Prílohy

Príloha A - Zoznam zamestnancov a doktorandov organizácie k 31.12.2019

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.	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.	doc. Ing. Miroslav Hnatko, PhD.	100	1.00
3.	doc. Ing. Mária Chromčíková, PhD.	100	1.00
4.	Mgr. Ľuboš Jankovič, PhD.	100	1.00
5.	Mgr. Stanislav Kedžuch, PhD.	100	0.91
6.	Mgr. Stanislav Komorovský, PhD.	100	0.50
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. Helena Pálková, PhD.	100	1.00
11.	Ing. Viliam Pavlík, PhD.	100	1.00
12.	Ing. Anna Prnová, PhD.	100	1.00
13.	Ing. Jaroslav Sedláček, PhD.	100	1.00
14.	Ing. Eva Scholtzová, CSc.	100	1.00
15.	Ing. František Šimko, PhD.	100	1.00
16.	Mgr. Peter Švančárek, PhD.	100	1.00
17.	Ing. Peter Tatarko, PhD.	100	1.00
18.	Mgr. Monika Tatarková, PhD.	100	1.00
19.	Ing. Štefan Varga, CSc.	100	1.00
Vedeckí pracovníci			
1.	James Richard Asher, PhD	100	1.00
2.	Mgr. Tímea Baranyaiová, PhD.	100	0.33
3.	Mgr. Peter Boháč, PhD.	100	0.50
4.	Mgr. Roman Bystrický, PhD.	20	0.86
5.	Ing. Ondrej Hanzel, PhD.	100	1.00
6.	Mgr. Valéria Kureková, PhD.	100	0.10
7.	Ing. Monika Michálková, PhD.	60	0.60
8.	Ing. Jarmila Mlynáriková, PhD.	100	1.00
9.	Ing. Zuzana Netriová, PhD.	100	1.00
10.	Mgr. Marek Pribus, PhD.	100	0.33
11.	Ing. Michal Slaný, PhD.	100	0.33
12.	Ing. Peter Škorňa, PhD.	100	1.00

13.	Ing. Jana Valúchová, PhD.	100	1.00
14.	Ing. Zuzana Vasková, PhD.	100	0.00
Odborní pracovníci s VŠ vzdelaním (výskumní a vývojoví zamestnanci)			
1.	Ing. Martin Barlog	28	0.18
2.	doc. RNDr. Edmund Dobročka, CSc.	20	0.03
3.	Ing. Eva Hadzimová	100	0.00
4.	Ing. Michal Hičák	55	0.04
5.	Ing. Iveta Macková	100	1.00
6.	Ing. Eva Mikšíková	125	1.25
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.	Rastislav Haška	100	1.00
2.	Ing. Ingrid Hierwegová	5	0.05
3.	Ing. Elena Krippelová	100	0.16
4.	Mgr. Martina Pakanová	100	0.58
5.	Ing. Ján Piško	100	1.00
6.	Ing. Jaroslav Rusnák, PhD.	33	0.33
7.	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.	Jaromíra Dankovičová	125	1.25
5.	Jarmila Heinleinová	100	1.00
6.	Miriam Hnatková	100	1.00
7.	Anna Jurová	100	1.00
8.	Zdena Kapišinská	35	0.35
9.	Magdaléna Kňazovičová	53	0.53
10.	Anna Kovárová	100	1.00
11.	Alexandra Dominika Rigáňová	100	0.33
12.	Mária Strempeková	100	1.00
13.	Alexandra Tonkovičová	100	1.00
Ostatní pracovníci			
1.	Margita Hudáková	100	1.00
2.	Anna Jurová	20	0.20
3.	Ing. Iveta Macková	20	0.08
4.	Terézia Pírová	100	1.00

Zoznam zamestnancov, ktorí odišli v priebehu roka

	Meno s titulmi	Dátum odchodu	Ročný prepočítaný úväzok
Vedúci vedeckí pracovníci DrSc.			
1.	prof. RNDr. Jozef Noga, DrSc.	31.3.2019	0.13
Samostatní vedeckí pracovníci			
1.	Mgr. Adriana Czímerová, PhD.	31.5.2019	0.41
Vedeckí pracovníci			
1.	Mgr. Silvia Belušáková, PhD.	14.7.2019	0.58
2.	Dr. Mohamed Radwan	31.3.2019	0.24

Odborní pracovníci s VŠ vzdelaním (výskumní a vývojoví zamestnanci)			
1.	Hesham Abdelrehim, Dr.	31.8.2019	0.67
2.	Ing. Michal Slaný	31.8.2019	0.67
Odborní pracovníci s VŠ vzdelaním (ostatní zamestnanci)			
1.	Mgr. Miroslav Adámek	30.4.2019	0.16
2.	Ing. Ján Piško	31.12.2019	1.00
Odborní pracovníci ÚSV			
1.	Jaromíra Dankovičová	31.12.2019	1.25
2.	Magdaléna Kňazovičová	31.12.2019	0.53

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.	Ing. Michal Hičák	Prírodovedecká fakulta UK	4.1.15 anorganická chémia
4.	Florian Andreas Lemken	Univerzita Komenského v Bratislave	4.1.11 chemická fyzika
5.	Daniel Moreno Rodriguez	Slovenská technická univerzita v Bratislave	5.2.19 anorganická technológia a materiály
6.	Mgr. Debora Pastvová	Univerzita Komenského v Bratislave	4.1.11 chemická fyzika
7.	Mgr. Patrícia Petrisková	Univerzita Komenského v Bratislave	4.1.15 anorganická chémia
8.	Eva Skoura	Univerzita Komenského v Bratislave	4.1.15 anorganická chémia
9.	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.	Mgr. Marek Pribus, PhD.	30.8.2019	1.9.2019	100
2.	Mgr. Tímea Baranyaiová, PhD.	26.8.2019	1.9.2019	100
3.	Ing. Michal Slaný, PhD.	26.8.2019	1.9.2019	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:
V súlade s plánom projektu bol druhý rok riešenia venovaný príprave nových vysokoteplotných keramických materiálov na báze ZrB_2-25vol.% SiC s rôznym obsahom (2, 5, a 10 hm.%) oxidov prvkov vzácnych zemín (Eu_2O_3, Yb_2O_3 a Lu_2O_3). Hutné materiály boli získané spekaním práškových zmesí za asistencie elektrického prúdu pomocou zariadenia "Direct Hot Press", pri podmienkach 2000°C a tlaku 70MPa. Následne boli študované mechanické vlastnosti materiálov pri izbovej teplote na partnerskej organizácií, ÚFM AVČR v Brne. Prísady oxidov prvkov vzácnych zemín boli pridávané do systému ZrB_2-SiC za účelom zlepšenia vysokoteplotných vlastností týchto materiálov, t.j. odolnosti proti oxidácií a ablácií. Za najdôležitejší výsledok možno považovať to, že mechanické vlastnosti materiálov ZrB_2-SiC, akými sú tvrdosť, pevnosť a modul pružnosti boli na rovnakej úrovni aj po pridaní 10 hm.% prísad vzácnych zemín, ktorých mechanické vlastnosti sú výrazne odlišné od vlastnosti matrice. Lomová húževnatosť materiálov dokonca vzrástla po pridaní prísad oxidov prvkov vzácnych zemín. Vysokoteplotné vlastnosti týchto materiálov budú študované v nasledujúcom roku riešenia projektu.
Medziakademická spolupráca s ÚFM AVČR v Brne bola zároveň orientovaná na štúdium mechanických vlastností (tvrdosť, pevnosť a modul pružnosti) keramických spojov na báze SiC a tiež na prípravu nových keramických pórovitých materiálov na báze $Al_2O_3/SiO_2/CaO$.

Výstupy:
1. FÜRDÖSOVÁ, Zuzana - ÜNSAL, Hakan - KOVALČÍKOVÁ, Alexandra - DLOUHÝ, Ivo - TATARKO, Peter. ZrB2-SiC ceramics with rare-earth oxide additives. In Workshop Processing and properties of advanced ceramics and glasses, November 20-22, 2019, Ráztočno, Slovak Republic: book of extended abstracts. Ed. Jana Valúchová; 2019, p. 57-61. ISBN 978-80-971648-8-1. Typ: AFD
2. FÜRDÖSOVÁ, Zuzana - KOVALČÍKOVÁ, Alexandra - HANZEL, Ondrej - DLOUHÝ, Ivo - TATARKO, Peter. Influence of powder processing route and rare earth additives on the mechanical properties of ZrB2-SiC ceramics. In XVI ECerS Conference, Torino, Italy, 16-20 June 2019: abstract book. - Italy, 2019, p. 813. Typ: AFG
3. FÜRDÖSOVÁ, Zuzana - KOVALČÍKOVÁ, Alexandra - HANZEL, Ondrej - DLOUHÝ, Ivo - TATARKO, Peter. Preparation and characterization of ZrB2-based ceramics with rare earth oxide additives. In Engineering Ceramics 2019, Advanced Research Workshop: Ceramics for people, Smolenice castle, May 12-16, 2019: book of abstracts, p. 71. ISBN 978-80-971648-7-4. Typ: AFH
4. TATARKO, Peter - ZHOU, Xiaobing - KOVALČÍKOVÁ, Alexandra - DLOUHÝ, Ivo. Joining of SiC ceramics with Ti-based alloys by SPS. In Workshop Processing and properties of advanced ceramics and glasses, November 20-22, 2019, Ráztočno, Slovak Republic: book of extended abstracts. Ed. Jana Valúchová, p. 68-72. ISBN 978-80-971648-8-1. Typ: AFD
5. TATARKO, Peter - SAUNDERS, Theo G. - GRASSO, Salvatore - CHLUP, Zdeněk - DLOUHÝ, Ivo - REECE, Michael J. Interaction between SiC and Ti6Al4V in the SPS - From wetting studies to joining. In XVI ECerS Conference, Torino, Italy, 16-20 June 2019: abstract book. - Italy, 2019, p. 177. Typ: AFG
6. TATARKO, Peter - ZHOU, Xiaobing - GRASSO, Salvatore - DLOUHÝ, Ivo - REECE, Michael J. - FERRARIS, Monica. Electric current assisted solid-state diffusion joining of advanced SiC-based ceramics. In CICC-11: The Eleventh International Conference on High-Performance Ceramics, May 25-29, 2019, Kunming, China: abstract book. - China: The Chinese Ceramic Society, 2019, p. 86. Typ: AFG
7. BERTOLLA, Luca - ŠEVEČEK, Oldřich - DLOUHÝ, Ivo - TATARKO, Peter. Composite Al2O3/SiO2/CaO foams reinforced with cellulose acetate fibres from cigarette tows. In XVI ECerS Conference, Torino, Italy, 16-20 June 2019 :

abstract book. - Italy, 2019, p. 27. Typ: AFG
8. BERTOLLA, Luca - CHLUP, Zdeněk - TATARKO, Peter - HANZEL, Ondrej - ŠEVEČEK, Oldřich - ROUPCOVÁ, Pavla - DLOUHÝ, Ivo. Composite Al2O3/SiO2/CaO foams reinforced with cellulose acetate fibers from cigarette tows. In CICC-11: The Eleventh International Conference on High-Performance Ceramics, May 25-29, 2019, Kunming, China: abstract book. - China: The Chinese Ceramic Society, 2019, p. 345. Typ: AFG

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:
Príprava pórovitých mikro guličiek na báze systému 45S5 bioskla plameňovou syntézou a optimalizácia jej parametrov.
2. Tvorba C-S-H gélu a natritu na povrchu konvenčne pripraveného bioskla, ktoré sa následne pri plameňovej syntéze rozkladajú a tým pôsobia ako pórotvorné činidlo.
3. Verifikácia synergického efektu terapeutických iónov bóru a kobaltu pri angiogenéze v bioskle 45S5.
Publikácie:
1. Kraxner, J., M. Michalek, A. R. Romero, H. Elsayed, E. Bernardo, A. R. Boccaccini and D. Galusek (2019). "Porous bioactive glass microspheres prepared by flame synthesis process." Materials Letters 256: 126625.

3.) Vývoj a charakterizácia nových povlakov na báze sklo/keramika pre vysokoteplotné aplikácie *(Development and characterization of a novel glass/ceramic coating systems for high temperatue applications)*

Zodpovedný riešiteľ:	Dušan Galusek
Trvanie projektu:	1.1.2018 / 31.12.2019
Evidenčné číslo projektu:	
Organizácia je koordinátorom projektu:	nie
Koordinátor:	Universität Bayreuth
Počet spoluriešiteľských inštitúcií:	0
Čerpané financie:	-

Dosiahnuté výsledky:
1.Vývoj optimálnej metodiky čistenia oceľových substrátov na zabezpečenie adhézie povlakov k oceľovému substrátu.
2. Vývoj kompozitnej vrstvy na báze PDC so sklenými a keramickýcmi pasívnymi plnivami s vysokou adhéziou k oceľovému substrátu a vysokou odolnosťou voči oxidácii pri teplotách do 1000 ?C.
Publikácie:
I. Petríková, M. Parchovianský, P. Švančárek, M. Lenz leite, G. Motz, D. Galusek, Passive filler loaded polysilazane-derived glass/ceramic coating system applied to AISI 441 stainless steel, part 1: Processing and characterization. Int. J. Appl. Ceram. Technol., 1-12, (2019), DOI: 10.1111/ijac.13417

4.) Spájanie moderných keramických materiálov na báze SiC *(Joining of advanced SiC-based ceramic materials)*

Zodpovedný riešiteľ:	Peter Tatarko
Trvanie projektu:	1.1.2018 / 31.12.2019
Evidenčné číslo projektu:	SK-CN-2017-0040
Organizácia je	áno

koordinátorom projektu:	
Koordinátor:	Ústav anorganickej chémie SAV
Počet spoluriešiteľských inštitúcií:	0
Čerpané financie:	-
	Podpora medzinárodnej spolupráce z národných zdrojov: 4000 €

Dosiahnuté výsledky:

V tomto roku sa riešenie projektu zameralo na štúdium mechanických vlastností pri vysokých teplotách, a to vysokoteplotnej pevnosti spojov a ich odolnosti proti teplotným šokom. Počas riešenia projektu bolo pripravených niekoľko sérií SiC spojov, pričom SiC materiály boli spájané pomocou multifázových medzivrstiev na báze TiC/Ti_3SiC_2, ktoré vznikali "in-situ" reakciami počas spájania, alebo pomocou monolitnej medzivrstvy Ti_3SiC_2. Na základe výsledkov pevnosti spojov pri izbovej teplote boli zvolené spoje s najvyššou pevnosťou, pre ktoré sa skúmala pevnosť za vysokých teplôt a odolnosť proti teplotným šokom do 1000°C. Pevnosť multifázových spojov sa lineárne znižovala s rastúcou teplotou. Na druhej strane odolnosť spojov proti teplotným šokom bola veľmi dobrá, s kritickou hodnotou ΔT na úrovni ~ 940°C. Výsledky preukázali, že prítomnosť prechodovej vrstvy TiC medzi základným materiálom (SiC) a medzivrstvou Ti_3SiC_2 výrazne zníži zvyškové napätia v oblasti spoja, čo priaznivo vplýva na mechanické vlastnosti materiálov. Spoje vytvorené pomocou monolitnej medzivrstvy Ti_3SiC_2 sa vyznačovali najlepšou pevnosťou za vysokých teplôt, nakoľko pri teplote 1200°C si stále držali 68% ich pôvodnej pevnosti.

Výstupy:

1. TATARKO, Peter - ZHOU, Xiaobing - KOVALČÍKOVÁ, Alexandra - DLOUHÝ, Ivo. Joining of SiC ceramics with Ti-based alloys by SPS. In Workshop Processing and properties of advanced ceramics and glasses, November 20-22, 2019, Ráztočno, Slovak Republic: book of extended abstracts. Ed. Jana Valúchová, p. 68-72. ISBN 978-80-971648-8-1.
2. TATARKO, Peter - SAUNDERS, Theo G. - GRASSO, Salvatore - CHLUP, Zdeněk - DLOUHÝ, Ivo - REECE, Michael J. Interaction between SiC and Ti6Al4V in the SPS - From wetting studies to joining. In XVI ECerS Conference, Torino, Italy, 16-20 June 2019: abstract book. - Italy, 2019, p. 177. Typ: AFG
3. TATARKO, Peter - ZHOU, Xiaobing - GRASSO, Salvatore - DLOUHÝ, Ivo - REECE, Michael J. - FERRARIS, Monica. Electric current assisted solid-state diffusion joining of advanced SiC-based ceramics. In CICC-11: The Eleventh International Conference on High-Performance Ceramics, May 25-29, 2019, Kunming, China: abstract book. - China: The Chinese Ceramic Society, 2019, p. 86. Typ: AFG
4. ZHOU, Xiaobing - TATARKO, Peter - KOVALČÍKOVÁ, Alexandra - DLOUHÝ, Ivo - HUANG, Z. - HUANG, Q. SiC ceramics joined with an in-situ reaction gradient layer of TiC/Ti3SiC2 using electric field-assisted sintering technique. In Engineering Ceramics 2019, Advanced Research Workshop: Ceramics for people, Smolenice castle, May 12-16, 2019: book of abstracts. Eds. Zoltán Lenčéš, Jana Valúchová. - Bratislava, Slovakia: Institute of Inorganic Chemistry, Slovak Academy of Sciences, 2019, p. 52. ISBN 978-80-971648-7-4. Typ: AFF

5.) 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:	-
	Podpora medzinárodnej spolupráce z národných zdrojov: 2153 €

Dosiahnuté výsledky:

V súlade s plánom projektu bol prvý rok riešenia zameraný na prípravu keramických materiálov na báze B_4C-TiB_2 a B_4C-SiC, pre využitie pri aplikáciách pracujúcich v extrémnych podmienkach. Prášky boli syntetizované na partnerskej organizácií v Belehrade v Srbsku, pričom ich zhutnenie prebehlo na ÚACH SAV. V prvom prípade boli finálne materiály pripravené reakčným spekaním práškovej zmesi B_4C-TiO_2 pomocou spekania za asistencie elektrického prúdu. Za najdôležitejší výsledok možno považovať to, že materiály boli pripravené pri nižších teplotách a časoch ako sú bežne uvádzané v literatúre. Počas prípravy materiálov B_4C-SiC bolo preukázané, že hutné materiály možno dosiahnuť optimalizovaným procesom spekania za asistencie elektrického prúdu bez nutnosti použitia ďalších spekacích prísad. V oboch prípadoch tieto nové postupy prípravy predstavujú výrazné zníženie nákladov na výrobu týchto materiálov pre

extrémne podmienky. V nasledujúcom období bude štúdium zamerané na charakterizáciu a vlastnosti týchto karbidických materiálov.

Výstupy:
1. ÜNSAL, Hakan - SHEPA, Ivan - MATOVIC, Branko - HANZEL, Ondrej - MÚDRA, Erika - TATARKO, Peter. Densification of B4C-TiB2 composites by field assisted sintering. In Workshop Processing and properties of advanced ceramics and glasses, November 20-22, 2019, Ráztočno, Slovak Republic: book of extended abstracts. Ed. Jana Valúchová, 2019, p. 52-56. ISBN 978-80-971648-8-1. Typ: AFD
2. ÜNSAL, Hakan - SHEPA, Ivan - HANZEL, Ondrej - MÚDRA, Erika - VOJTKO, Marek - DUSZA, Ján - TATARKO, Peter. In situ synthesis and characterization of B4C-TiB2 fibers composites. In XVI ECerS Conference, Torino, Italy, 16-20 June 2019: abstract book. Italy, 2019, p. 701. Typ: AFG
3. ÜNSAL, Hakan - SHEPA, Ivan - HANZEL, Ondrej - MÚDRA, Erika - VOJTKO, Marek - DUSZA, Ján - TATARKO, Peter. The effect of temperature and pressure on the densification behaviour of B4C-TiB2(f) composites. In Engineering Ceramics 2019, Advanced Research Workshop: Ceramics for people, Smolenice castle, May 12-16, 2019: book of abstracts, 2019, p. 85. ISBN 978-80-971648-7-4. Typ: AFH
4. 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: book of abstracts, 2019, p. 102. Typ: AFG

6.) 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: 24000 €

Dosiahnuté výsledky:
V súlade s plánom projektu, bolo riešenie v tomto roku zamerané na optimalizáciu procesu prípravy súvislých vrstiev na báze ZrB_2-SiC-RE_2O_3 na vyleštený povrch CVD-SiC materiálov. Nakoľko riešenie tohto projektu priamo nadväzuje na riešenie projektu H2020 CeramCom (viď nižšie), cieľom bolo nájsť najvhodnejší spôsob nanášania povlakov metódou „aerosol deposition“ na povrch monolitnej keramiky SiC. Tieto poznatky sú následne prenesené a využité pri príprave daných povlakov na povrch keramických kompozitných materiálov (C_f/SiC). Úspešne sa podarilo pripraviť súvislú vrstvu ZrB_2-SiC s minimálnou pórovitosťou, avšak tvrdosť povlaku a adhézia k povrchu nebola dostatočná. Tieto vlastnosti neboli vylepšené ani následným tepelným spracovaním, resp. žíhaním. Preto sa pristúpilo k optimalizácií procesu v zmysle nanesenia vrstvy $ZrSi_2$-B_4C-C na CVD-SiC, pričom takto pripravený materiál bol žíhaný pri teplote 1670°C s cieľom in-situ tvorby požadovaného chemického zloženia ZrB_2-SiC. V ďalšom kroku riešenia projektu dôjde k optimalizácií procesu prípravy povlaku ZrB_2-SiC s prídavkom vzácnej zeminy (RE_2O_3).
Súbežne bolo štúdium zamerané aj na prípravu hutných diboridových keramík s prísadami RE_2O_3 za účelom nájdenia najvhodnejšieho chemického zloženia v zmysle dosiahnutia najlepšej odolnosti proti oxidácií a ablácií. Pri vývoji týchto materiálov sa tiež preskúmala možnosť ich texturovania, resp. usporiadania zŕn v jednom smere, za účelom zlepšenia mechanických vlastností v požadovanom smere.

Výstupy:
1. 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, 2019, in press, https://doi.org/10.1016/j.jeurceramsoc.2019.11.006. Typ: ADCA
2. FÜRDÖSOVÁ, Zuzana - ÜNSAL, Hakan - KOVALČÍKOVÁ, Alexandra - DLOUHÝ, Ivo - TATARKO, Peter. ZrB2-SiC ceramics with rare-earth oxide additives. In Workshop Processing and properties of advanced ceramics and glasses, November 20-22, 2019, Ráztočno, Slovak Republic: book of extended abstracts. Ed. Jana Valúchová; 2019, p. 57-61. ISBN 978-80-971648-8-1. Typ: AFD
3. TATARKO, Peter - GRASSO, Salvatore - KOVALČÍKOVÁ, Alexandra - DLOUHÝ, Ivo - REECE, Michael J. Preparation of highly textured TiB2-based ceramics using a strong magnetic field. In Engineering Ceramics 2019,

Advanced Research Workshop: Ceramics for people, Smolenice castle, May 12-16, 2019 : book of abstracts, 2019, p. 51. ISBN 978-80-971648-7-4. Typ: AFH
4. FÜRDÖSOVÁ, Zuzana - KOVALČÍKOVÁ, Alexandra - HANZEL, Ondrej - DLOUHÝ, Ivo - TATARKO, Peter. Influence of powder processing route and rare earth additives on the mechanical properties of ZrB2-SiC ceramics. In XVI ECerS Conference, Torino, Italy, 16-20 June 2019: abstract book. - Italy, 2019, p. 813. Typ: AFG
5. FÜRDÖSOVÁ, Zuzana - KOVALČÍKOVÁ, Alexandra - HANZEL, Ondrej - DLOUHÝ, Ivo - TATARKO, Peter. Preparation and characterization of ZrB2-based ceramics with rare earth oxide additives. In Engineering Ceramics 2019, Advanced Research Workshop: Ceramics for people, Smolenice castle, May 12-16, 2019: book of abstracts, p. 71. ISBN 978-80-971648-7-4. Typ: AFH

Programy: ERANET

7.) Multifunkčné hrubé povlaky keramik-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:	1 - Nemecko: 1, Maďarsko:1, Slovensko: 3
Čerpané financie:	EU: 11502 €

Dosiahnuté výsledky:
V rámci riešenia projektu boli pripravené kompozitné prášky na báze SiC so spekacími prísadami Y_2O_3 a Sc_2O_3 a s rôznym prídavkom (1, 5 a 10 hm.%) grafénových nanoplatničiek (GNP) alebo oxidu grafénu (GO) pomocou metódy vymrazovacej granulácie. Následne boli takto pripravené kompozitné prášky spekané metódou rapid hot-pressing (RHP) pri teplote 2000°C použitím tlaku 50 MPa v atmosfére N_2 po dobu 30 minút. Časť vzoriek bola žíhaná pri teplote 1800°C v pretlaku dusíka (3 MPa) po dobu 6 h. Relatívna hustota pripravených vzoriek bola vyššia ako 97 %. Na takto pripravených hutných materiáloch bola vykonaná mikroštruktúrna analýza a boli merané funkčné vlastnosti (konkrétne elektrická vodivosť a tepelná difuzivita) v rovnobežnom a kolmom smere vzhľadom na grafénové vrstvy. Taktiež bol skúmaný vplyv prídavku grafénu a efekt žíhania na funkčné vlastnosti materiálov (elektrická a tepelná vodivosť). Elektrická vodivosť kompozitných materiálov sa zvyšovala s rastúcim obsahom grafénu a bola vyššia v smere rovnobežnom s grafénovými platničkami. Taktiež bol pozorovaný pozitívny efekt žíhania. Najvyššia elektrická vodivosť (11800 S/m) bola dosiahnutá pri vzorke s 10 % grafénu po žíhaní v dusíku. V porovnaní s elektrickou vodivosťou referenčnej vzorky (1700 S/m) bez prídavku grafénu sme dosiahli 7 násobný nárast elektrickej vodivosti. Žíhanie pripravených vzoriek v dusíkovej atmosfére malo výrazne pozitívny vplyv na tepelné vlastnosti týchto materiálov. Najvyššie tepelné vodivosti (~240 W/m·K) boli dosiahnuté v smere rovnobežnom s grafénovými vrstvami pri vzorkách s 1 % GO a 5 % GNP po žíhaní. Tieto výsledky dokazujú, že použitie metód vymrazovacej granulácie, spekania v rapid hot-presse a žíhanie vzoriek v dusíkovej atmosfére umožňuje získať kompozitné materiály SiC-grafén s vysokou elektrickou a tepelnou vodivosťou.
V rámci riešenia projektu boli taktiež pripravené kompozitné prášky na báze SiC so spekacími prísadami Y_2O_3 a Al_2O_3 s rôznym prídavkom grafénových nanoplatničiek (5 a 15 hm.%) pomocou metódy vymrazovacej granulácie. Takto pripravené prášky boli lisované s cieľom pripraviť vrstevnaté materiály s vrstvou SiC bez prídavku grafénu, medzivrstvou s 5 hm.% grafénu a vonkajšou vrstvou s vysokým obsahom grafénu (15 hm.%). Takto pripravené vrstevnaté materiály boli spekané pri teplote 1800°C, pri rôznom zaťažení (30, 40 alebo 50 MPa) vo vákuu po dobu 5 minút. Všetky pripravené vzorky vykazovali vysokú hutnosť (relatívna hustota viac ako 99 %). Na takto pripravených vzorkách bola vykonaná základná mikroštrukturálna analýza (veľkosť častíc SiC matrice, distribúcia a preferovaná orientácia grafénových platničiek). V budúcnosti budeme skúmať súdržnosť vrstiev, základné mechanické vlastnosti (tvrdosť, scratch testy) a funkčné vlastnosti (najmä elektrickú a tepelnú vodivosť) vrstevnatých materiálov na báze SiC-grafén.

Publikácie:
HANZEL, Ondrej - SINGH, Meinam Annebushan - MARLA, Deepak - SEDLÁK, Richard - ŠAJGALÍK, Pavol. Wire electrical discharge machinable SiC with GNPs and GO as the electrically conducting filler. In Journal of the European Ceramic Society, 2019, vol. 39, no. 8, p. 2626-2633. (4.029 - IF2018). ISSN 0955-2219. Typ: ADCA

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, p. 241-250.
Akceptovaný článok
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, p. 234-240. Akceptovaný článok
HANZEL, Ondrej – LENČÉŠ, Zoltán – KIM, Young-Wook – FEDOR, Ján, ŠAJGALÍK, Pavol. Electrical and thermal conductivity of SiC-graphene composites annealed in nitrogen atmosphere. 10. odborný seminár *Interakcie tavenín s progresívnymi anorganickými materiálmi,* 14-15.10.2019, Hradec nad Moravicí, Česká republika, ed. V. Novák, vydala VŠB-TU Ostrava, 2019, p. 4-10.

Programy: Horizont 2020

8.) 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: 60717 €

Dosiahnuté výsledky:
Riešenie projektu prebiehalo v súlade s plánom na rok 2019. Hlavná aktivita bola venovaná štúdiu zmáčanlivosti komplexných práškových zmesí (ZrB_2-B_4C-RE_2O_3) na povrchu keramických kompozitov s keramickou matricou (CMCs), dodaných firmou Airbus Defence & Space. Cieľom štúdie bolo pochopenie fyzikálno-chemických javov prebiehajúcich počas vývoja vysokoteplotných keramických materiálov s keramickou matricou (UHTCMC). Nakoľko nedošlo k požadovanému nataveniu zliatiny a jej infiltrácií do pórovitej matrice pri použití horeuvedenej komplexnej práškovej zmesi, k optimalizácii procesu sa dospelo dvojkrokovou infiltráciou. Dodané materiály boli najprv infiltrované práškom B_4C pomocou vákuovej infiltrácie. Na takto modifikovaných povrchoch kompozitných materiálov bola potom študovaná zmáčanlivosť roztavených zliatin ZrB_2 a ZrB_2-RE_2O_3. V tomto prípade došlo k požadovanému roztaveniu zliatiny pri teplote 1670°C, pričom taveniny bola infiltrovaná do pórov kompozitov, kde reagovala s B_4C za vzniku požadovaného chemického zloženia ZrB_2-SiC-RE_2O_3. Bolo testovaných niekoľko kompozitov s rôznou pórovitosťou za účelom selekcie materiálu, ktorého pórovitosť zabezpečí tvorbu požadovaného chemického zloženia, a rovnomernú infiltráciu zliatiny až do hĺbky cca 800 µm. V ďalšom, poslednom roku riešenia projektu budú aktivity venované smerom k tvorbe finálneho povlaku na báze ZrB_2-SiC-RE_2O_3 na SiC kompozitoch spevnených uhlíkovými vláknami (C_f/SiC).

Výstupy:
1. FÜRDÖSOVÁ, Zuzana - ÜNSAL, Hakan - KOVALČÍKOVÁ, Alexandra - DLOUHÝ, Ivo - TATARKO, Peter. ZrB_2-SiC ceramics with rare-earth oxide additives. In Workshop Processing and properties of advanced ceramics and glasses, November 20-22, 2019, Ráztočno, Slovak Republic: book of extended abstracts. Ed. Jana Valúchová; 2019, p. 57-61. ISBN 978-80-971648-8-1. Typ: **AFD**
2. TATARKO, Peter - VALENZA, Fabrizio - ÜNSAL, Hakan - KOVALČÍKOVÁ, Alexandra - BYSTRICKÝ, Roman. Wetting and phase interaction between C_f/SiC and transition metal disilicides-based alloys. In HT-CMC10. 10th International conference on hihg temperature ceramic matrix composites, September 22-26, 2019, Bordeaux, France: book of abstracts. - France, 2019, p. 323. Typ: **AFG**

Domáce projekty

Programy: VEGA

1.) Roztavené fluoridové systémy s vyššou funkcionalitou *(Molten fluoride systems with higher functionality)*

Zodpovedný riešiteľ:	Miroslav Boča
Trvanie projektu:	1.1.2016 / 31.12.2019
Evidenčné číslo projektu:	2/0114/16
Organizácia je koordinátorom projektu:	áno
Koordinátor:	Ústav anorganickej chémie SAV
Počet spoluriešiteľských inštitúcií:	0
Čerpané financie:	SAV: 17085 €

Dosiahnuté výsledky:

Zlúčenina α-K_2ZrF_6 podlieha nezvyčajnej viacstupňovej modifikačnej premene v tuhom stave. Táto modifikačná premena môže byť reverzibilná alebo ireverzibilná vzhľadom na cieľovú teplotu. Zahrievanie K_2ZrF_6 na 250 °C spôsobuje nevratnú modifikačnú premenu, ktorej produktom je fáza označená ako meta-K_2ZrF_6 a fáza K_3ZrF_7. Starnutie takejto zmesi podlieha ďalšiemu procesu premien, kedy vzniká aj fáza α-K_2ZrF_6 ale nárast jej koncentrácie sa zastaví, keď dosiahne rovnaký podiel ako meta-K_2ZrF_6. V prípade, že α-K_2ZrF_6 je zahriata na teplotu vyššiu ako 250 °C pri chladení nastane reverzibilná premena vysokoteplotnej fázy naspať na α-K_2ZrF_6 fázu. Proces transformačných premien bol sledovaný rôznymi metódami ako DTA, DSC, ^{19}F MAS NMR, XRD, tepelnou difuzivitou a Ramanavou spektroskopiu. Zaujímavosťou je aj to, že odozva monitorovania modifikačných premien rôznymi technikami vykazovala neočakávané rozpory, ktoré bolo treba interpretovať.

Publikácie a príspevky:

BOČA, Miroslav** – NETRIOVÁ, Zuzana – RAKHMATULLIN, Aydar – VASKOVÁ, Zuzana – HADZIMOVÁ, Eva – SMRČOK, Ľubomír – HANZEL, Ondrej – KUBÍKOVÁ, Blanka. The differing responses of various techniques in measuring the phase transformations of K2ZrF6. In Journal of Molecular Liquids, 2019, vol. 287, p. 110969-1-110969-10. (4.561 – IF2018). (2019 – Current Contents, WOS, SCOPUS). ISSN 0167-7322. Typ: **ADCA**

HRUŠKA, Branislav** – NETRIOVÁ, Zuzana – VASKOVÁ, Zuzana – BOČA, Miroslav – CHROMČÍKOVÁ, Mária – LIŠKA, Marek. High-temperature Raman study of K2ZrF6 phase transitions. In Journal of Alloys and Compounds, 2019, vol. 791, p. 45-50. (4.175 – IF2018). (2019 – Current Contents, WOS, SCOPUS). ISSN 0925-8388. Typ: **ADCA**

BOČA, Miroslav – ŠIMURDA, Michal – ŠVEC, Peter - ŠVEC, Peter Jr. – JANIČKOVIČ, Dušan – CZÍMEROVÁ, Adriana – KUBÍKOVÁ, Blanka –MLYNÁRIKOVÁ, Jarmila. Unusual phase transformations in ternary fluoride systems. In 19th European Symposium on Fluorine Chemistry: Book of Abstracts. - Warszawa, Poland: Oficyna Wydawniczo-Poligraficzna ADAM, 2019, p. 134. Type: **AFE**

BOČA, Miroslav – ŠIMURDA, Michal – ŠVEC, Peter - ŠVEC, Peter Jr. – JANIČKOVIČ, Dušan – CZÍMEROVÁ, Adriana – KUBÍKOVÁ, Blanka –MLYNÁRIKOVÁ, Jarmila. Unusual phase transformations in ternary fluoride systems. In MS11. 11th international symposium on molten salts - chemistry and technology, 19-23 Mai 2019, Orleans, France: program and abstracts. - France, 2019, p. 87. Typ: **AFG**

BOČA, Miroslav – ŠIMURDA, Michal – ŠVEC, Peter - ŠVEC, Peter Jr. – JANIČKOVIČ, Dušan – CZÍMEROVÁ, Adriana – KUBÍKOVÁ, Blanka – NETRIOVÁ, Zuzana – MLYNÁRIKOVÁ, Jarmila. Unusual phase transformations in ternary fluoride systems. In ChemZi : Zborník abstraktov: 71. Zjazd chemikov, 9-13 september 2019, Vysoké Tatry, Horný Smokovec, Slovensko. - Bratislava: Slovenská chemická spoločnosť, 2019, 2019, roč. 15, č. 1, s. 82. ISSN 1336-7242. Typ: **AFH**

2.) Fotoaktívne hybridné materiály *(Photoactive hybrid materials)*

Zodpovedný riešiteľ:	Adriana Czímerová
Trvanie projektu:	1.1.2017 / 31.05.2019
Evidenčné číslo projektu:	2/0156/17
Organizácia je koordinátorom projektu:	áno
Koordinátor:	Ústav anorganickej chémie SAV
Počet spoluriešiteľských inštitúcií:	0
Čerpané financie:	-

Dosiahnuté výsledky:
Projekt bol predčasne ukončený.

3.) Nové anorganické fosfory na báze stechiometrických hlinitanov a kremičitanov s dlhodobou svetelnou emisiou pre optické a biomedicínske aplikácie *(Nové anorganické fosfory na báze stechiometrických hlinitanov a kremičitanov s dlhodobou svetelnou emisiou pre optické a biomedicínske aplikácie)*

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: 4686 €

Dosiahnuté výsledky:
Pripravené boli luminofory v sústave $SrAl_2O_4$ dopované Dy^{3+} a kombináciou opticky aktívnych provkov Dy^{3+}/Eu^{2+} reakciou v tuhej fáze pri teplotách nad 1300 °C v redukčnej atmosfére. Sledoval sa vplyv podmienok prípravy luminoforov a koncentrácie dopantov na dĺžku dosvitu pripraveného luminoforu.

4.) 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: 6170 €

Dosiahnuté výsledky:
1. Príprava transparentnej $MgAl_2O_4$ keramiky metódou SPS a optimalizácia podmienok zabraňujúcich kontaminácii materiálu uhlíkom počas spekania.
2. Otestovanie nových typov prísad na podporu spekania (CoF_2, MnF_2) pre prípravu vysoko hutnej keramiky na báze $MgAl_2O_4$, ktoré zároveň slúžia ako zdroj opticky aktívnych dopantov.
3. Aplikácia metódy Master Sintering Curve na hodnotenie priebehu spekania spinelovej keramiky.
Publikácie
1. Ali Talimian, Dusan Galusek; Aqueous slip casting of translucent magnesium aluminate spinel: Effects of dispersant concentration and solid loading; Ceramics International 45 (2019) 10646–10653; doi.org/10.1016/j.ceramint.2019.02.134
2. Talimian Ali - Puchlý V. - El-Maghraby Hesham F. - Maca K. - Galusek Dušan: Impact of high energy ball milling on densification behaviour of magnesium aluminate spinel evaluated by master sintering curve and constant rate of heating approach, In: Ceramics international. - ISSN 0272-8842. - Vol.45, No.17(2019), p.23467-23474, part B., https://doi.org/10.1016/j.ceramint.2019.08.051

5.) 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: 9709 €

Dosiahnuté výsledky:

V súlade s harmonogramom projektu sme na začiatku druhej etapy, zahájili optimalizáciu spôsobu prípravy trabekulárnych telies z SN granúl. Zámerom je vyvinúť technológiu prípravy pórovitého, bioaktívneho, antibakterialného skeletu s dostatočnou pevnosťou, ktorá by sa dala využiť pri príprave náhrad kostí rôznych tvarov a veľkostí jednoduchým a rýchlym spôsobom. Úlohou bolo spojiť pripravené granule do pevného skeletu vytvorením „kŕčkov" medzi nimi a to rýchlym záhrevom na optimálnu teplotu s krátkou výdržou a rýchlym schladením. Ako bioaktívnu a zároveň spájaciu zložku sme použili štyri rôzne systémy, ktoré boli do granúl primiešané už v procese ich prípravy, alebo neskôr, boli do nich infiltrované vo forme sólu (system CaSiO3; CaO-P2O5-SiO2; vodné sklo s vyšším podielom Na2O; a Bioglass®,). V rámci charakterizácie kompozitných materiálov na báze kalcium-fosfátových cementov s prídavkom pórovitých SN mikroguličiek bol stanovený súbor fyzikálno-chemických a biologických vlastností týchto materiálov. Výsledky sú spracované do formy publikácie, ktorá je pred zaslaním.

Publikácie:

BYSTRICKÝ, Roman - HNATKO, Miroslav - SEDLÁČEK, Jaroslav. Preparation of lightweight aggregates from industrial waste. In Preparation of ceramic materials: Proceedings of the 13th international conference. Jahodná, 25.-27.6.2019. Eds. B. Plešingerová, D. Medveď. Košice: Technical University, 2019, p. 33-37. ISBN 978-80-553-3314-4.(Preparation of ceramic materials : international conference). AFD

HIČÁK, Michal - HNATKO, Miroslav - LABUDOVÁ, Martina - GALUSKOVÁ, Dagmar - SEDLÁČEK, Jaroslav - LENČÉŠ, Zoltán - ŠAJGALÍK, Pavol. Bioproperties of Si3N4-based ceramics after oxy-acetylene flame treatment = Biologické vlastnosti keramiky na báze Si3N4 po opracovaní povrchu kyslíkovo-acetylénovým plameňom. In Workshop Processing and properties of advanced ceramics and glasses, November 20-22, 2019, Ráztočno, Slovak Republic: book of extended abstracts. Ed. Jana Valúchová; recenzenti Marián Janek, Robert Klement, Alexandra Kovalčíková, Monika Michálková, Jozef Ráheľ, Peter Tatarko. - Bratislava, Slovak Republic: Institute of Inorganic Chemistry SAS, 2019, p. 30-41. ISBN 978-80-971648-8-1.(Workshop Processing and properties of advanced ceramics and glasses). AFD

HNATKO, Miroslav - HIČÁK, Michal - SEDLÁČEK, Jaroslav - ŠAJGALÍK, Pavol. Surface modification of dense silicon nitride. In Preparation of ceramic materials: Proceedings of the 13th international conference. Jahodná, 25.-27.6.2019. Eds. B. Plešingerová, D. Medveď. - Košice: Technical University, 2019, p. 103-109. ISBN 978-80-553-3314-4.(Preparation of ceramic materials : international conference). AFD

TATARKOVÁ, Monika - TATARKO, Peter - DLOUHÝ, Ivo - DUSZA, Ján. Sintering behaviour and microstructural evolution of silicon nitride composites with boron nitride platelets. In Preparation of ceramic materials: Proceedings of the 13th international conference. Jahodná, 25.-27.6.2019. Eds. B. Plešingerová, D. Medveď. Košice: Technical University, 2019, p. 111-114. ISBN 978-80-553-3314-4.

6.) 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:	Ústav anorganickej chémie SAV
Počet spoluriešiteľských inštitúcií:	0
Čerpané financie:	SAV: 2913 €

Dosiahnuté výsledky:

Riešenie sa zameralo na problematiku parametrizácie termodynamických modelov úžitkových skiel. Riešil sa problém chýbajúceho reprezentanta štruktúrnej jednotky Q3 pre binárny subsystém CaO-SiO2. Model sa preto rozšíril o zlúčeninu CaO·2SiO2. Navrhla a validovala sa metóda odhadu molárnej Gibbsovej energie tejto zlúčeniny založená na lineárnej závislosti reakčnej Gibbsovej energie na vytvorenie jedného nemôstikového kyslíka v štruktúrnej jednotke Qn na hodnote n. Výsledky boli publikované v práci: M. Liška, J. Macháček, M. Chromčíková, R. Svoboda: Thermodynamic model of CaO-SiO2 glasses. Ceramics-Silikáty, doi: 10.13168/cs.2019.0049

7.) Štruktúra a vlastnosti oxidových skiel - termodynamický model, entalpická a objemová relaxácia *(Structure abd properties of oxide glasses - thermodynamic models, entalpic and structural relaxation)*

Zodpovedný riešiteľ:	Mária Chromčíková
Trvanie projektu:	1.1.2016 / 31.12.2020
Evidenčné číslo projektu:	2/0088/16
Organizácia je koordinátorom projektu:	áno
Koordinátor:	Ústav anorganickej chémie SAV
Počet spoluriešiteľských inštitúcií:	1 - Slovensko: 1
Čerpané financie:	SAV: 1751 €

Dosiahnuté výsledky:

Riešenie projektu sa sústredilo na validovanie termodynamických modelov fosforečnanových a boritanových skiel cestou porovnania výsledkov analýzy sérií Ramanových spektier matematicko-štatistickými metódami PCA a MCR s výsledkom rozkladov týchto spektier Malfaitovou metódou založenou rovnovážnych látkových množstvách zložiek termodynamického modelu.

Pre binárne bárnato-fosforečnanové sklá s nízkym obsahom Al2O3 sa preskúmala entalpická a štruktúrna relaxácia. Výsledky sa interpretovali v kontexte termodynamického modelu sústavy BaO-Al2O3-P2O5.

8.) 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: 14893 €

Dosiahnuté výsledky:

Experimentálne boli pripravené luminofori na báze $LaSi_3N_5$ dopované Ce, Eu, Sm, Er, Nd a Yb. Luminofory boli pripravené zo zmesí nitrid-oxid ($LaSi_3N_5$/Ln_2O_3) a nitrid fluorid ($LaSi_3N_5$/LnF_3) žíhaním pri 1600 °C po dobu 3 h v pretlaku dusíka 2 MPa. Fluoridy majú výrazne nižšiu teplotu topenia v porovnaní s oxidmi, čo umožňuje prípravu luminoforov pri nižších teplotách, čo bolo dokázané aj experimentmi. Teplotu syntézy sme znížili o 150 °C v prípade luminoforov s prídavkom dopantov vo forme fluoridov. Luminofory dopované fluoridmi vykazujú pomerne ostré/úzke emisné píky s maximom 546 nm pre CeF_3-dopovaný materiál, pri 397 nm a 468 nm pre ErF_3 a pri 483 nm pre YbF_3 dopovaný $LaSi_3N_5$ luminofor. V prípade luminoforov $LaSi_3N_5$ dopovaných oxidmi lantanoidov boli namerané výrazne širšie emisné píky (pri 510 – 625 nm pre CeO_2 dopovaný materiál, 370 – 600 nm pre Er_2O_3, a 440 – 600 nm pre Yb_2O_3 dopovaný materiál). Bola stanovená aj doba trvania excitovaných stavov luminoforu, ktorá sa pohybovala v rozmedzí 120 ns ($LaSi_3N_5$:Ce) až 300 ns ($MgSiN_2$:Eu). Tieto doby zhášania umožňujú aplikovať vyvinuté luminofory nielen v LED, ale aj v displejoch s vysokou ostrosťou farieb.

V prípade materiálov na báze $LaSi_3N_5$:Nd neboli pozorované žiadne emisie vo viditeľnej oblasti spektra. Silné emisie boli namerané v blízko-infračervenej oblasti s maximami pri 895 nm a 1083 nm. Tieto materiály môžu byť použité napr. v infralampách na liečbu IČ svetlom.

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)

Podrobnejšie boli študované luminiscenčných vlastností spinelu ($MgAl_2O_4$) dopovaného Cr^{3+}. Cieľom bolo overiť možnosť náhrady drahých dopantov z radu lantanoidov lacnejšími prechodnými prvkami. Luminofor $MgAl_2O_4$:Cr^{3+}vykazoval slabú emisiu s maximom pri 370 nm (fialové svetlo) po excitácii λ_{ex} = 250 nm. Po excitácii zeleným svetlom (λ_{ex} = 500 – 550 nm) bola nameraná silná emisia v tmavo-červenej oblasti viditeľného svetla s maximom pri 690 – 710 nm.

Študoval sa aj vplyv množstva Eu v koncentračnom rozsahu 0,5 mol% až 3 mol% na luminiscenčné vlastnosti spinelu MgAlON (tuhý roztok $MgAl_2O_4$ a AlN). Emisné spektrá vzoriek po excitácii 350 nm žiarením mali maximum emisie je pri 472 nm (modré svetlo). Z výsledkov vyplýva, že najvyššia intenzita emitovaného žiarenia bola dosiahnutá v prípade MgAlON vzorky dopovanej 0,5 mol% Eu, potom pri zvyšujúcom sa obsahu Eu dochádzalo ku koncentračnému zhášaniu. V porovnaní so vzorkou $MgAl_2O_4$:Eu ($\lambda_{em,max}$ = 460 nm) došlo k červenému posuvu maxima v dôsledku prítomnosti dusíka v štruktúre a zvýšeniu kovalentnosti väzieb v blízkom okolí dopantu.

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Young-Wook Kim, Shynar Kultayeva, Jaroslav Sedláček, Ondrej Hanzel, Peter Tatarko, Zoltán Lenčéš, Pavol Šajgalík: Thermal and electrical properties of additive-free rapidly hot-pressed SiC ceramics. J. Eur. Ceram. Soc., 40 (2020) 234-240.

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O. Hanzel, M.A. Singh, D. Marla, R. Sedlák, P. Šjagalík, Wire electrical discharge machinable SiC with GNPs and GO as the electrically conductive filler. J. Eur. Ceram. Soc., 39 (2019) 2626-2633. https://doi.org/10.1016/j.jeurceramsoc.2019.03.012

O. Hanzel, Z. Lenčéš, Y.-W. Kim, J. Fedor, P. Šajgalík, High electrically and thermally conductive silicon carbide – graphene composites with yttria and scandia additives. J. Eur. Ceram. Soc., (2019) under review. Manuscript Ref. No.: JECS-D-19-01506

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Z. Lenčéš, M. Radwan, A. Czímerová, P. Šajgalík, Preparation of transparent/translucent spinel-based phosphors. Abstract Book of the XVIth Conference and Exhibition of the European Ceramic Society, 16-20 June 2019, Torino, Societa Ceramica Italiana, p. 507. AFG

LENČÉŠ, Zoltán - CZÍMEROVÁ, Adriana - PETRISKOVÁ, Patrícia - KLEMENT, Róbert - HULMAN, Martin. Influence of lanthanide oxides and fluorides on the photoluminescence of LaSi3N5. In Engineering Ceramics 2019, Advanced Research Workshop: Ceramics for people, Smolenice castle, May 12-16, 2019: book of abstracts. - Bratislava, Slovakia: Institute of Inorganic Chemistry, Slovak Academy of Sciences, 2019, p. 79. ISBN 978-80-971648-7-4.

PETRISKOVÁ, Patrícia - RADWAN, Mohamed - MONFORT, O. - PLESCH, Gustáv - LENČÉŠ, Zoltán. Photocatalytic TiO2 nanotubes arrays formation on polymeric and ceramic substrates. In Engineering Ceramics 2019, Advanced Research Workshop: Ceramics for people, Smolenice castle, May 12-16, 2019: book of abstracts. - Bratislava, Slovakia: Institute of Inorganic Chemistry, Slovak Academy of Sciences, 2019, p. 81. ISBN 978-80-971648-7-4. (Engineering Ceramics 2019: Ceramics for people). AFH

9.) 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: 17085 €

Dosiahnuté výsledky:

V treťom roku riešenia projektu boli skompletizované interpretácie výsledkov zamerané na sledovanie rôznych faktorov vplývajúcich na usporiadanie/konformáciu alkylamóniových surfaktantov ako sú dĺžka alkylového reťazca, typ centrálnej skupiny surfaktantu a teplota. Získané výsledky boli publikované v prácach [1, 2]. Pozoroval sa aj vplyv náboja vrstiev troch rôznych montmorillonitov (SAz, JP a SWy) na usporiadanie surfaktantov. Zistilo sa, že so stúpajúcim nábojom vrstiev narastá množstva usporiadaných "trans" a klesá neusporiadaných "gauche" konformérov. Modifikáciou montmorillonitu JP katiónmi 4C1-N/P, 4C4-N/P, 4-C8-N/P, 3C8-N/P-1C12, 3C8-N/P-1C14, 3C8-N/P-1C16 sa prípravili dve série organoílov s rôznou veľkosťou organického katiónu a rôznym centrálnym atómom (N alebo P). Testovali sa experimentálne podmienky s cieľom získať kompletnú výmenu anorganických Na-katiónov za katióny organické. Ab initio molekulová dynamika na DFT úrovni bola použitá na štúdium štruktúry montmorillonitu (Mt) interkalovaného

tetrabutylamóniovým (TBA) a tetrabutylfosfóniovým (TBP) katiónom. Analýza medziatómových vzdialeností ukázala, že slabé C–O•••H vodíkové väzby sú dôležité pre stabilizáciu obidvoch katiónov, pričom trochu silnejšie H-väzby boli indikované pre TBP katión. Vypočítané interkalačné a adsorpčné energie potvrdili, že TBP-Mt je stabilnejší ako TBA-Mt [3]. V rámci úlohy zameranej na trojzložkové materiály s fotoaktívnymi farbivami sa študovali vlastnosti hybridného nanokompozitného materiálu na báze ílového nosiča smektitu, fluoresceínom modifikovaného polymérneho dextránu (FITC) a fotosenzibilizátora v podobe aniónového farbiva floxín B (PhB). Cieľom bolo pripraviť tenké filmy s vysokoúčinnou absorbciou žiarenia vo viditeľnej oblasti s následným rezonančným prenosom tejto energie z FITC na PhB. Takéto materiály majú potenciálne využitie ako antimikrobiálne fotosenzibilizačné materiály s možnosťou využitia polychromatického žiarenia [4].
V rámci dlhodobej medzinárodnej spolupráce časť exeprimentov sa zamerala na prípravu pórovitých heteroštruktúrnych materiálov na báze montmorillonitu, tzv porous clay heterostructures (PCH), ktoré môžu predstavovať zaujímavú alternatívu k rôznych štruktúram na báze SiO2. Optimalizáciou podmienok syntézy (koncentrácia FeCl3, ktorý sa použil ako zdroj Fe3+, tlak, čas impregnácie a kalcinácie) sa pripravil kompozitný materiál PCH/FeOx s vysokou efektivitou v reakcii rozkladu toluénu. Práca poskytla originálne interpretácie zmien IČ spektrách v ďalekej oblasti s podporou DFT výpočtov, čím sa potvrdila prítomnosť α-Fe2O3 a Fe3O4 fáz na povrchu Fe-PCH [5].

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10.) 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: 13142 €

Dosiahnuté výsledky:
KONEČNÝ, Lukáš** – REPISKÝ, Michal – RUUD, Kenneth – KOMOROVSKÝ, Stanislav**. Relativistic four-component linear damped response TDDFT for electronic absorption and circular dichroism calculations. In Journal of Chemical Physics, 2019, vol. 151, no. 19, p. 194112-1-194112-14. (2.997 – IF2018). ISSN 0021-9606. Typ: ADCA

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: 5914 €

Dosiahnuté výsledky:
V prvom roku projektu sa úspešne pripravili modely špirálovitej štruktúry hallozyitu, planárneho haloyzitu s irinotekanom(liečivo), hektoritu, hybridných komplexov cholín/acetylcholín -beidelit(Bd)/montmorilonit(Mt), atrazín-Bd/Mt a chrómanov v Bd. Štruktúry hybridných komplexov íl-polutant boli pripravené a charakterizované aj experimentálne. Čiastkové výsledky boli prezentované na vedeckých konferenciách formou prednášok a postrov. Všetky výsledky získané v tomto období sa spracúvajú do článkov v renomovaných vedeckých časopisoch.

Výstupy:
SCHOLTZOVÁ, Eva - JANKOVIČ, Ľuboš - ŠKORŇA, Peter - MORENO RODRÍGUEZ, Daniel - TUNEGA, Daniel. Insight into the stability of beidellite intercalates. In BIT´s 7th Annual Conference of AnalytiX-2019, April 12-14, 2019, Singapore: conference handbook.Exploring Innovative Advances and Applications. - Singapore, 2019, p. 78.
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SCHOLTZOVÁ, Eva. Computational study of Cs-hectorite. In 6th Workshop of Slovak Clay Group: Clay minerals and selected non-raw materials in material science, industrial applications and environmental technology. May 27-28, 2019, Banská Bystrica, Slovakia: book of abstracts. - Bratislava, Slovakia: Slovak Clay Group, 2019, p. 17-18. ISBN 978-80-972367-3-1. (Workshop of Slovak Clay Group).
ŠKORŇA, Peter - SCHOLTZOVÁ, Eva - JANKOVIČ, Ľuboš - TUNEGA, Daniel. Structural and spectroscopic characterization of beidellite intercalated with choline and acetylcholine. In 6th Workshop of Slovak Clay Group: Clay minerals and selected non-raw materials in material science, industrial applications and environmental technology. May 27-28, 2019, Banská Bystrica, Slovakia: book of abstracts. - Bratislava, Slovakia: Slovak Clay Group, 2019, p. 21-22. ISBN 978-80-972367-3-1.

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: 9364 €

Dosiahnuté výsledky:

Uskutočnila sa komplexná analýza správania sa pseudobinárnych systémov $MF{-}Al_2O_3$, v závislosti od zloženia a teploty. Vo všetkých systémoch bola pozorovaná prítomnosť štyroch už známych fáz, a to prítomnosť MF, M_3AlF_6, $MAlO_2$ a $M_2Al_{22}O_{34}$ (M=K, Rb, Cs). Okrem toho boli identifikované nové fázy, a to $M_2Al_2O_3F_2$ (M= Rb, Cs), pričom sa stanovila aj ich štruktúra. Pozoruhodnou charakteristikou kryštálovej štruktúry oboch pripravených komplexov je prítomnosť vrstiev, zložených z jednotlivých (AlO_3F) tetrédrov, zdieľajúcich navzájom spoločné rohy, v ktorých sú umiestnené atómy kyslíka, zatiaľ čo atómy fluóru oddeľujú jednotlivé vrstvy. Počet a množstvo neekvivaletných kryštalografických polôh jednotlivých atómov, prítomných v uvedenej štruktúre sa určil pomocou ^{19}F, ^{27}Al, ^{87}Rb a ^{133}Cs MAS NMR spektier v tuhom stave. Získaná fáza, $Rb_2Al_2O_3F_2$, vykazovala aj určitú iónovú vodivosť pri izbovej teplote hodnoty $1{,}74\times10^{-5}$ S cm^{-1}. Pomocou termickej analýzy sa zistilo, že analyzované, pseudobinárne systémy $MF{-}Al_2O_3$ sa chovajú ako stabilné diagonálne časti komplexných kvartérnych systémov $MF{-}AlF_3{-}Al_2O_3{-}M_2O$ (M=K, Rb, Cs), so základým iónovými zložkami (M^+, Al^{3+}, O^{2-} a F^-), zodpovednými za tvorbu pozorovaných komplexných zlúčenín. Novo objavená fáza, $Rb_2Al_2O_3F_2$, bola prítomná v celom koncentračnom rozsahu skúmaného systému. Zistilo sa, že so zmenou teploty sa čiastočne rozkladá na oxohlinitan rubídny ($Rb_2Al_{22}O_{34}$), ktorý má podobné štruktúrne usporiadanie ako $Rb_2Al_2O_3F_2$, a na príslušnú fluoridovú fázu (Rb_3AlF_6, RbF). Nestabilita oxofluórohlinitanu rubídneho pravdepodobne súvisí s uvedenou štruktúrnou podobnosťou $Rb_2Al_2O_3F_2$ a $Rb_2Al_{22}O_{34}$, ktorá bola zistená a potvrdená NMR analýzou v tuhej fáze.
Následne sa stanovila elektrická vodivosť roztavených fluoridových komplexných zlúčenín, 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 Rb_3AlF_6 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.

Publikácie a príspevky:
ŠIMKO, František - RAKHMATULLIN, Aydar - VÉRON, Emmanuel - ALLIX, Mathieu - FLORIAN, Pierre - KORENKO, Michal - NETRIOVÁ, Zuzana - BESSADA, Catherine. Oxo- and (oxo)(fluoro)-aluminates: Synthesis, stability and structure correlation = Oxo- a (oxo)(fluoro)-hlinitany: Syntézy, stabilita a vzájomná štruktúrna korelácia. In Interakce tavenin s progresivními anorganickými materiály, 10. odborný seminář, 14. - 15. října 2019, Hradec nad Moravicí, Česká republika. - Česká republika: VŠB TU Ostrava, 2019, p. 11-13.
ŠIMKO, František - RAKHMATULLIN, Aydar - VERON, Emmanuel - ALLIX, Mathieu - FLORIAN, Pierre - NETRIOVÁ, Zuzana - KORENKO, Michal - KAVEČANSKÝ, Viktor - BESSADA, Catherine. Oxo- and (oxo)(fluoro)-aluminates: Synthesis, stability and structure correlation. In MS11. 11th international symposium on molten salts - chemistry and technology, 19-23 Mai 2019, Orleans, France: program and abstracts. - France, 2019, p. 26.
ŠIMKO, František - RAKHMATULLIN, Aydar - VÉRON, Emmanuel - ALLIX, Mathieu - FLORIAN, Pierre - BUČKO, Tomáš - NETRIOVÁ, Zuzana - KORENKO, Michal - BESSADA, Catherine. Fluoro-, oxo- and oxofluoro-aluminates: Synthesis, and their stability. In ChemZi: Zborník abstraktov: 71. Zjazd chemikov, 9-13 september 2019, Vysoké Tatry, Horný Smokovec, Slovensko. Bratislava: Slovenská chemická spoločnosť, 2019, 2019, roč. 15, č. 1, s. 174. ISSN 1336-7242.

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 / 30.6.2020
Evidenčné číslo projektu:	APVV-15-0479
Organizácia je koordinátorom projektu:	áno
Koordinátor:	Ústav anorganickej chémie SAV
Počet spoluriešiteľských inštitúcií:	0
Čerpané financie:	APVV: 60000 €

Dosiahnuté výsledky:
Bola uskutočnená fyzikálno-chemická analýza viacerých roztavených fluoridových systémov s obsahom MgO. Pre tieto sústavy bola meraná rozpustnosť, hustota, elektrická vodivosť a viskozita. Bolo zistené, že rozpustnosť oxidu horečnatého je nízka vo všetkých študovaných systémoch a je pod 0,5 mol.% MgO. Hustota na báze horečnatých roztavených sústav bola meraná pre dva systémy: (CaF2-MgF2)eut-MgO a (CaF2-MgF2-LiF)eut-MgO. Výsledky ukázali, že experimentálne hodnoty hustôt v oboch prípadoch lineárne klesajú s teplotou. Vplyv prídavku MgO do roztavených systémov (CaF2-MgF2)eut a (CaF2-MgF2-LiF)eut je však rozdielny. V prvom prípade bol pozorovaný malý pozitívny vplyv; hodnoty

hustôt sa menili do 1%, kým v prípade (MgF2 – CaF2-LiF) eutektickej zmesi, prídavok MgO mal výrazný negatívny vplyv (7-9%). Ešte výraznejší rozdiel vplyvu prídavku MgO do týchto dvoch roztavených zmesí je badateľný v prípade koncentračnej závislosti molárneho objemu. V sústavách bez fluoridu lítneho molárny objem klesá s prídavkom MgO, v sústavách s fluoridom lítnym bol pozorovaný opačný trend, molárny objem narastá s prídavkom MgO. Vysvetlením pre takého správanie môže byť rozdielne vnútorné usporiadanie týchto tavenín, kde v sústavách bez LiF oxid horečnatý vytvára komplexné častice približne rovnakej veľkosti, v sústavách s fluoridom lítnym MgO tvorí komplexné častice rôznej veľkosti. Výsledky z merania elektrickej vodivosti sústavy MgF2 – CaF2 – MgO ukázali, že nárast pomeru MgF2/CaF2 má negatívny vplyv na elektrickú vodivosť taveniny. Pozitívny vplyv na túto vlastnosť bol pozorovaný v prípade nárastu obsahu MgF2. Ďalšou študovanou fyzikálno-chemickou vlastnosťou bola viskozita meraná pre eutektické zloženie (MgF2 – CaF2)eut. Výsledky ukázali, že viskozita tohto binárneho systému je relatívne vysoká.
Publikácie a príspevky:
KORENKO, Michal - ŠIMKO, František - MLYNÁRIKOVÁ, Jarmila - LARSON, Carol - MIKŠÍKOVÁ, Eva - PRIŠČÁK, Jozef - AMBROVÁ, Marta - PALUMBO, Robert. Physico-chemical properties of (MgF2-CaF2-(LiF))eut-MgO system as a molten electrolyte for Mg electrowinning. In Journal of Molecular Liquids, 2019, vol. 275, p. 535-543. (4.561 - IF2018). (2019 - Current Contents, WOS, SCOPUS). ISSN 0167-7322. Typ: ADCA
KORENKO, Michal - ŠIMKO, František - MLYNÁRIKOVÁ, Jarmila - LARSON, Carol - MIKŠÍKOVÁ, Eva - PRIŠČÁK, Jozef - PALUMBO, Robert - AMBROVÁ, Marta. Physico-chemical properties of (MgF2-CaF2-(LiF))eut-MgO system as a molten electrolyte for solar thermal Mg electrowinning. In MS11. 11th international symposium on molten salts - chemistry and technology, 19-23 Mai 2019, Orleans, France: program and abstracts. - France, 2019, p. 58. Typ: AFG

14.) 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 / 30.6.2020
Evidenčné číslo projektu:	APVV-15-0347
Organizácia je koordinátorom projektu:	nie
Koordinátor:	Prírodovedecká fakulta UK
Počet spoluriešiteľských inštitúcií:	0
Čerpané financie:	APVV: 22000 €

Dosiahnuté výsledky:
V rámci nových experimentov sa podarilo pripraviť niekoľko typov modifikovaných polymérov s aktívnym povrchom, čo sa dosiahlo modifikáciou s vrstevnatými silikátmi, ktorých častice boli funkcionalizované fotoaktívnymi farbivami. Dokázalo sa, že použitie fluorescenčných polymérov môže pomôcť pri zužitkovaní širokého spectra viditeľného svetla pre efektívnejšiu fotosenzibilizáciu (1). Doposiaľ nebolo jasné, prečo metylénová modrá, napriek zníženej fotoaktivity vykazuje lepšie antimikrobiálne vlastnosti v hybridných systémoch so silikátmi. Dokázalo sa, že častice sáilikátov môžu aktívne ovplyvňovať chemické vlastnosti adsorbovaných molekúl farbív (2). Príkladom je stabilizácia metylénovej modrej, ktorej redukcia neprebiehala v adsorbovanom stave. Práve tento jav môže zohrávať kľúčovú úlohu pri antimikrobiálnych vlastnostiach hybridných systémov fotosenzibilizačných farbív a vrstevnatých silikátov (2). V tejto súvislosti sme sa zaoberali aj vplyvom adsorpcie buniek baktérií na častice silikátov, a nové výsledky boli súčasťou publikácie (3).

1. LACKOVIČOVÁ, Monika - BARANYAIOVÁ, Tímea - BUJDÁK, Juraj**. The chemical stabilization of methylene blue in colloidal dispersions of smectites. In Applied Clay Science, 2019, vol. 181, no., p. 105222-1-105222-8. (2018: 3.890 - IF, Q1 - JCR, 0.990 - SJR, Q1 - SJR, karentované - CCC).

2. KUREKOVÁ, Valéria - BELUŠÁKOVÁ, Silvia - BOHÁČ, Peter - BUJDÁK, Juraj**. Resonance energy transfer in the systems of smectite modified with a fluorescent cationic polymer and a photosensitizer. In Applied Clay Science, 2019, vol. 183, no., p. 105326-1-105326-9. (2018: 3.890 - IF, Q1 - JCR, 0.990 - SJR, Q1 - SJR, karentované - CCC).

3. GAÁLOVÁ, Barbora - VYLETELOVÁ, Ivana - POKORNÁ, Katarína - KIKHNEY, Judith - MONET, Annette - BUJDÁK, Juraj - BUJDÁKOVÁ, Helena**. Decreased vitality and viability of Escherichia coli isolated by adherence to saponite particles. In Applied Clay Science, 2019, vol. 183, p. 105316-1-105316-9. (2018: 3.890 - IF, Q1 - JCR, 0.990 - SJR, Q1 - SJR, karentované - CCC).

15.) 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 / 30.6.2020
Evidenčné číslo projektu:	APV-15-0469
Organizácia je koordinátorom projektu:	nie
Koordinátor:	Ústav materiálového výskumu SAV
Počet spoluriešiteľských inštitúcií:	0
Čerpané financie:	APVV: 22000 €

Dosiahnuté výsledky:

Na základe výsledkov nadobudnutých počas riešenia projektu v minulých rokov, bola hlavná aktivita venovaná optimalizácií procesu prípravy materiálov na báze TiB2 s prídavkom rôzneho obsahu grafénových nanoplatničiek (1, 2, 5, a 10 hm.%). Proces zhutnenia týchto materiálov, t.j. mechanizmus a kinetika spekania, bol porovnaný s procesom spekania kompozitných TiB2-SiC materiálov s rovnakým množstvom prísad grafénových nanoplatničiek, ktoré boli v predchádzajúcom období riešenia projektu pripravené a študované. Za veľmi pozitívny výsledok možno považovať skutočnosť, že po optimalizácií procesu prípravy sa podarilo získať hutné vzorky aj bez nutnosti použitie prísady SiC. V nasledujúcom období budú tieto vzorky podrobené fázovej a mikroštruktúrnej analýze, a ich mechanické vlastnosti budú porovnané s materiálmi TiB2-SiC s prídavkom grafénových nanoplatničiek.

Výstupy:

1. KOVALČÍKOVÁ, Alexandra - TATARKO, Peter - SEDLÁK, Richard - MEDVEĎ, Dávid - HÚLAN, Michal - MÚDRA, Erika - IVOR, Michal - DUSZA, Ján. Mechanical and tribological properties of TiB2-SiC-GPLs ceramic composites. In CICC-11: The Eleventh International Conference on High-Performance Ceramics, May 25-29, 2019, Kunming, China: abstract book. - China: The Chinese Ceramic Society, 2019, p. 86. Typ: AFG
2. KOVALČÍKOVÁ, Alexandra - TATARKO, Peter - MEDVEĎ, Dávid - SEDLÁK, Richard - CHLUP, Zdeněk - MÚDRA, Erika - DUSZA, Ján. Effect of graphene platelets on mechanical and tribological properties of TiB2-SiC-GPLs ceramic composites. In Fractography of advanced ceramics FAC 2019: The International conference. Book of abstracts. Smolenice, 8.-11.9.2019, ISBN 978-80-89782-12-3. Typ: AFH

16.) 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 / 30.6.2020
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: 22500 €

Dosiahnuté výsledky:

1.Vývoj optimálnej metodiky čistenia oceľových substrátov na zabezpečenie adhézie povlakov k oceľovému substrátu.
2.Vývoj kompozitnej vrstvy na báze PDC so sklenými a keramickými pasívnymi plnivami s vysokou adhéziou k oceľovému substrátu a vysokou odolnosťou voči oxidácii pri teplotách do 1000 ?C.
3.Verifikácia koróznej odolnosti povlakovaných ocelí pomocou dlhodobých oxidačných testov a určenie parametrov zodpovedných za zvýšenie odolnosti antikoróznych vrstiev.
Publikácie:
1.I. Petríková, M. Parchovianský, P. Švančárek, M. Lenz leite, G. Motz, D. Galusek, Passive filler loaded polysilazane-derived glass/ceramic coating system applied to AISI 441 stainless steel, part 1: Processing and characterization. Int. J. Appl. Ceram. Technol., 1-12, (2019), DOI: 10.1111/ijac.13417
2.Milan Parchovianský, Ivana Petríková, Peter Švančárek, Mateus Lenz Leite, Günter Motz, Dušan Galusek, Passive

Filler loaded PDC coating system applied to AISI 441 stainless steel, Part 2: Corrosion behaviour, Int. J. Appl. Ceram. Technol, submitted

17.) Nové sklenené a sklokeramické fosfory na báze hlinitanov vzácnych zemín pre aplikácie v pevnolátkových energiu šetriacich svetelných zdrojoch vyžarujúcich biele svetlo (pc-ELED 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: 12960 €

Dosiahnuté výsledky:

1. Príprava luminoforov vo forme mikroguľočok v sústave YAG-Al2O3 dopovaných PL aktívnymi iónmi Ce3+ a Eu2+ - efekt koncentrácie na PL vlastnosti.
2.Štúdium kinetiky kryštalizácie skiel v sústave YAG-Al2O3.
3. Optimalizácia prípravy kompaktov luminoforov zo sklených mikroguľočok žiarovým lisovaním – optimalizácia časovo-teplotného režim, štúdium vplyvu procesných podmienok (teploty spekania) na optické a luminiscenčné vlastnosti pripravených kompaktov.
4.Štúdium optických a fotoluminiscenčných vlastností luminoforu emitujúceho červené svetlo v transparentnej keramike Al2O3:Cr3+ - efekt koncentrácie dopantu.

Publikácie

1. Anna Prnová, Jana Valúchová, Milan Parchovianský, Wolfgang Wisniewski, Peter Švančárek, Robert Klement, Ľubomír Hric, Els Bruneel, Dušan Galusek: Y3Al5O12-?-Al2O3 composites with fine-grained microstructure by hot pressing of Al2O3-Y2O3 glass microspheres, J. Eur. Ceram. Soc. 40(3) (2020), 852-860.
2. Katarína Drdliková, Robert Klement, Daniel Drdlik, Dušan Galusek, Karel Maca: Processing and properties of luminescent Cr3+ doped transparent alumina ceramics, J. Eur. Ceram. Soc. In press (https://doi.org/10.1016/j.jeurceramsoc.2019.11.010).

18.) 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: 44137 €

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 agragátov 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) Voblasti keramicko-cementových kompozitov bol optimalizovaný prístup kombinácie druhotných surovín (odpadov) na báze popolčekov v kombinácii s bežne dostupným portlandským cementom (PC). Kombináciou druhotných surovín s vyšším obsahom SiO2, PC a vhodného aktivátora bolo možné dosiahnuť zvýšenú puzolánovú aktivitu takejto zmesi a teda tvorbu hydratovaných kremičitanov, ktoré následným tepelným spracovávaním pri realtívne nízkych teplotách (do 1000°C) pôsobia ako spekacia prísada a v konečnom dôsledku spevňujú štruktúru vzniknutého kompozitu (zvýšenie pevnosti).

Publikácie:
BYSTRICKÝ, Roman - HNATKO, Miroslav - SEDLÁČEK, Jaroslav. Preparation of lightweight aggregates from industrial waste. In Preparation of ceramic materials: Proceedings of the 13th international conference. Jahodná, 25.-27.6.2019. Eds. B. Plešingerová, D. Medveď. Košice Technical University, 2019, p. 33-37. ISBN 978-80-553-3314-4. AFD
HNATKO, Miroslav - HIČÁK, Michal - SEDLÁČEK, Jaroslav - ŠAJGALÍK, Pavol. Surface modification of dense silicon nitride. In Preparation of ceramic materials: Proceedings of the 13th international conference. Jahodná, 25.-27.6.2019. Eds. B. Plešingerová, D. Medveď. Košice Technical University, 2019, p. 103-109. ISBN 978-80-553-3314-4. AFD

19.) 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 / 30.6.2020
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: 40000 €

Dosiahnuté výsledky:
Riešenie projektu postupuje podľa schváleného harmonogramu. V roku 2019 sa riešili úlohy, ktoré patria čiastočne do tretej (05/2018 – 07/2019) a štvrtej (01/2019 – 06/2020) etapy. Pripravila sa kompaktná séria organoílov na báze syntetických (komerčne nedostupných) trimetylalkylfosfóniovych katiónov s rôznou dĺžkou alkylového reťazca (Me3P-C2 až Me3P-C20). Paralelne k tejto sade sa pripravila séria organo-montmorillonitov (O-Mt) z tributylalkyl-fosfóniových (Bu3P-C*X*) a tributylalkylamóniových (Bu3N-C*X*) katiónov (*X* = 4, 8, 12 a 16) a uskutočnila sa ich základná charakterizácia a vyhodnotenie vlastností vzhľadom na typ centrálneho atómu a dĺžku alkylového reťazca. Na syntetických smektitoch interkalovaných tetraoktylamóniovým (Oct4N) a tetraoktylfosfóniovým (Oct4P) katiónom, sýtených v rôznom stupni vzhľadom na katiónovýmennú kapacitu (KVK) pôvodného smektitu, sa sledoval vplyv surfaktantu a typu smektitu na expanziu medzivrstvového priestoru, termickú a mechanickú stabilitu, ako aj na luminiscenčné aj hydratačné vlastnosti pripravených organoílov. Boli ukončené experimenty a interpretácia výsledkov na sérii organoílov modifikovanými C1-NH_3 (metyl-) až C19-NH_3 (nonadecyl-) katiónmi [1], ktoré sa porovnajú s vlastnosťami organoílov s interkalovanými syntetickými fosfóniovými Me3P-C2 - Me3P-C20 katiónmi, ktoré majú podobnú dĺžke alkylového reťazca. V rámci riešenia úloh zameraných na interakcie organoílov s fluorescenčnými farbivami sa pripravili a charakterizovali hybridné materiály zložené zo saponitu, fotosenzibilizačného farbiva floxínu B a polysacharidu modifikovaného kladnými amóniovými skupinami a označeného fluoresceínovým luminofórom. Takéto materiály majú potenciálne využitie ako antimikrobiálne fotosenzibilizačné materiály [2]. Sledoval sa aj vplyv častíc smektitu na redox reakciu medzi metylénovou modrou a kyselinou askorbovou vo vodných roztokoch a koloidných sústavách [3]. Aplikáciou *Ab initio* molekulovej dynamiky na DFT úrovni sa skompletizovala štúdia opisu väzbových a štruktúrnych pomerov montmorillonitu interkalovanom dvomi typmi organických katiónov, tetrabutylfosfóniovým a tetrabutylamóniovým [4]. Uskutočnila sa kompletná charakterizácia in vitro toxicity pripravených alkylfosfóniových solí. Dôvodom bolo ich použitie v biodegradovateľných polyméroch, čo otvára možnosť využitia pre biomedicínske účely. Interkaláciou štyroch komerčne dostupných surfaktantov alkylfosfóniových solí sa pripravili O-Mt, ktoré sa následne použili na prípravu polymérno-ílových kompozitov. Vzorky O-Mt v rozličnej koncentrácii sa budú testovať ako plnivá vo vybraných polymérnych matriciach. Vlastnosti nanokompozitov sa porovnajú s analogickými materiálmi na báze amóniových katiónov.

Publikácie:
[1] SLANÝ, Michal - JANKOVIČ, Ľuboš - MADEJOVÁ, Jana. Structural characterization of organo-montmorillonites prepared from a series of primary alkylamines salts: Mid-IR and near-IR study. In Applied Clay Science, 2019, vol. 176, p. 11-20. (3.890 - IF2018).

[2] BIZOVSKÁ KUREKOVÁ, Valéria - BELUŠÁKOVÁ, Silvia - BOHÁČ, Peter - BUJDÁK, Juraj. Resonance energy transfer in the systems of smectite modified with a fluorescent cationic polymer and a photosensitizer. In Applied Clay Science, 2019, vol. 183, no., p. 105326-1-105326-9. (3.890 - IF2018).
[3] LACKOVIČOVÁ, Monika - BARANYAIOVÁ, Tímea - BUJDÁK, Juraj. The chemical stabilization of methylene blue in colloidal dispersions of smectites. In Applied Clay Science, 2019, vol. 181, no., p. 105222-1-105222-8. (3.890 - IF2018).
[4] SCHOLTZOVÁ, Eva - TUNEGA, Daniel. Density functional theory study of the stability of the tetrabutylphosphonium and tetrabutylammonium montmorillonites. In Clay Minerals, 2019, vol. 54, no. 1, p. 41-48. (1.787 - IF2018).

20.) Fotoluminescenčné keramické materiály na báze oxynitridov kremíka *(Silicon oxynitride-based photoluminescent ceramic materials)*

Zodpovedný riešiteľ:	Zoltán Lenčéš
Trvanie projektu:	1.7.2015 / 30.6.2019
Evidenčné číslo projektu:	APVV-14-0385
Organizácia je koordinátorom projektu:	áno
Koordinátor:	Ústav anorganickej chémie SAV
Počet spoluriešiteľských inštitúcií:	2 - Slovensko: 2
Čerpané financie:	APVV: 17617 €

Dosiahnuté výsledky:

Podrobnejšie boli študované luminiscenčných vlastností spinelu ($MgAl_2O_4$) dopovaného Cr^{3+}. Cieľom bolo overiť možnosť náhrady drahých dopantov z radu lantanoidov lacnejšími prechodnými prvkami. Luminofor $MgAl_2O_4:Cr^{3+}$vykazoval slabú emisiu s maximom pri 370 nm (fialové svetlo) po excitácii λ_{ex} = 250 nm. Po excitácii zeleným svetlom (λ_{ex} = 500 – 550 nm) bola nameraná silná emisia v tmavo-červenej oblasti viditeľného svetla s maximom pri 690 – 710 nm.

Študoval sa aj vplyv množstva Eu v koncentračnom rozsahu 0,5 mol% až 3 mol% na luminiscenčné vlastnosti spinelu MgAlON (tuhý roztok $MgAl_2O_4$ a AlN). Emisné spektrá vzoriek po excitácii 350 nm žiarením mali maximum emisie je pri 472 nm (modré svetlo). Z výsledkov vyplýva, že najvyššia intenzita emitovaného žiarenia bola dosiahnutá v prípade MgAlON vzorky dopovanej 0,5 mol% Eu, potom pri zvyšujúcom sa obsahu Eu dochádzalo ku koncentračnému zhášaniu. V porovnaní so vzorkou $MgAl_2O_4$:Eu ($\lambda_{em,max}$ = 460 nm) došlo k červenému posuvu maxima v dôsledku prítomnosti dusíka v štruktúre a zvýšeniu kovalentnosti väzieb v blízkom okolí dopantu.
Bola vykonaná aj sada experimentov s cieľom pripraviť luminofor na báze O'-sialonu (všeobecný vzorec $Si_{2-x}Al_xO_{1+x}N_{2-x}$). Zo zmesi Si_3N_4 a polymérneho prekurzoru SiAlOC sa podarilo pripraviť luminofor O'-sialon dopovaný cérom (Ce^{3+}) žiarovým lisovaním pri 1720 °C po dobu 15 min, mechanickom tlaku 30 MPa a následným žíhaním pri 1620 °C po dobu 3 h v atmosfére dusíka (2 MPa). Po excitácii luminoforu UV žiarením bola pozorovaná emisia v zelenej oblasti svetla s maximom pri 534 nm.

V rámci riešenia projektu vznikla aj spolupráca s Functional Ceramics Laboratory, Department of Materials Science and Engineering, University of Seoul, (prof. Young-Wook Kim) na vývoji keramických substrátov pre LED aplikácie.

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LENČÉŠ, Zoltán - RADWAN, Mohamed - ŠAJGALÍK, Pavol. Preparation of transparent $MgAl_2O_4$ ceramics for LED applications. In ICACC 2019. 43rd International Conference & Exposition on Advanced Ceramics and Composites, January 27 - February 1, 2019, Daytona Beach, Florida, USA: abstract book. USA: The American Ceramic Society, 2019, p. 36. (ICACC 2019. International Conference & Exposition on Advanced Ceramics and Composites).
Z. Lenčéš, M. Radwan, A. Czímerová, P. Šajgalík, Preparation of transparent/translucent spinel-based phosphors. Abstract Book of the XVIth Conference and Exhibition of the European Ceramic Society, 16-20 June 2019, Torino, Societa Ceramica Italiana, p. 507.
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PETRISKOVÁ, Patrícia - RADWAN, Mohamed - MONFORT, O. - PLESCH, Gustáv - LENČÉŠ, Zoltán. Photocatalytic TiO_2 nanotubes arrays formation on polymeric and ceramic substrates. In Engineering Ceramics 2019, Advanced Research Workshop: Ceramics for people, Smolenice castle, May 12-16, 2019: book of abstracts. - Bratislava, Slovakia: Institute of Inorganic Chemistry, Slovak Academy of Sciences, 2019, p. 81. ISBN 978-80-971648-7-4.

21.) 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: 40200 €

Dosiahnuté výsledky:
KOMOROVSKÝ, Stanislav – CHERRY, Peter – REPISKÝ, Michal. Four-component relativistic time-dependent density-functional theory using a stable noncollinear DFT ansatz applicable to both closed- and open-shell systems. In Journal of Chemical Physics, 2019, vol. 151, no. 18, p. 184111-1-184111-14. (2.997 – IF2018). ISSN 0021-9606. Typ: ADCA

22.) 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: 5600 €

Dosiahnuté výsledky:
V prvom polroku riešenia projektu prebehlo zaobstaranie farbív a surfaktantov. Začali sa pilotné experimenty, v ktorých sa realizovala príprava a charakterizácia niektorých typov hybridných materiálov na báze organických zlúčenín a vrstevnatých hydrosilikátov. Otestovali sa niektoré komerčne dostupné polyméry a schopnosť vrstevnatých častíc vytvoriť kompatkný film s polymérom a niektorými základnými farbivami.

23.) 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 / 30.6.2020
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: 35000 €

Dosiahnuté výsledky:

Projekt je zameraná na možné zachytenie metastabilných fáz z roztavených fluorových tavenín. Metóda extrémne rýchleho chladenia (melt spinning; typicky používaná pre tvorbu kovových skiel) bola aplikovaná na zachytenie a prípravu metastabilných fáz z roztavených fluoridových tavenín; konkrétne zo systému zloženia $(LiF–CaF_2)_{eut}–xLaF_3$ (x = 0, 5, 10, 20, a 30 mol%). Touto metódou boli pripravené dva typy podchladených fragmentov – tvaru šupiniek a sférického tvaru. Fázová analýza doplnená o SEM-EDX a S/TEM analýzu potvrdila existenciu metastabilnej fázy obsahujúcej prvky Ca, La a F. Táto fáza súvisí so známou fcc $Ca_{0.65}La_{0.35}F_{2.35}$ fázou. Mriežkové parametre metastabilnej fázy sa menili so zložením ochladzovaného systému. Bolo zistené, že po teplotnej relaxácii sa metastabilná fáza rozpadá na CaF_2 a LaF_3, čo je v súlade s rovnovážnym fázovým diagramom študovaného systému. Pozorovanie tvorby dodatočnej/zdanlivej fázy v nerovnovážnom stave demonštruje využitie extrémne rýchleho chladenia na dosiahnutie a štúdium teplotne nerovnovážnych stavov tuhých látok, čo odráža akýsi zamrznutý stav kvapaliny.

Publikácie a príspevky:

BOČA, Miroslav - ŠIMURDA, Michal - ŠVEC, Peter - ŠVEC, Peter Jr. - JANIČKOVIČ, Dušan - CZÍMEROVÁ, Adriana - KUBÍKOVÁ, Blanka - MLYNÁRIKOVÁ, Jarmila. Unexpected phase transformations in ternary fluoride systems. In 19th European Symposium on Fluorine Chemistry: Book of Abstracts. - Warszawa, Poland: Oficyna Wydawniczo-Poligraficzna ADAM, 2019, p. 134.

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BOČA, Miroslav - ŠIMURDA, Michal - ŠVEC, Peter - ŠVEC, Peter Jr. - JANIČKOVIČ, Dušan - CZÍMEROVÁ, Adriana - KUBÍKOVÁ, Blanka - NETRIOVÁ, Zuzana - MLYNÁRIKOVÁ, Jarmila. Unusual phase transformations in ternary fluoride systems. In ChemZi: Zborník abstraktov: 71. Zjazd chemikov, 9-13 september 2019, Vysoké Tatry, Horný Smokovec, Slovensko. Bratislava: Slovenská chemická spoločnosť, 2019, 2019, roč. 15, č. 1, s. 82. ISSN 1336-7242. Typ: AFH

24.) 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: 45863 €

Dosiahnuté výsledky:

Riešenie projektu pokračovalo optimalizáciou procesu spekania materiálov na báze diboridovej keramiky ZrB2-SiC s prídavkom rôzneho obsahu rôznych oxidov prvkov vzácnych zemín. Na základe výsledkov spekania (kinetika, hustota vzoriek) bol ako najoptimálnejší spôsob prípravy určený spekanie pri podmienkach 2000°C/70MPa/7min/Ar pre materiály s prídavkom 2 a 5 hmot.% prísad. Nakoľko oxidy vzácnych zemín podporovali spekanie, materiály s obsahom 10 hmot.% boli spekané pri nižšej teplote, t.j. pri podmienkach: 1950°C/70MPa/7min/Ar. Všetky materiály dosiahli relatívnu hustotu viac ako 98% teoretickej hustoty. Boli študované mechanické vlastnosti týchto materiálov pri izbovej teplote, akými sú pevnosť, Youngov modul pružnosti, tvrdosť a lomová húževnatosť. Za pozitívny výsledok možno považovať, že ani prísada 10 hmot.% oxidov vzácnych zemín nezhoršila mechanické vlastnosti pri izbovej teplote, naopak napr. lomová húževnatosť materiálov dokonca vzrástla. Výrazný rozdiel medzi vplyvom rôznych prvkov vzácnych zemín na spekanie a mechanické vlastnosti materiálov pri izbovej teplote nebol pozorovaný. Tieto prísady sú pridávané za

účelom zlepšenia vysokoteplotných vlastností, akými sú odolnosť materiálov proti oxidácií a ablácií. Tieto vlastnosti budú študované v nasledujúcom kroku, pričom sa očakáva výrazny vplyv množstva a typu oxidu prvku vzácnej zeminy. Počas riešenia projektu sa taktiež skúmala možnosť tvorby usporiadaných štruktúr u diboridových keramík. Ako modelový systém sa študoval materiál na báze TiB2 a tiež kompozitný systém TiB2-SiC. K usporiadaniu, resp. textúre došlo vplyvom pôsobenia silného magnetického poľa počas odlievania keramickej suspenzie obsahujúcej požadované chemické zloženie. Bolo jasne preukázané, že texturované materiály majú výrazne zlepšené mechanické vlastnosti v jednom smere. V ďalšom kroku sa bude skúmať možnosť texturovania komplexnej, viacfázovej štruktúry s prídavkom prvkov vzácnych zemín.

Výstupy:
1. 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, 2019, in press, https://doi.org/10.1016/j.jeurceramsoc.2019.11.006.
2. FÜRDÖSOVÁ, Zuzana - ÜNSAL, Hakan - KOVALČÍKOVÁ, Alexandra - DLOUHÝ, Ivo - TATARKO, Peter. ZrB2-SiC ceramics with rare-earth oxide additives. In Workshop Processing and properties of advanced ceramics and glasses, November 20-22, 2019, Ráztočno, Slovak Republic: book of extended abstracts. Ed. Jana Valúchová; 2019, p. 57-61. ISBN 978-80-971648-8-1.
3. TATARKO, Peter - GRASSO, Salvatore - KOVALČÍKOVÁ, Alexandra - DLOUHÝ, Ivo - REECE, Michael J. Preparation of highly textured TiB2-based ceramics using a strong magnetic field. In Engineering Ceramics 2019, Advanced Research Workshop: Ceramics for people, Smolenice castle, May 12-16, 2019: book of abstracts, 2019, p. 51. ISBN 978-80-971648-7-4.
4. FÜRDÖSOVÁ, Zuzana - KOVALČÍKOVÁ, Alexandra - HANZEL, Ondrej - DLOUHÝ, Ivo - TATARKO, Peter. Influence of powder processing route and rare earth additives on the mechanical properties of ZrB2-SiC ceramics. In XVI ECerS Conference, Torino, Italy, 16-20 June 2019: abstract book. - Italy, 2019, p. 813.
5. FÜRDÖSOVÁ, Zuzana - KOVALČÍKOVÁ, Alexandra - HANZEL, Ondrej - DLOUHÝ, Ivo - TATARKO, Peter. Preparation and characterization of ZrB2-based ceramics with rare earth oxide additives. In Engineering Ceramics 2019, Advanced Research Workshop: Ceramics for people, Smolenice castle, May 12-16, 2019: book of abstracts, p. 71. ISBN 978-80-971648-7-4.
6. ÜNSAL, Hakan - SHEPA, Ivan - HANZEL, Ondrej - MÚDRA, Erika - VOJTKO, Marek - DUSZA, Ján - TATARKO, Peter. In situ synthesis and characterization of B4C-TiB2 fibers composites. In XVI ECerS Conference, Torino, Italy, 16-20 June 2019: abstract book. - Italy, 2019, p. 701.

25.) 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: 27100 €

Dosiahnuté výsledky:
V prvej etape riešenia projektu boli pripravené hutné materiály na báze Si_3N_4 s rôznymi spekacími prísadami na báze kremičitanov a fosforečnanov. Bol optimalizovaný proces teploty a času spekania s cieľom dosiahnúť na hraniciach nitridu kremičitého bioaktívne fázy. Analýzou kryštalických fáz pomocou röntgenovej difrakcie a amorfných fáz energiovo disperznou analýzou boli vybrané spekacie prísady, ktorých vplyv na výsledné mechanické vlastnosti (tvrdosť, pevnosť) a biologickú odozvu bude študovaný v nasledujúcich etapách projektu.

Výstupy:
HIČÁK, Michal - HNATKO, Miroslav - LABUDOVÁ, Martina - GALUSKOVÁ, Dagmar - SEDLÁČEK, Jaroslav - LENČÉŠ, Zoltán - ŠAJGALÍK, Pavol. Bioproperties of Si3N4-based ceramics after oxy-acetylene flame treatment = Biologické vlastnosti keramiky na báze Si3N4 po opracovaní povrchu kyslíkovo-acetylénovým plameňom. In Workshop Processing and properties of advanced ceramics and glasses, November 20-22, 2019, Ráztočno, Slovak Republic: book of extended abstracts. - Bratislava, Slovak Republic: Institute of Inorganic Chemistry SAS, 2019, p. 30-41. ISBN 978-80-971648-8-1. (Workshop Processing and properties of advanced ceramics and glasses).
TATARKOVÁ, Monika - TATARKO, Peter - DLOUHÝ, Ivo - DUSZA, Ján. Sintering behaviour and microstructural

evolution of silicon nitride composites with boron nitride platelets. In Preparation of ceramic materials: Proceedings of the 13th international conference. Jahodná, 25.-27.6.2019. Eds. B. Plešingerová, D. Medveď. Košice: Technical University, 2019, p. 111-114. ISBN 978-80-553-3314-4.

Programy: Štrukturálne fondy EÚ Výskum a inovácie

26.) 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: 9867 €

Dosiahnuté výsledky:
V ramci podaktivity 1.4. sme sa venovali modifikácii povrchu mikroguličiek na báze nitridu kremičitého s prídavkom bioaktívnej zložky (tzv. bioaktívne plnivo) za účelom skúmania zmien ich biologických vlastností. Rovnako sme sa zacali venovať príprave hutných keramických materiálov pre extrémne aplikácie na báze boridov a karbidov ako aj príprave kompozitov s prídavkom grafénu.

HIČÁK, Michal - HNATKO, Miroslav - LABUDOVÁ, Martina - GALUSKOVÁ, Dagmar - SEDLÁČEK, Jaroslav - LENČÉŠ, Zoltán - ŠAJGALÍK, Pavol. Bioproperties of Si3N4-based ceramics after oxy-acetylene flame treatment = Biologické vlastnosti keramiky na báze Si3N4 po opracovaní povrchu kyslíkovo-acetylénovým plameňom. In Workshop Processing and properties of advanced ceramics and glasses, November 20-22, 2019, Ráztočno, Slovak Republic: book of extended abstracts. Ed. Jana Valúchová; recenzenti Marián Janek, Robert Klement, Alexandra Kovalčíková, Monika Michálková, Jozef Ráheľ, Peter Tatarko. - Bratislava, Slovak Republic: Institute of Inorganic Chemistry SAS, 2019, p. 30-41. ISBN 978-80-971648-8-1.
ŠIMKO, František - RAKHMATULLIN, Aydar - VÉRON, Emmanuel - ALLIX, Mathieu - FLORIAN, Pierre - KORENKO, Michal - NETRIOVÁ, Zuzana - BESSADA, Catherine. Oxo- and (oxo)(fluoro)-aluminates: Synthesis, stability and structure correlation = Oxo- a (oxo)(fluoro)-hlinitany: Syntézy, stabilita a vzájomná štruktúrna korelácia. In Interakce tavenin s progresivními anorganickými materiály, 10. odborný seminář, 14. - 15. října 2019, Hradec nad Moravicí, Česká republika. - Česká republika: VŠB TU Ostrava, 2019, p. 11-13.
HANZEL, Ondrej - SINGH, Meinam Annebushan - MARLA, Deepak - SEDLÁK, Richard - ŠAJGALÍK, Pavol. Wire electrical discharge machinable SiC with GNPs and GO as the electrically conducting filler. In Journal of the European Ceramic Society, 2019, vol. 39, no. 8, p. 2626-2633. (4.029 - IF2018). ISSN 0955-2219.

Príloha C - Publikačná činnosť organizácie (generovaná z ARL)

ADCA Vedecké práce v zahraničných karentovaných časopisoch – impaktovaných

ADCA01 BAČÍK, Peter** - FRIDRICHOVÁ, Jana - UHER, Pavel - RYBÁR, S. - KUREKOVÁ, Valéria - LUPTÁKOVÁ, Jarmila - VRABLÍKOVÁ, Dana - PUKANČÍK, Libor - VACULOVIČ, T. Octahedral substitution in beryl from weakly fractionated intragranitic pegmatite Predne Solisko, Tatry Mountains (Slovakia): the indicator of genetic conditions. In Journal of Geosciences, 2019, vol. 64, no. 1, p. 59-72. (2018: 1.275 - IF, Q3 - JCR, 0.559 - SJR, Q2 - SJR, karentované - CCC). (2019 - Current Contents). ISSN 1802-6222.

ADCA02 BOČA, Miroslav** - NETRIOVÁ, Zuzana - RAKHMATULLIN, Aydar - VASKOVÁ, Zuzana - HADZIMOVÁ, Eva - SMRČOK, Ľubomír - HANZEL, Ondrej - KUBÍKOVÁ, Blanka. The differing responses of various techniques in measuring the phase transformations of K2ZrF6. In Journal of Molecular Liquids, 2019, vol. 287, p. 110969-1-110969-10. (2018: 4.561 - IF, Q1 - JCR, 0.862 - SJR, Q1 - SJR, karentované - CCC). (2019 - Current Contents, WOS, SCOPUS). ISSN 0167-7322.

ADCA03 BORA, Pankaj L. - NOVOTNÝ, Jan - RUUD, Kenneth - KOMOROVSKÝ, Stanislav - MAREK, Radek**. Electron-spin structure and metal-ligand bonding in open-shell systems from relativistic EPR and NMR: A case study of square-planar iridium catalysts. In Journal of Chemical Theory and Computation, 2019, vol. 15, no. 1, p. 201-214. (2018: 5.313 - IF, Q1 - JCR, 2.236 - SJR, Q1 - SJR, karentované - CCC). (2019 - Current Contents). ISSN 1549-9618.

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FAI Zostavovateľské práce knižného charakteru (bibliografie, encyklopédie, katalógy, slovníky, zborníky, atlasy ...)

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3. [1.1] CHAN, Bun - SIMMIE, John M. Barriometry an enhanced database of accurate barrier heights for gas-phase reactions. In PHYSICAL CHEMISTRY CHEMICAL PHYSICS. ISSN 1463-9076, 2018, vol. 20, no. 16, pp. 10732-10740., Registrované v: WOS
4. [1.1] KESHARWANI, Manoj K. - SYLVETSKY, Nitai - KOEHN, Andreas - TEW, David P. - MARTIN, Jan M. L. Do CCSD and approximate CCSD-F12 variants converge to the same basis set limits? The case of atomization energies. In JOURNAL OF CHEMICAL PHYSICS. ISSN 0021-9606, 2018, vol. 149, no. 15, pp., Registrované v: WOS
5. [1.1] KLAWOHN, Sascha - KAUPP, Martin - KARTON, Amir. MVO-10: A Gas-Phase Oxide Benchmark for Localization/Delocalization in Mixed-Valence Systems. In JOURNAL OF CHEMICAL THEORY AND COMPUTATION. ISSN 1549-9618, 2018, vol. 14, no. 7, pp. 3512-3523., Registrované v: WOS
6. [1.1] LASAR, Christian - KLUENER, Thorsten. Explicitly correlated orbital optimized contracted pair correlation methods: Foundations and applications. In JOURNAL OF THEORETICAL & COMPUTATIONAL CHEMISTRY. ISSN 0219-6336, 2018, vol. 17, no. 4, pp., Registrované v: WOS
7. [1.1] MA, Qianli - WERNER, Hans-Joachim. Explicitly correlated local coupled-cluster methods using pair natural orbitals. In WILEY INTERDISCIPLINARY REVIEWS-COMPUTATIONAL MOLECULAR SCIENCE. ISSN 1759-0876, 2018, vol. 8, no. 6, pp., Registrované v: WOS
8. [1.1] ZHAO, Yan - XIA, Lixue - LIAO, Xiaobin - HE, Qiu - ZHAO, Maria X. - TRUHLAR, Donald G. Extrapolation of high-order correlation energies: the WMS model. In PHYSICAL CHEMISTRY CHEMICAL PHYSICS. ISSN 1463-9076, 2018, vol. 20, no. 43, pp. 27375-27384., Registrované v: WOS

ADDA Vedecké práce v domácich karentovaných časopisoch – impaktovaných

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, karentované - CCC). (2010 - Current Contents). ISSN 1335-0552.

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1. [1.1] ZUZANA, Dankova - ZUZANA, Dakos - IVETA, Styriakova - ALEXANDRA, Bekenyiova. STUDY OF Cu(II) ADSORPTION BY BENTONITE AND FOLLOWING REGENERATION BY BIOLEACHING. In ARCHIVES FOR TECHNICAL SCIENCES. ISSN 1840-4855, 2018, vol., no. 19, pp. 45-56., Registrované v: WOS

ADDA02 ANDREJKOVIČOVÁ, Slávka - MADEJOVÁ, Jana - CZÍMEROVÁ, Adriana - GALKO, Igor - DOHRMANN, Reiner - KOMADEL, Peter. Mineralogy and chemistry of Fe-rich bentonite from the Lieskovec deposit (Central Slovakia). In Geologica Carpathica, 2006, vol. 57, no. 5, p. 371-378. (2005: 0.449 - IF, karentované - CCC). (2006 - Current Contents). ISSN 1335-0552.

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1. [1.1] POLAK, Filip - URIK, Martin - BUJDOS, Marek - UHLIK, Peter - MATUS, Peter. Evaluation of aluminium mobilization from its soil mineral pools by simultaneous effect of Aspergillus strains'; acidic and chelating exometabolites. In JOURNAL OF INORGANIC BIOCHEMISTRY. ISSN 0162-0134, 2018, vol. 181, no., pp. 162-168., Registrované v: WOS

ADDA03 BOČA, Miroslav - KUCHARÍK, Marián - VASILJEV, Roman - DANĚK, V.. Surface tension of melts of the system KF-K2MoO4-SiO2. In Chemical Papers - Chemické zvesti, 2003, vol. 57, no. 2, p. 68-72. (2003 - Current Contents). ISSN 0366-6352.

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1. [1.1] LOCK, Simon J. - STEWART, Sarah T. - PETAEV, Michail I. - LEINHARDT, Zoe - MACE, Mia T. - JACOBSEN, Stein B. - CUK, Matija. The Origin of the Moon Within a Terrestrial Synestia. In JOURNAL OF

GEOPHYSICAL RESEARCH-PLANETS. ISSN 2169-9097, 2018, vol. 123, no. 4, pp. 910-951., Registrované v: WOS

ADDA04 DANKO, Martin - MIČUŠÍK, Matej - OMASTOVÁ, Mária - BUJDÁK, Juraj - CHORVÁT, Dušan Jr. Spectral characterisation of new organic fluorescent dyes with an alkoxysilane moiety and their utilisation for the labelling of layered silicates. In Chemical papers, 2013, vol. 67, no. 1, p. 18-28. (2012: 0.879 - IF, 0.301 - SJR, karentované - CCC). (2013 - Current Contents). ISSN 0366-6352.

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1. [1.2] THIRUVASAGAM, P. Synthesis and characterization of new aromatic hydroxy acid compounds. In Bulletin of the Chemical Society of Ethiopia. ISSN 10113924, 2018-01-01, 32, 3, pp. 523-530., Registrované v: SCOPUS

ADDA05 HRACHOVÁ, Jana - CHODÁK, Ivan - KOMADEL, Peter. Modification and characterization of montmorillonite fillers used in composites with vulcanized natural rubber. In Chemical papers, 2009, vol. 63, no. 1, p. 55-61. (2008: 0.758 - IF, karentované - CCC). (2009 - Current Contents). ISSN 0366-6352.

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2. [1.1] CAO, J. - WEN, N. - ZHENG, Y.Y. The preparation of calcium pimelate modified OMMT from natural Camontmorillonite and its application as beta-nucleating agent for polypropylene. In POLYMER TESTING. ISSN 0142-9418, FEB 2018, vol. 65, p. 352-359., Registrované v: WOS

3. [1.1] RANGEL-PORRAS, G. - MONCADA-SANCHEZ, C. - ZARRAGA-NUNEZ, R. - ROMERO-TOLEDO, R. - MIRANDA-AVILES, R. Thermogravimetric characterization of tyrosine and catechol adsorbed on montmorilionite. In INSTRUMENTATION SCIENCE & TECHNOLOGY. ISSN 1073-9149, 2018, vol. 46, no. 6, p. 676-692., Registrované v: WOS

4. [1.1] VERMISOGLOU, E.C. - GIANNAKOPOULOU, T. - TODOROVA, N. - BOUKOS, N. - VAIMAKIS, T. - PETRIDIS, D. - TRAPALIS, C. Organoclay/Graphitic Nanoplatelets Lamellar Hybrid Composites. In JOURNAL OF NANOSCIENCE AND NANOTECHNOLOGY. ISSN 1533-4880, NOV 2018, vol. 18, no. 11, p. 7797-7803., Registrované v: WOS

5. [1.1] VERMISOGLOU, E.C. - GIANNAKOPOULOU, T. - TODOROVA, N. - VAIMAKIS, T. - BOUKOS, N. - PETRIDIS, D. - TRAPALIS, C. 2-Dimensional Clay/Reduced Graphene Oxide Ordered Heterostructures Dispersible in Water via a One-Step Hydrothermal Route. In JOURNAL OF NANOSCIENCE AND NANOTECHNOLOGY. ISSN 1533-4880, JUL 2018, vol. 18, no. 7, p. 4684-4691., Registrované v: WOS

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ADDA06 ŠIMKO, František - DANĚK, V.. Cryoscopy in the system Na3AlF6-Fe2O3. In Chemical Papers - Chemické zvesti, 2001, vol. 55, no. 5, p. 269-272. ISSN 0366-6352.

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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). (2011 - Thomson Reuters Master Journal List). ISSN 0950-0618.

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2. [1.1] KHATER, H. M. - EZZAT, M. Preparation and characterization of engineered stones based geopolymer composites. In JOURNAL OF BUILDING ENGINEERING. ISSN 2352-7102, 2018, vol. 20, p. 493-500., Registrované v: WOS

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ADEB Vedecké práce v ostatných zahraničných časopisoch – neimpaktovaných

ADEB01 GALLO, Jiří - STEWART, Todd - NOVOTNÝ, Radek - DUSZA, Ján - GALUSEK, Dušan. Early fracture of a plasma cup ceramic liner: a case report and surface analysis. In Biomedical Papers, 2007,

vol. 151, no. 2, p. 341-346. ISSN 1213-8118.

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1. [1.1] CUCCHI, Davide - GATHEN, Martin - STREICHER, Robert - WIRTZ, DIeter Christian. Ceramic-on-Ceramic in Total Hip Replacement Revision. In Zeitschrift fur Orthopadie und Unfallchirurgie. ISSN 18646697, 2018-01-01, 156, 3, pp. 272-280., Registrované v: WOS

ADEB02 KAUPP, Martin - MALKIN, Vladimír - MALKINA, Oľga - SALAHUB, Dennis R. Ab initio ECP/DFT calculation and interpretation of carbon and oxygen NMR chemical shift tensors in transition-metal carbonyl complexes. In Chemistry -A European Journal, 1996, vol. 2, no. 1, p. 24-30. ISSN 0947-6539.

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ADEB03 MALKIN, Vladimír - MALKINA, Oľga - STEINEBRUNNER, G. - HUBER, H. Solvent effect on the NMR chemical shieldings in water calculated by a combination of molecular dynamics and density functional theory. In Chemistry - A European Journal, 1996, vol. 2, no. 4, p. 452-457. ISSN 0947-6539.

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2. [1.1] GALAMBA, N. - CABRAL, Benedito J. C. Magnetic properties and core electron binding energies of liquid water. In JOURNAL OF CHEMICAL PHYSICS. ISSN 0021-9606, 2018, vol. 148, no. 4, pp., Registrované v: WOS

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ADEB04 TATARKO, Peter - LOJANOVÁ, Š. - DUSZA, Ján - ŠAJGALÍK, Pavol. Characterization of rare-earth doped Si3N4/SiC micro/nano-composites. In Processing and Application of Ceramics, 2010, vol. 4, no. 1, p. 25-32.

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1. [1.1] LI, Bin - LI, Guangqi - CHEN, Haiyang - CHEN, Junhong - HOU, Xinmei - LI, Yong. Reaction and formation mechanism of Fe-Si3N4 composite prepared by flash combustion synthesis. In CERAMICS INTERNATIONAL. ISSN 0272-8842, 2018, vol. 44, no. 18, pp. 22777-22783., Registrované v: WOS

2. [1.1] LI, Bin - LI, Guangqi - CHEN, Junhong - CHEN, Haiyang - XING, Xinming - HOU, Xinmei - LI, Yong. Formation mechanism of elongated beta-Si3N4 crystals in Fe-Si3N4 composite via flash combustion. In CERAMICS INTERNATIONAL. ISSN 0272-8842, 2018, vol. 44, no. 8, pp. 9395-9400., Registrované v: WOS

3. [1.1] MARCHENKO, V. M. - KISELEV, V. V. Ruby Emission in the Range 400-800 nm with Excitation by Continuous-Wave CO2 Laser Pulses. In JOURNAL OF APPLIED SPECTROSCOPY. ISSN 0021-9037, 2017, vol. 83, no. 6, pp. 1042-1045., Registrované v: WOS

4. [1.1] PARKHOMENKO, A. A. - LUKIANOVA, O. A. - KHMARA, A. N. - KRASIL';NIKOV, V. V. Effect of the Various Oxide Additives on the Microhardness of Silicon Nitride Ceramics. In PROCEEDINGS OF THE 2017 IEEE 7TH INTERNATIONAL CONFERENCE NANOMATERIALS: APPLICATION & PROPERTIES (NAP). ISSN 2306-580X, 2017, vol., no., pp., Registrované v: WOS

ADFB Vedecké práce v ostatných domácich časopisoch – neimpaktovaných

ADFB01 PELIKÁN, P. - LIŠKA, Marek. MO study of TD-D4H equilibrium in complexes of transition metals. II. Equilibrium in tetrafluoro and tetrabromo complexes of atoms of the first transition row. In Collection of Czechoslovak Chemical Communications, 1984, vol. 49, no. 12, p. 2837-2856. ISSN 0010-0765.

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1. [1.1] SADOK, Ines Ben Hadj - HAJLAOUI, Fadhel - BEN AYED, Hanen - ENNACEUR, Nasreddine - NASRI, Moncef - AUDEBRAND, Nathalie - BATAILLE, Thierry - ZOUARI, Nabil. Crystal packing, high-temperature phase transition, second-order nonlinear optical and biological activities in a hybrid material: [(S)-C7H16N2][CuBr4]. In JOURNAL OF MOLECULAR STRUCTURE. ISSN 0022-2860, 2018, vol. 1167, no., pp. 316-326., Registrované v: WOS

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

ADMA01 BOČA, Miroslav - GURIŠOVÁ, Veronika - ŠIMKO, František. Some aspects of the wavelength dispersive x-ray determination of fluorine content in various matrices. In Journal of Applied Spectroscopy, 2017, vol. 84, no. 2, p. 324-331. (2016: 0.572 - IF, Q4 - JCR, 0.194 - SJR, Q4 - SJR).

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1. [1.1] BODNAR, Victoria - GANEEV, Alexander - GUBAL, Anna - SOLOVYEV, Nikolay - GLUMOV, Oleg - YAKOBSON, Viktor - MURIN, Igor. Pulsed glow discharge enables direct mass spectrometric measurement of fluorine in crystal materials Fluorine quantification and depth profiling in fluorine doped potassium titanyl phosphate. In SPECTROCHIMICA ACTA PART B-ATOMIC SPECTROSCOPY. ISSN 0584-8547, 2018, vol. 145, no., pp. 20-28., Registrované v: WOS

ADMA02 LIU, Aimin - SHI, Zhongning - XIE, K. - HU, Xianwei - GAO, Bingliang - KORENKO, Michal - WANG, Zhaowen. Extraction of Al-Si master alloy and alumina from coal fly ash. In Journal of Mining and Metallurgy : Section B: Metallurgy, 2017, vol. 53, no. 2, p. 155-162. (2016: 0.804 - IF, Q3 - JCR, 0.529 - SJR, Q2 - SJR). ISSN 1450-5339.

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ADMA03 SILNÝ, A. - KORENKO, Michal - DANĚK, V. - CHRENKOVÁ, Marta. Carbon consumption during laboratory aluminum electrolysis. In Canadian Metallurgical Quarterly, 2006, vol. 45, no. 3, p. 275-281. ISSN 0008-4433.

Citácie:

1. [1.1] OUZILLEAU, Philippe - GHERIBI, Aimen E. - CHARTRAND, Patrice. Prediction of CO2/CO formation from the (primary) anode process in aluminium electrolysis using an electrothermodynamic model (for coke crystallites). In ELECTROCHIMICA ACTA. ISSN 0013-4686, 2018, vol. 259, no., pp. 916-929., Registrované v: WOS

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

ADMB01 CZÍMEROVÁ, Adriana - BUJDÁK, Juraj - GÁPLOVSKÝ, A. Reduction of the negative charge of layered silicates probed by cationic, azine dyes. In Solid State Phenomena, 2003, vol. 90-91, p. 469-474. (2003 - Current Contents). ISSN 1012-0394.

Citácie:

1. [1.1] NAKAZATO, Ryosuke - SHIMADA, Tetsuya - OHTANI, Yuta - ISHIDA, Tamao - TAKAGI, Shinsuke. Adsorption and emission enhancement behavior of 4,4 ';-bipyridine on dispersed montmorillonite nano-sheets under aqueous conditions. In TETRAHEDRON LETTERS. ISSN 0040-4039, 2018, vol. 59, no. 25, pp. 2459-2462., Registrované v: WOS

ADMB02 SALAMON, D. - ŠAJGALÍK, Pavol - LIŠKA, Marek. Mechanical properties and microstructure of alpha-sialon based cutting tools. In Key Engineering Materials. - Trans Tech Publications, 2005, vol. 290, p. 250-253. (2004: 0.278 - IF). (2005 - SCOPUS). ISSN 1013-9826.

Citácie:

1. [1.1] AHMED, B. A. - HAKEEM, A. S. - LAOUI, T. - AL MALKI, M. - EHSAN, M. A. - ALI, S. Low-temperature spark plasma sintering of calcium stabilized alpha sialon using nano-size aluminum nitride precursor. In INTERNATIONAL JOURNAL OF REFRACTORY METALS & HARD MATERIALS. ISSN 0263-4368, 2018, vol. 71, no., pp. 301-306., Registrované v: WOS

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

AEC01 DUSZA, Ján - ŠAJGALÍK, Pavol - RUDNAYOVÁ, Emöke - HVIZDOŠ, Pavol - LENČÉŠ, Zoltán. Fracture characterization of silicon nitride based layered composites. In Fracture Mechanics of Ceramics. - New York : Plenum Press, 1996, vol. 12, P. 383-398.

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1. [1.1] TANG, Xueyuan - LI, Yongwei - CHENG, Xuan - ZHANG, Ying. In-situ formation of BN layers by nitriding boron powders in BN/Si3N4-based composite ceramics. In CERAMICS INTERNATIONAL. ISSN 0272-8842, 2018, vol. 44, no. 9, pp. 10322-10327., 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:

1. [1.1] YU, Jun-Jie - GUO, Wei-Ming - WEI, Wan-Xin - LIN, Hua-Tay - WANG, Cheng-Yong. Fabrication and wear behaviors of graded Si3N4 ceramics by the combination of two-step sintering and beta-Si3N4 seeds. In JOURNAL OF THE EUROPEAN CERAMIC SOCIETY. ISSN 0955-2219, 2018, vol. 38, no. 10, pp. 3457-3462., Registrované v:

WOS

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

AFDA01 TATARKO, Peter - LOJANOVÁ, Š. - DUSZA, Ján - ŠAJGALÍK, Pavol. Fracture toughness of Si3N4 based ceramics with rare-earth oxide sintering additives. In Key Engineering Materials, 2009, vol. 409, p. 377-381. (2009 - SCOPUS). ISSN 1013-9826.(Fractography of Advanced Ceramics III : International Conference on Fractohraphy of Advanced Ceramics).

Citácie:

1. [1.1] ZHONG, Jing - HUA, Guomin - CHEN, Linbo - LI, Changsheng - YANG, Jianhong - CHENG, Xiaonong. Influence of carbon on structure stability, mechanical and tribological properties of beta-Si-3(C-x,N1-x)(4) silicon carbonitride. In MATERIALS RESEARCH EXPRESS. ISSN 2053-1591, 2018, vol. 5, no. 5, pp., Registrované v: WOS

Príloha D- Údaje o pedagogickej činnosti organizácie

Semestrálne prednášky:

doc. Ing. Miroslav Boča, DrSc.
Názov semestr. predmetu: Spectroscopy
Počet hodín za semester: 28
Názov katedry a vysokej školy: Northeastern University, Shenyang, Čína, School of Metallurgy

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

Ing. Blanka Kubíková, PhD.
Názov semestr. predmetu: Thermodynamic of condensed systems
Počet hodín za semester: 4
Názov katedry a vysokej školy: Northeastern University, Shenyang, Čína, School of Metallurgy

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

doc. Ing. Zoltán Lenčéš, PhD.
Názov semestr. predmetu: Materiály pro speciální použití
Počet hodín za semester: 2
Názov katedry a vysokej školy: Vysoká škola báňská - TU Ostrava, Česká republika, Fakulta metalurgie a materiálového inženýrství

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:

doc. Ing. Zoltán Lenčéš, PhD.
Názov semestr. predmetu: Materiálová chémia
Počet hodín za semester: 50
Názov katedry a vysokej školy: Prírodovedecká fakulta UK, Katedra anorganickej chémie

Ing. Jarmila Mlynáriková, PhD.
Názov semestr. predmetu: Pokročilé cvičenie z fyzikálnej chémie (1)
Počet hodín za semester: 12
Názov katedry a vysokej školy: Prírodovedecká fakulta UK, Katedra fyzikálnej chémie

Ing. Zuzana Netriová, PhD.
Názov semestr. predmetu: Pokročilé cvičenie z fyzikálnej chémie (1)
Počet hodín za semester: 12

Názov katedry a vysokej školy: Prírodovedecká fakulta UK, Katedra fyzikálnej chémie

Mgr. Patrícia Petrisková
Názov semestr. predmetu: Všeobecná a anorganická chémia
Počet hodín za semester: 40
Názov katedry a vysokej školy: Univerzita Komenského v Bratislave, Katedra anorganickej chémie

Semináre:

Mgr. Stanislav Komorovský, PhD.
Názov semestr. predmetu: Chemické výpočty (2)
Počet hodín za semester: 26
Názov katedry a vysokej školy: Prírodovedecká fakulta UK, Katedra anorganickej chémie

Terénne cvičenia:

Individuálne prednášky:

Dr. Vladimír Malkin, DrSc.
Názov semestr. predmetu: Introduction to Density Functional Theory
Počet hodín za semester: 4
Názov katedry a vysokej školy: Prírodovedecká fakulta UK, Katedra fyzikálnej a teoretickej chémie

Príloha E - Medzinárodná mobilita organizácie

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

Krajina	Druh dohody					
	MAD, KD, VTS		Medziústavná		Ostatné	
	Meno pracovníka	Počet dní	Meno pracovníka	Počet dní	Meno pracovníka	Počet dní
Belgicko	Anna Prnová	15				
Česko	Ondrej Hanzel	5				
	Ondrej Hanzel	3				
	Peter Tatarko	3				
	Peter Tatarko	5				
Čína	Michal Korenko	17				
Počet vyslaní spolu	**6**	**48**				

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

Krajina	Druh dohody					
	MAD, KD, VTS		Medziústavná		Ostatné	
	Meno pracovníka	Počet dní	Meno pracovníka	Počet dní	Meno pracovníka	Počet dní
Česko	Gianmarco Taveri	4				
	Jiří Hybler	7				
	Luca Bertolla	12				
Čína					Shuang Wu	181
Grécko					Eleni Gianni	93
Rakúsko					Christina Atzenhofer	27
Rusko					Igor Petrushenko	30
Ukrajina					Anna Kityk	125
Veľká Británia					Peter Cherry	275
Počet prijatí spolu	**3**	**23**			**6**	**731**

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

Krajina	Názov konferencie	Meno pracovníka	Počet dní
Belgicko	JPNM	Miroslav Boča	1
		Peter Tatarko	1
Bulharsko	MMT	Mária Chromčíková	8
Česko	IICCCL	Juraj Bujdák	3
	Interakce tavenin	Michal Korenko	2
		Zoltán Lenčéš	2
		František Šimko	2
	Kalorimetrický seminář	Mária Chromčíková	5
	KSAP-PM 2019	Anna Prnová	3
	NETZSCH	Mária Chromčíková	2
		Blanka Kubíková	2
		Zuzana Netriová	2
		Anna Prnová	2
	Strategy AV21	Juraj Bujdák	3
Čína	CICC-11	Ondrej Hanzel	10
		Pavol Šajgalík	5
		Peter Tatarko	10
Francúzsko	AMARE	Patrícia Petrisková	8

	deMon Developers	Oľga Malkin	5
		Vladimír Malkin	5
	EUROCLAY	Martin Barlog	7
		Silvia Belušáková	7
		Juraj Bujdák	7
		Ľuboš Jankovič	7
		Jana Madejová	11
		Daniel Moreno	6
		Helena Pálková	7
		Eva Scholtzová	6
		Michal Slaný	9
		Peter Škorňa	7
	HT-CMC 10	Peter Tatarko	5
	MS11	Miroslav Boča	6
		Michal Korenko	6
		Blanka Kubíková	6
		František Šimko	6
Maďarsko	JTACC-V4	Mária Chromčíková	5
		Anna Prnová	5
Poľsko	ESFC	Miroslav Boča	6
Rakúsko	CESTC	Stanislav Komorovský	4
	MMQC	Oľga Malkin	6
		Vladimír Malkin	6
	UGM	Daniel Moreno	3
Singapur	ACA	Eva Scholtzová	8
Srbsko	CYSC	Hakan Ünsal	6
	SSCerM	Ondrej Hanzel	4
		Peter Tatarko	4
Španielsko	SSNMR	Anna Prnová	5
Taliansko	CEEC-TAC	Mária Chromčíková	7
	ECERS	Ondrej Hanzel	6
		Miroslav Hnatko	6
		Zoltán Lenčéš	6
		Jaroslav Sedláček	6
		Pavol Šajgalík	5
		Peter Tatarko	6
		Monika Tatarková	6
		Hakan Ünsal	9
USA	ICACC	Zoltán Lenčéš	6
		Pavol Šajgalík	6
Spolu	**26**	**58**	**315**

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

Skratky použité v tabuľke C:

ACA - 7th Annual Conference of Analytix
AMARE - International Conference of Applications of Multiscale Approaches in Environmental Chemistry
CEEC-TAC - "5th Central and Eastern European on Thermal Analysis and Calorimetry" and "14th Mediterranean Conference on Calorimetry and Thermal Analysis
CESTC - "17th Central European Symposium on Theoretical Chemistry"
CICC-11 - 11th International Conference on High-Performance Ceramics
CYSC - "13th Conference for Young Scientists in Ceramics"
deMon Developers - 19th deMon Developers Workshop
ECERS - "16th Conference and Exhibition of the European Ceramic Society"
ECERS - 16th Conference and Exhibition of the European Ceramic Society
ESFC - "19th European Symposium on Fluorine Chemistry"

EUROCLAY - "International Conference on Clay Science and Technology"
HT-CMC 10 - "10th International Conference on High Temperature Ceramic Matrix Composites"
ICACC - 43th International Conference and Exposition on Advanced Ceramics and Composites
IICCCL - Interaction of Inorganic Cluster, Cages and Containers with Light
Interakce tavenin - "Interakce tavenin s progresivními anorganickými materiály"
Interakce tavenin - "Interakce tavenin s progresivními anorganickými materiály"norganickými materiály"
JPNM - EERA Joinf Programme on Nuclear Materials
JTACC-V4 - "2st Journal of Thermal Analysis and Calorimetry Conference and 7th V4 (Joint Czech-Hungarian-Polish-Slovakian) Thermal Conference
JTACC-V4 - "2st Journal of Thermal Analysis and Calorimetry Conference and 7th V4 (Joint Czech-Hungarian-Polish-Slovakian) Thermal Conference
Kalorimetrický seminář - 41. Medzinárodní český a slovenký kalorimetrický seminář
KSAP-PM 2019 - "21. ročník Konference o Speciálních Anorganických Pigmentech a Práškových Materiálech"
MMQC - XIIth Workshop: Modern Methods in Quantum Chemistry
MMT - "21st International Conference. Materials, Methods and Technologies
MS11 - "11th International symposium on Molten salts Chemistry and Technology"
NETZSCH - Termická analýza NETZSCH, Alpha Technologies Brucker Optic
SSCerM - 5th Conference of the Serbian Society for Ceramic Materials"
SSNMR - IV School on Solid State Nuclear Magnetic Resonance and Applications
Strategy AV21 - Strategy AV21 - Molecules and Materials for Life
UGM - "Materials Design User Group Meeting"

Príloha F - Vedecko-popularizačná činnosť pracovníkov organizácie SAV

Meno	Spoluautori	Typ[1]	Názov	Miesto zverejnenia	Dátum alebo počet za rok
Juraj Bujdák		RO	Nočná pyramída - hosť	SRo 1	30.4.2019
Viliam Pavlík		EX	Nájdi v sebe vedca	ÚACH	29.5.2019
Anna Prnová	J. Valúchová, R. Klement, D. Galusek	PB	Študentská vedecká konferencia Nová Dubnica	Nová Dubnica	1.4.2019
Peter Tatarko		EX	Exkurzia pre študentov denného štúdia programu Anorganická technológia FCHPT STU	ÚACH SAV	4.4.2019
		PB	Nové trendy vo vývoji pokročilej keramiky na ÚACH SAV	FCHPT STU	11.12.2019
		PB	Skúsenosti držiteľa grantu H2020-IF-MSCA	CVTI	23.5.2019
Miroslav Boča		PB	Prvky známe aj neznáme	ChemZi	1
Ing. Dušan Galusek		TL	Anketa SME	SME veda a technika	5
Viliam Pavlík		PB	Letná škola mladých vedcov 15.-19. 7. 2019	ÚACH	1

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