ИНСТИТУТ ТЕХНИЧКИХ НАУКА САНУ

Кнез Михајлова 35/IV

11000 Београд

НАУЧНОМ ВЕЋУ ИНСТИТУТА ТЕХНИЧКИХ НАУКА САНУ

Предмет: Молба за покретање поступка за реизбор у звање научни сарадник

Молим Научно веће Института техничких наука САНУ, да у складу са Правилником о поступку, начину вредновања и квантитативном исказивању научноистраживачих резултата истраживача (Сл. Гласник РС, бр. 24/2016, 21/2017), покрене поступак мог реизбора у звање научни сарадник.

За чланове комисије за припрему извештаја Научном већу, предлажем:

1. др Смиљу Марковић, научну саветницу Института техничких наука САНУ
2. др Ненада Филиповића, вишег научног сарадника Института техничких наука САНУ
3. др Ивану Стојковић Симатовић, ванредну професорку Факултета за физичку хемију, Универзитета у Београду

У Прилогу достављам:

1. Биографију са библиографијом
2. Извештај о цитираности радова
3. Одлуку о стицању научног звања научни сарадник - реизбор
4. Скенирану диплому о стеченом научном степену доктора наука
5. Прилози

У Београду:
20.08.2024.

Подносилац Молбе:

Ана Станковић

др Ана Станковић

СТРУЧНА БИОГРАФИЈА

Др Ана Станковић је рођена 1979. год. у Крушевцу. Завршила је Гимназију у Трстенику. Основне студије уписала је 1998. год. на Факултету за физичку хемију где је дипломирала 2005. год. (дипломски рад *Примена глобалне оптимизације у макромолекулској кристалографији).* Исте године уписала је последипломске студије на матичном факултету где је и магистрирала 2009. год. (магистарски рад: *Утицај параметара процесирања на ток механохемијске синтезе и спречавање процеса агломерације наноструктурних керамичких прахова*). Докторску дисертацију одбранила је 2014. год. на Факултету за физичку хемију (докторска дисертација: *Корелација функционалних и физичко-хемијских својстава прахова ZnO добијених различитим методама синтезе*).

У звање Научног сарадника изабрана је 2015. и реизабрана 2020. год. У Институту техничких наука САНУ запослена је од јула 2005. године.

Научноистраживачка делатност др Ане Станковић је орјентисана ка синтези и карактеризацији материјала на бази цинк оксида, ZnO. Посебно се бави проучавањем процеса фото- и фото-електро катализе, детекције и деградације различитих врста загађујућих једињења у присуству честица ZnO као и композитних материјала на бази ZnO. Осим тога, др Ана Станковић се бави проучавањем антибактеријских и антиканцерогених својстава наноструктурних прахова ZnO са посебном пажњом на испитивању њихове цитотоксичности у односу на хумане ћелије.

Аутор и коаутор је 11 публикација објављених у међународним часописима и 2 у часопису од националног значаја (М52). У врхунским међународним часописима (М21) објавила је 5 радова, у истакнутим међународним часописима (М22) 4 рада, у међународном часопису (М23) 1 рад и 1 рад у монографској студији/поглављу у књизи М11 или рад у тематском зборнику водећег међународног значаја (М13). Након реизбора у звање научни сарадник објавила је 1 рад у врхунском међународном часопису (М21) и 1 рад у међународном часопису (М23). Коаутор је већег броја саопштења са међународних научних скупова штампаних у целини.

Радови др Ане Станковић су према бази SCOPUS (на дан 28.08.2024. год.) цитирани 439 пута, од тога број хетероцитата износи 414, док је вредност *h* индекса 8.

<u>Ангажовање на пројектима</u>

- **Национални пројекти:**

2023– : Water pollutants detection by ZnO-modified electrochemical sensors: From computational modeling via electrochemical testing to real system application, Пројекат Фонда за науку Републике Србије, позив ПРИЗМА; сарадница на пројекту.

2024– : Development of ion-selective electrode for the detection of Chlorpyrifos in water, Пројекат Фонда за науку Републике Србије, позив Доказ концепта, сарадница на пројекту.

2024– : Програм институционалног финансирања; Уговор између Министарства науке, технолошког развоја и иновација и ИТН САНУ о реализацији и финансирању научноистраживачког рада број 451-03-47/2023-01/200175; сарадница на пројекту.

2011–2019. Молекуларно дизајнирање наночестица контролисаних морфолошких и физичко-хемијских карактеристика и функционалних материјала на њиховој основи.
ИИИ45004; Министарство просвете, науке и технолошког развоја Републике Србије; сарадница на пројекту.

2006–2010: Синтеза функционалних материјала са контролисаном структуром на молекуларном и нано нивоу, ОИ 142006, Министарство науке Републике Србије; сарадница на пројекту.

- **Међународни пројекти:**

2023– : Preparation of $ZnTiO_3$, ZnO and $(YGd)_2O_3$:Eu ceramic with conventional and pulse electric current sintering technique, Билатерални пројекат између Републике Србије и Републике Словачке, сарадница на пројекту.

2021–: COST Action CA20130 “European MIC Network – New paths for science, sustainability and standards”, Euro-MIC; сарадница на пројекту.

2019–2022: COST action CA17140, Nano2Clinic (Cancer Nanomedicine - from the bench to the bedside) Working group WG2: Physio-chemical characterization of nanodrugs; сарадница на пројекту.

2016–2017: Biocompatible engineered particles and scaffolds for drug delivery and regenerative medicine, Билатерални пројекат између Републике Србије и Републике Словеније, сарадница на пројекту.

2011–2015: COST Action TD 1004 - Theragnostic imaging and therapy: An action to develop novel nanosized systems for imaging-guided drug delivery”, сарадница на пројекту.

2012–2013: Nanostructural designing of multifunctional and sintered electrical and biological functionallygraded materials. Билатерални пројекат између Републике Србије и Републике Словеније, сарадница на пројекту.

БИБЛИОГРАФИЈА

Stanković, Ana | eNauka

Ana Stankovic (0000-0003-4433-2560) - ORCID

Stanković, Ana - Author details - Scopus (nb.rs)

1.1 Радови објављени ПРЕ избора у звање научни сарадник

M21(8,0) Радови у врхунским међународним часописима

1. **A. Stanković,** S. Dimitrijević, D. Uskoković, "Influence of size scale and morphology on antibacterial properties of ZnO powders hydrothemally synthesized using different surface stabilizing agents", *Colloids and Surfaces B: Biointerfaces* **102** (2013) 21-28. (http://dx.doi.org/10.1016/j.colsurfb.2012.07.033)

2. **A. Stanković**, Lj. Veselinović, S.D. Škapin, S. Marković D. Uskoković, Controlled mechanochemically assisted synthesis of ZnO nanopowders in the presence of oxalic acid, Journal of Materials Science 46 (11) (2011) 3716-3724. (http://link.springer.com/article/10.1007%2Fs10853-011-5273-6)

M22 (5,0) Рад у истакнутом међународном часопису

1. **Stanković,** Z. Stojanović, Lj. Veselinović, S. D. Škapin, I. Bračko, S. Marković, D. Uskoković, ZnO micro and nanocrystals with enhanced visible light absorption, *Materials Science and Engineering B* **177**(13) (2012) 1038-1045. (http://dx.doi.org/10.1016/j.mseb.2012.05.013)

2. **A. Čeliković**, Lj. Kandić, M. Zdujić D. Uskoković, Synthesis of ZnO and ZrO2 powders by mechanochemical processing. Materials Science Forum 555 (2007) 279-284. (10.4028/www.scientific.net/MSF.555.279)

M23 (3,0) Рад у међународном часопису

1. S. Marković, **A. Stanković**, Lj. Veselinović, Z. Stojanovć, D. Uskoković, Kreiranje morfologije i veličine čestica ZnO prahova, *Tehnika*, **5** (2012) 685. (http://www.sits.rs/include/data/docs0374.pdf)

M33 (1,0) Саопштење са међународног скупа штампано у целини

1. **A. Stanković**, Z. Stojanović, Lj. Veselinović, S. Marković, and D. Uskoković, Controlled Hydrothermal Processing of ZnO Powders in the Presence of PVP, 11^{th} International

Conference on Fundamental and Applied Aspects of Physical Chemistry, Physical Chemistry 2012., Proceedings, pp. 431-433. (http://www.socphyschemserb.org/enclosures/pc2012.pdf)

2. S. Marković, **A. Stanković**, V. Rajić and D. Uskoković, Optical and Catalytical Properties of Microwave Processed ZnO Powders, 12^{th} International Conference on Fundamental and Applied Aspects of Physical Chemistry, Physical Chemistry 2014., Proceedings, pp. 252-255.(http://www.socphyschemserb.org/enclosures/final-program-2014.pdf)

M34 (0,5) Саопштење са међународног скупа штампано уизводу

1. **Čeliković**, Lj. Kandić, D. Uskoković, Mechanochemical synthesis of ZnO and ZrO_2 nanoparticles and inhibiting effect of $CaCl_2$ on particle agglomeration, Eight Yugoslav Materials Research Society Conference - YUCOMAT 2006, Book of abstracts, str. 75. (http://www.mrs-serbia.org.rs/images/2006-1.pdf)

2. **A. Stanković**, Z. Stojanović, D. Uskoković, Effect of organic surfactants on mechanochemicaly synthesized ZnO nanoparticles, Ninth Annual Conference of the Yugoslav Materials Research Society - YUCOMAT 2007, Book of abstracts, str. 83. (http://www.mrs-serbia.org.rs/images/2007-1.pdf)

3. **A. Stanković**, Z. Stojanović, D. Uskoković, Synthesis of ZnO nanocrystals through surfactant assisted mechanochemical process, VII Students' Meeting Processing and application of ceramics, 2007, Book of abstracts, str 45. (http://www.mrs-serbia.org.rs/images/2007-1.pdf)

4. **A. Stanković**, Lj. Veselinović, D. Uskoković, Mechanochemical synthesis of ZnO nanostructured powder using a different organic surfactants and its influence on the particles size and morphology, Eleventh Annual Conference - YUCOMAT 2009, Book of abstracts, str. 164. (http://www.mrs-serbia.org.rs/images/2009-1.pdf)

5. **A. Stanković**, Z. Stojanović, Lj. Veselinović, S. Dimitrijević, S.D. Škapin, D. Uskoković, Influence of size scale and morphology on antibacterial properties of ZnO nanoparticles, Twelve Annual Conference – YUCOMAT 2010, Book of abstracts, str. 91. (http://www.mrs-serbia.org.rs/images/2010-3.pdf)

6. S. Makević, **A. Stanković**, D. Uskoković, Improvement of solubility of disperse materials by the means of the mechanochemical treatment, Twelve Annual Conference – YUCOMAT 2010, Book of abstracts, str. 92. (http://www.mrs-serbia.org.rs/images/2010-3.pdf)

7. **Stanković**, Lj. Veselinović, S. Marković, S. Dimitrijević, S.D. Škapin, D. Uskoković, Hydrothermal synthesis of ZnO nanostructures with different morphologies and their antimicrobial activity against *Escherihia coli* and *Staphylococus aureus* bacterial cultures, Thirteenth Annual Conference – YUCOMAT 2011, Book of abstracts, str. 166. (http://www.mrs-serbia.org.rs/images/YUCOMAT2011-web.pdf)

8. M.J. Lukić, **A. Stanković**, Lj. Veselinović, I. Bračko, S.D. Škapin, S. Marković, D. Uskoković, Chemical precipitation synthesis and characterization of Zr-doped hydroxyapatite nanopowders, Twelve Annual Conference – YUCOMAT 2011, Book of abstracts, str. 89. (http://www.mrs-serbia.org.rs/images/YUCOMAT2011-web.pdf)

9. M.J. Lukić, **A. Stanković**, Lj. Veselinović, S.D.Škapin, S. Marković, D. Uskoković, Mechanochemically-assisted synthesis and characterization of Zr-dopped hydroxyapattite nanopowders, VII International Conference on Mechanochemistry and Mechanical Alloying-INCOME 2011, Book of abstracts, str. 93. (http://www.mrs-serbia.org.rs/income2011/images/INCOME2011-Book%20of%20Abstracts.pdf)

10. **A. Stanković,** Lj. Veselinović, S. Marković, S. Dimitrijević, S.D. Škapin, D. Uskoković, Morphology controlled hydrothermal synthesis of ZnO particles and examination of their antibacterial properties on *Escherichia coli* and *Staphylococus aureus* bacterial cultures, Tenth Young Researchers' Conference Materials Science and Engineering, 2011, Book of abstracts, str. 7.(http://www.mrs-serbia.org.rs/images/2011-1.pdf)

11. **A. Stanković,** Z. Stojanović, Lj. Veselinović, I. Bračko, S.D. Škapin, S. Marković, D. Uskoković, Hydrothermal sythesis of ZnO powders with a tailored particle morphology and improuved optical characteristics, Fourteen Annual Conference – YUCOMAT 2012, Book of abstracts, str. 47. (http://www.mrs-serbia.org.rs/images/Yucomat2012-Book-of-abstracts.pdf)

12. **A. Stanković**, Z. Stojanović, Lj. Veselinović, N. Abazović, S.D. Škapin, S. Marković, D. Uskoković, Influence of particle size and morphology of ZnO powders on their optical properties, The Eleventh Young Researchers' Conference Materials Science and Engineering and The First European Early Stage Researchers' Conference on Hydrogen Storage, 2012, Book of abstracts, str 60. (http://www.mrs-serbia.org.rs/images/book_of_abstracts.pdf)

13. **A. Stanković**, Lj. Veselinović, S. Marković, D. Uskoković, Sonocatalytic degradation of methilene blue dye using a nanosized zinc oxide powder prepared via sonochemical method, Fiftheenth Annual Conference- YUCOMAT 2013, Book of abstracts, str. 115. (http://www.mrs-serbia.org.rs/images/YUCOMAT2013-book.pdf)

14. S. Marković, **A. Stanković**, Z. Lopičić, M. Stojanović, D. Uskoković, Application of peach shells for the removal of methylene blue and briliant green, Fiftheenth Annual Conference-YUCOMAT 2013, Book of abstracts, str. 111. (http://www.mrs-serbia.org.rs/images/YUCOMAT2013-book.pdf)

15. S. Marković, V. Rajić, **A. Stanković**, D. Uskoković, Photocatalytic activity of ZnO-PEO composites, Sixteenth Annual Conference – YUCOMAT 2014, Book of abstracts, str.31. (http://www.mrs-serbia.org.rs/images/YUCOMAT-2014.pdf)

16. **A. Stanković**, S. Marković, D. Uskoković, Mechanochemical synthesis of ZnO:SnO_2 material as a potential photocatalysts, Sixteenth Annual Conference – YUCOMAT 2014, Book of abstracts, str.64. (http://www.mrs-serbia.org.rs/images/YUCOMAT-2014.pdf)

Докторска дисертација - М70

- Ана Станковић „***Корелација функционалних и физичко-хемијских својстава прахова ZnO добијених различитим методама синтезе*.**"
  Факултет за физичку хемију, 03.10.2014.год.

1.2 <u>Радови објављени НАКОН избора у звање научни сарадник</u>

М21 (8,0) Радови у врхунским међународним часописима

1. S. Marković, **A. Stanković**, Z. Lopičić, S. Lazarević, M. Stojanović, D. Uskoković, "Application of raw peach shell particles for removal of methylene blue", *Journal of Environmental Chemical Engineering*, 3, 2 (**2015**) 716-724. http://dx.doi.org/10.1016/j.jece.2015.04.002

2. S. Marković, V. Rajić, **A. Stanković**, Lj. Veselinović, J. Belošević-Čavor, K. Batalović, N. Abazović, S.D. Škapin, D. Uskoković, "Effect of PEO molecular weight on sunlight induced photocatalytic activity of ZnO/PEO composites", *Solar Energy*, 127 (**2016**) 124-135. http://dx.doi.org/10.1016/j.solener.2016.01.026.

3. Katarina Aleksić, Ivana Stojković Simatović, **Ana Stanković**, Ljiljana Veselinović, Stevan Stojadinović, Vladislav Rac, Nadežda Radmilović, Vladimir Rajić, Srečo Davor Škapin, Lidija Mančić and Smilja Marković "Enhancement of ZnO@RuO_2 bifunctional photo-electro catalytic activity toward water splitting" *Frontiers in Chemistry*, 11, (**2023**). https://doi.org/10.3389/fchem.2023.1173910

M22 (5,0) Рад у истакнутом међународном часопису

1. **A. Stanković**, M. Sezen, M. Milenković, S. Kaišarević, N. Andrić, M. Stevanović, "PLGA/Nano-ZnO Composite Particles for Use in Biomedical Applications: Preparation, Characterization, and Antimicrobial Activity", *Journal of Nanomaterials (*(**2016**), Article ID 9425289 https://doi.org/10.1155/2016/9425289.

2. S. Marković, **A. Stanković**, J. Dostanić, Lj. Veselinović, L. Mančić, S. D. Škapin, G. Dražič, I. Janković-Častvan, D. Uskoković, "Simultaneous enhancement of natural sunlight- and artificial UV-driven photocatalytic activity of a mechanically activated ZnO/SnO2 composite", *RSC Advances*, 7, 68 (**2017**) 42725-42737. https://doi.org/10.1039/C7RA06895F.

M23 (3,0) Рад у међународном часопису

1. Željko Janićijević, **Ana Stanković**, Bojana Žegura, Đorđe Veljović, Ljiljana Djekić, Danina Krajišnik, Metka Filipič, Magdalena M. Stevanović," Safe-by-design gelatin-modifed zinc oxide nanoparticles ", *Journal of Nanoparticles Research*, 23:203, (**2021**) **https://doi.org/10.1007/s11051-021-05312-3**

M13 (7,0) Монографска студија/поглавље у књизи M11 или рад у тематском зборнику водећег међународног значаја

1. M. Stevanović, M. J. Lukić, **A. Stanković**, N. Filipović, M. Kuzmanović, Ž. Janićijević, Chapter 1 - Biomedical inorganic nanoparticles: preparation, properties, and perspectives, in: Grumezescu, V., Grumezescu, A.M. (Eds.), *Materials for Biomedical Engineering*. Elsevier, 2019, pp. 1–46. https://doi.org/10.1016/B978-0-08-102814-8.00001-9.

M52 (1,5) Рад у часопису од националног значаја

1. Jelena Živojinović, Adriana Peleš Tadić, Darko Kosanović, Suzana Filipović, **Ana Stanković**, Nina Obradović, Uticaj mehaničke aktivacije na smešu $SrTiO_3$ i Fe_2O_3 kao aditiva,*Tehnika*, **2023**, 78(4), 395-400.10.5937/tehnika2304395Z

2. **Ana V. Stanković**, Sonja M. Jovanović, Ispitivanje uticaja mehanohemijskog procesiranja na rastvorljivost verapamil hidrohlorida, *Tehnika*, **2021**, 76(1), 9-14. 10.5937/tehnika2101009S

M32 (1,5) Предавање по позиву са међународног скупа штампано у изводу

1. **Ana Stanković**, Ljiljana Veselinović, Srečo Davor Škapin, Smilja Marković, Synthesis and characterization of ZnO nano/micro crystals with enhanced sunlight-induced photo-catalytic activity, Program and the Book of abstracts / Serbian Ceramic Society Conference Advanced Ceramics and Application IX: New Frontiers in Multifunctional Material Science

and Processing, Serbia, Belgrade, 20-21. September 2021, 2021, 36-36, ISBN: 978-86-915627-8-6 https://hdl.handle.net/21.15107/rcub_dais_11911

M33 (1,0) Саопштење са међународног скупа штампано у целини

1. S. Marković, **A. Stanković**, Lj. Veselinović, S. Stojadinović, J. Dostanić, S. Škapin and D. Uskoković, Optical and photocatalytic properties of ZnO: SnO_2 composite, *Physical Chemistry* **2016,** pp**.** 219-222. *(Prilog 1)*

2. Smilja Markovic, Ivana Stojkovic Simatovic, **Ana Stankovic**, Sreco Škapin, Lidija Mancic, Slavko Mentus and Dragan Uskokovic, Sunlight-driven Photocatalytic and Photo-electrochemical Activity of ZnO/SnO_2 Composite, *First International Conference on Electron Microscopy of Nanostructures, ELMINA* 2018, **2018**, pp. 151-153. Markovic-ELMINA-2018.pdf (sanu.ac.rs)

3. Smilja Marković, Katarina Aleksić, **Ana Stanković**, Nadežda Radmilović, Ivana Stojković Simatović, Lidija Mančić, Structural and Photo (Electro)-Catalytic Properties of ZnO/RuO_2 Composites depending on ZnO to RuO_2 Mass Ratio, Conference on Electron Microscopy of Nanostructures ELMINA 2024, 09/ 2024, Belgrade, Serbia*. (Prilog 2)*

4. Vladimir Rajić, Barbara Ramadani, Nemanja Latas, Lidija Mančić, Daniele Mantione, **Ana Stanković** and Milutin Ivanović, Influence of (poly)ionic liquid additives on electronic structure, optical properties and morphology of $FAPbI_3$ perovskite thin films for high performance solar cells, Conference on Electron Microscopy of Nanostructures ELMINA2024, 09/2024, Belgrade, Serbia. *(Prilog 3)*

M34 (0,5) Саопштења са међународних скупова штампаних у изводу

1. Katarina Aleksić, Iva Dimitrievska, Kristina Gočanin, **Ana Stanković**, Anita Grozdanov, Ivana Stojković Simatović, Smilja Marković, Electrochemical Sensing of Doxorubicin on ZnO/GO Modified Screen-Printed Electrodes, Advanced Ceramics and Applications XII: New Frontiers in Multifunctional Material Science and Processing, 09/2024, Belgrade, Serbia. *(Prilog 4)*
2. **A. Stanković**, K. Aleksić, M. Kratovac, I.S. Simatović, M.K. Roković, S. Marković, Electrochemical detection of chloramphenicol drug based on ZnO and ZnO/graphene oxide composite nanoparticles YUCOMAT 2023, 09/2023, Herceg Novi, Montenegro. https://dais.sanu.ac.rs/123456789/14870
3. Katarina Aleksić, **Ana Stanković**, Ljiljana Veselinović, Srečo Davor Škapin, Ivana Stojković Simatović, Smilja Marković, Tailoring the ZnO/RuO_2 ratio in composite electrocatalysts for efficient HER and OER, Advanced Ceramics and Applications XI, New Frontiers in Multifunctional Material Science and Processing, 09/2023, Belgrade, Serbia. https://dais.sanu.ac.rs/123456789/15853

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2.3 Радови објављени НАКОН РЕИЗБОРА у звање научни сарадник од 03/2020.

M21 (8,0) Радови у врхунским међународним часописима

1. Katarina Aleksić, Ivana Stojković Simatović, **Ana Stanković**, Ljiljana Veselinović, Stevan Stojadinović, Vladislav Rac, Nadežda Radmilović, Vladimir Rajić, Srečo Davor Škapin, Lidija Mančić and Smilja Marković "Enhancement of $ZnO@RuO_2$ bifunctional photo-electro catalytic activity toward water splitting" *Frontiers in Chemistry*, 11, (**2023**). https://doi.org/10.3389/fchem.2023.1173910

M23 (3,0) Рад у међународном часопису

1. Željko Janićijević, **Ana Stanković**, Bojana Žegura, Đorđe Veljović, Ljiljana Djekić, Danina Krajišnik, Metka Filipič, Magdalena M. Stevanović,"Safe-by-design gelatin-modifed zinc oxide nanoparticles", *Journal of Nanoparticles Research*, 23:203, (**2021**) https://doi.org/10.1007/s11051-021-05312-3

M52 (1,5) Рад у часопису од националног значаја

1. Jelena Živojinović, Adriana Peleš Tadić, Darko Kosanović, Suzana Filipović, **Ana Stanković**, Nina Obradović, Uticaj mehaničke aktivacije na smešu $SrTiO_3$ i Fe_2O_3 kao aditiva,*Tehnika*, **2023**, 78(4), 395-400.10.5937/tehnika2304395Z

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M32 (1,5) Предавање по позиву са међународног скупа штампано у изводу

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M33 (1,0) Саопштење са међународног скупа штампано у целини

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M34 (0,5) Саопштења са међународних скупова штампаних у изводу

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ИЗВЕШТАЈ О ЦИТИРАНОСТИ ДР АНЕ СТАНКОВИЋ

(према индексним базама *Web of Science Core Collection* и *Scopus*, на дан 31. јула 2024)

укупан број цитата: 453
хетероцитати: 419
h-индекс = 8

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Матични научни одбор за хемију

Број: 660-01-00002/2020-14/22
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На основу члана 27. став 1 тачка 1) и члана 76. став 5. Закона о науци и истраживањима („Службени гласник Републике Србије", бр. 49/2019) и Правилника о поступку, начину вредновања и квантитативном исказивању научноистраживачких резултата истраживача („Службени гласник Републике Србије", број 24/16, 21/17 и 38/17) и захтева који је поднео

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Матични научни одбор за хемију на седници одржаној 23.03.2020. године, донео је

ОДЛУКУ
О СТИЦАЊУ НАУЧНОГ ЗВАЊА

Др Ана Станковић

стиче научно звање
Научни сарадник
Реизбор

у области природно-математичких наука - хемија

О Б Р А З Л О Ж Е Њ Е

Институт техничких наука САНУ, Универзитет у Београду

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Доношењем ове одлуке именована стиче сва права која јој на основу ње по закону припадају.

Одлуку доставити подносиоцу захтева, именованој и архиви Министарства просвете, науке и технолошког развоја у Београду.

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О СТЕЧЕНОМ НАУЧНОМ СТЕПЕНУ
ДОКТОРА НАУКА

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НА ОСНОВУ ТОГА ИЗДАЈЕ ЈОЈ СЕ ОВА ДИПЛОМА О СТЕЧЕНОМ НАУЧНОМ СТЕПЕНУ

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PHYSICAL CHEMISTRY 2016

13th International Conference on Fundamental and Applied Aspects of Physical Chemistry

Proceedings
Volume I

B E L G R A D E
September 26 - 30, 2016

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OPTICAL AND PHOTOCATALYTIC PROPERTIES OF $ZnO:SnO_2$ COMPOSITE

S. Marković [1], A. Stanković [1], Lj. Veselinović [1], S. Stojadinović [2], J. Dostanić [3], S. Škapin [4] and D. Uskoković [1]

[1]Institute of Technical Sciences of SASA, Knez Mihailova 35/IV, 11000 Belgrade, Serbia. (smilja.markovic@itn.sanu.ac.rs)
[2]University of Belgrade, Faculty of Physics, Belgrade, Serbia.
[3]University of Belgrade, IChTM Center for catalysis, Belgrade, Serbia.
[4]Jožef Stefan Institute, Ljubljana, Slovenia.

ABSTRACT

$ZnO:SnO_2$ composite powder, in 0.9:0.1 molar ratio, was prepared by high-energy ball milling. The phase composition and crystal structure of the prepared powder were determined by X-ray diffraction (XRD), the particles morphology was characterized using field emission scanning electron microscopy (FE-SEM), while the optical properties were studied by UV-Vis diffuse reflectance (DRS) and photoluminescence (PL) spectroscopy. The photocatalytic activity of $0.9ZnO:0.1SnO_2$ powder was examined through decomposition of methylene blue (MB) water solution under: (1) direct sunlight irradiation, (2) UV lamp and (3) lamp which simulates sunlight. $0.9ZnO:0.1SnO_2$ composite shows good photocatalytic activity, for all the irradiation sources, being higher than 90 % after 1 h of irradiation.

INTRODUCTION

Water pollution caused by discharging of untreated industrial waste is one of the increasing problems that the world is facing today. The main classes of water pollutants are heavy metals, inorganic, and organic compounds. Heterogeneous photocatalysis can be used as an effective process for the decomposition of many kinds of organic pollutants without any trace of secondary pollution [1]. ZnO, TiO_2 and SnO_2 are recognized as useful materials for photocatalytic degradation process due to their high photoactivity, low cost and chemical inertness. However, their practical application for the degradation of organic pollutants is restricted by the high degree of electrons and holes recombination. Such disadvantage can be overcome to some level by coupling of semiconductors with different band gap energies. For example, $ZnO:SnO_2$ composite material show improved photocatalytic efficiency by lowering the electron-hole recombination [2].

EXPERIMENTAL

$ZnO:SnO_2$ composite was prepared by high-energy ball milling of ZnO (99%, Sigma-Aldrich) and SnO_2 (> 99%, Kemika, Zagreb) powders in a 0.9:0.1 molar ratio. The oxides were milled during 2 h in planetary ball mill (Across International PQ-NO4) with stainless steel vessels (100 ml) and balls (∅ 5 mm). The balls to powder weight ratio was 10:1. The angular velocity of the vessels was 400 rpm.

The phase composition and crystal structure were analyzed by XRD data, collected on a Philips PW-1050 over 10–70° 2θ (step size 0.05° 2θ and counting time 5 s). The particles morphology was observed by FE-SEM (SUPRA 35 VP Carl Zeiss). The UV-Vis DRS were recorded in the range 300–800 nm (Evolution 600 UV-Vis spectrophotometer, Thermo Scientific). PL spectra were recorded on Horiba Jobin Yvon Fluorolog FL3–22 **spectrofluorometer** using Xe lamp excitation (wave lenght 325 nm).

The photocatalytic activity was studied by the decomposition of methylene blue (MB) dye under: direct sunlight, UV lamp (medium-pressure mercury vapor UV lamps, UVA region, Philips, 4x15 W) and lamp which simulates sunlight (Osram Ultra Vitalux lamp, 300 W). In each of the experiments 100 mg of a powder was mixed with 100 ml of MB (10 ppm). Prior to irradiation, the suspension was magnetically stirred for 1 h in a dark to establish an adsorption-desorption equilibrium. During the irradiation stirring was maintained to keep the mixture in suspension. At specific time intervals 3 ml of aliquots was withdrawn and centrifuged (8000 rpm, 10 min) to remove particles from solution before the absorbance measurement. The concentration of MB after decomposition was calculated according to the absorbance value at 665 nm determined on a GBC Cintra UV–Vis spectrophotometer in the wavelength range of 300–800 nm.

RESULTS AND DISCUSSION

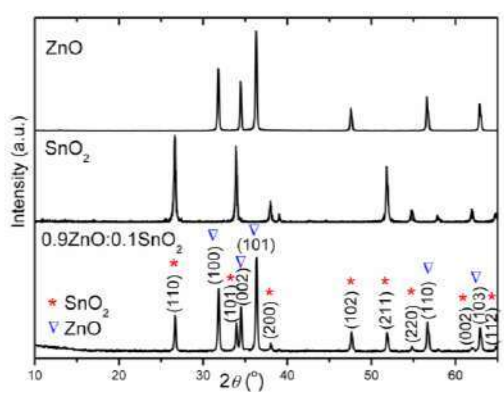

Figure 1. XRD patterns.

Figure 1. represents the XRD patterns of ZnO, SnO_2 and $0.9ZnO:0.1SnO_2$ powders. The patterns indicate that after 2 h of mechanical treatment of the reactants mixture, resulting powder is consisted of hexagonal wurtzite (ZnO) phase and tetragonal cassiterite (SnO_2) phase. There are no extra peaks of any other crystal phases or impurities.

Figure 2. shows the FE-SEM images of ZnO, SnO_2 and $0.9ZnO{:}0.1SnO_2$ powders. The ZnO particles were mainly of irregular hexagonal rod-shapes with the average diameter of about 95 nm and the average length of about 180 nm. The SnO_2 powder is consisted of coarsen polygonal grains with average size of about 600 nm; besides, the grains were organized in agglomerates of about 2 μm sizes. It can be seen that after 2 h of milling SnO_2 agglomerates were broken and the powders have been homogenized. The average particle size in $0.9ZnO{:}0.1SnO_2$ powder is about 160 nm.

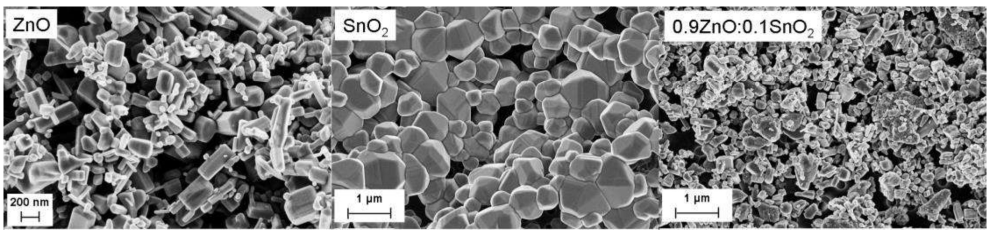

Figure 2. FE-SEM images of the examined powders.

The optical properties of the powders, examined by UV-Vis DRS, are presented in Figure 3 (a). The direct band gap energies, calculated by the Kubelka–Munk method, are 3.25, 3.56 and 3.24 eV for ZnO, SnO_2 and $0.9ZnO{:}0.1SnO_2$ powders, respectively. In the visible light region, 400 to 800 nm, composite particles revealed the highest absorbance capacity. PL spectra of ZnO, SnO_2 and composite powder are shown in Figure 3 (b). For all the samples two emission bands appeared at 382 and 433 nm, attributed to exciton recombination and oxygen vacancies, respectively. According to the PL spectra it can be concluded that concentration of oxygen vacancies is larger in the composite than in the ZnO powder, while number of exciton recombination is reduced.

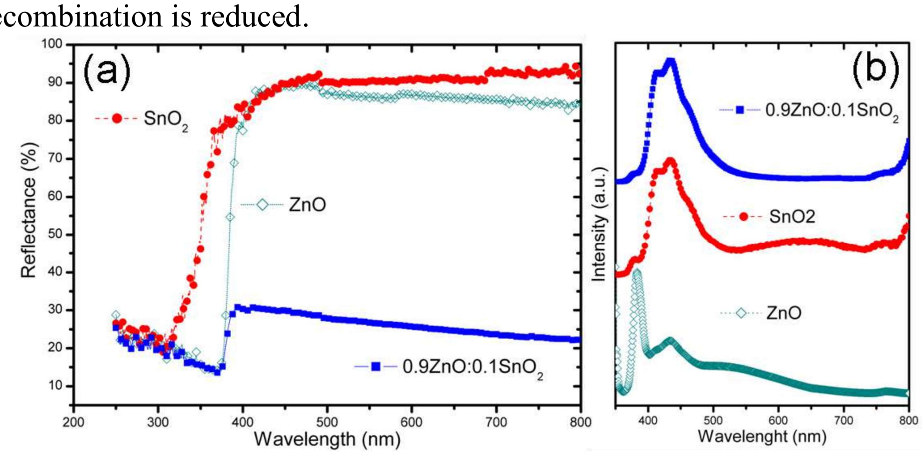

Figure 3. (a) UV-Vis DRS and (b) PL spectra of the examined powders.

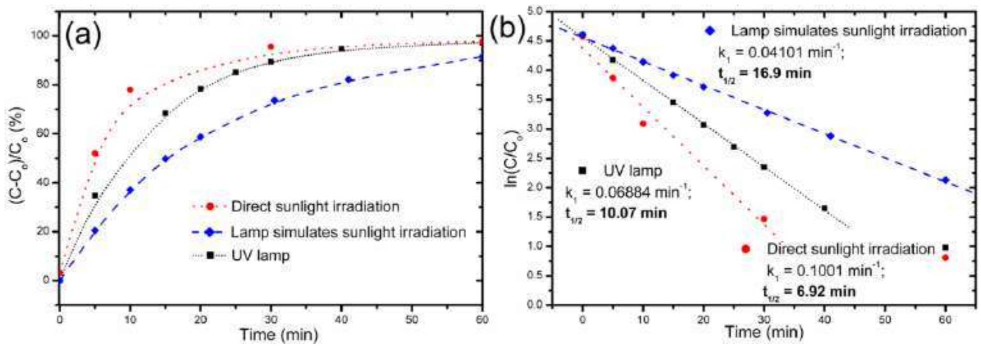

Figure 4. (a) Photocatalytic efficiency and (b) kinetic plot for the degradation of MB in the presence of $0.9ZnO:0.1SnO_2$ composite powder.

Figure 4 (a) shows the efficiency of the photocatalytic degradation of MB dye in the presence of the composite under different irradiation sources. The composite shows photocatalytic activity higher than 90% after 1h of irradiation, for all the irradiation sources. Figure 4 (b) shows a linear plot of $\ln(C/C_o)$ *versus* irradiation time, suggesting pseudo-first-order kinetics. The rate constant, k_1 [min^{-1}], and the time necessary for the degradation of 50% of the dye, $t_{1/2}$ [min], are calculated and denoted in Figure 4 (b).

CONCLUSION

$0.9ZnO:0.1SnO_2$ composite prepared by a mechanical milling is consisted of particles with significant amount of oxygen vacancies. The band gap energy of $0.9ZnO:0.1SnO_2$ composite is 3.24 eV; in the Vis range it absorbs about 70% of the incident light intensity. The oxygen vacancies enhanced visible-light absorption and promoted photocatalytic activity under direct sunlight irradiation. Due to the difference in the band gap energy of ZnO and SnO_2, photo-generated electrons and holes were effectively separated in $0.9ZnO:0.1SnO_2$ composite, which also improved photocatalytic efficiency.

Acknowledgement

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Structural and Photo(Electro)-Catalytic Properties of ZnO/RuO_2 Composites depending on ZnO to RuO_2 Mass Ratio

Smilja Marković[1], Katarina Aleksić[1], Ana Stanković[1], Nadežda Radmilović[2], Ivana Stojković Simatović[3] and Lidija Mančić[1]

1 Institute of Technical Sciences of SASA, Belgrade, Serbia

2 University of Belgrade, Institute for Nuclear Sciences, Vinča, Belgrade, Serbia

3 University of Belgrade, Faculty of Physical Chemistry, Belgrade, Serbia

Owing to its high energy density and environmentally friendly properties, hydrogen is recognized as promising fuels in the future energy system. Among the various techniques for H_2 production, electrochemical water splitting, concerning both the hydrogen evolution reaction (HER) and oxygen evolution reaction (OER), is established as an efficient one. However, the kinetics of electrocatalytic water splitting reaction is significantly slowed down by the large energy barriers of the two-electron transfer (HER) and four-electron-proton coupled reaction (OER) pathways. The sluggish kinetics of water splitting processes can be overcome by employing electrocatalysts. It has been shown that Pt-based electrocatalysts exhibit the best HER activity, while IrO_2 and RuO_2-based electrocatalysts demonstrate the best OER activity [1,2]. Though, scarcity of noble metals and high price hindered their commercial applications in water splitting. Hence, it is an imperative to replace noble metal-based catalysts or reduce their amount through combination with abundant materials.

The aim of this study was to examine an influence of ZnO to RuO_2 mass ratio in the ZnO/RuO_2 composites on their structural properties in order to prepare commercially acceptable materials with an enhanced photo(electro)-catalytic activity for water splitting. Composites of ZnO and RuO_2 with mass ratios of 1:1, 2:1 and 10:1, named $1ZnO/1RuO_2$, $2ZnO/1RuO_2$, $10ZnO/1RuO_2$, respectively, were synthesized using the microwave processing. The structural investigations of the composites were completed using TEM/HRTEM and ADF/STEM analysis, including EDXS elemental mapping (FEI Talos F200X microscope operating at 200 kV, Thermo Fisher Scientific, Waltham, MA, United States). The electrocatalytic (EC) activity of the prepared composites towards OER and HER was examined through linear sweep voltammetry (LSV) in both acidic (0.1 M H_2SO_4, pH ~ 1) and alkaline (0.1 M NaOH, pH ~ 13) electrolytes. An Ivium VertexOne potentiostat/galvanostat and a conventional three-electrode quartz cell setup, including a glassy carbon as the working electrode, a platinum foil as the counter electrode, and a saturated calomel electrode as the reference electrode, were used for the EC measurements. The working electrode, with a surface area of 0.3 cm^2, was coated with a catalyst ink prepared by previously published procedure [3]. The results of TEM analysis, Figure 1 (a-c), show that $2ZnO/1RuO_2$ composite is consisted of the smallest particles which are uniform in size and shape, while the both decreases of ZnO content (in $1ZnO/1RuO_2$ composite) and its increases (in $10ZnO/1RuO_2$) provoke appearance of larger, irregularly shaped particles. Besides, EDXS elemental mapping reveals that $2ZnO/1RuO_2$ composite possesses particles with the most homogeneous distribution of all constituting elements, Figure 1 (d-f). Figure 2 shows LSV curves illustrating the HER/OER catalytic performance of ZnO/RuO_2 composites in a (a) 0.1 M H_2SO_4, and (b) 0.1 M NaOH electrolyte solutions. Solid lines represent LSV results obtained under dark conditions while dashed lines represent LSV results obtained after 60 minutes of simulated solar-light illumination. As can be seen from Figure 2, the 2ZnO/1RuO_2 composite demonstrated superior HER/OER photo(electro)-catalytic activity in both electrolytes. Comprehensive structural analysis completed with Raman, PL and UV-Vis DR spectra indicates that superior HER/OER photo(electro)-catalytic activity of the 2ZnO/1RuO_2 composite can be attributed to an optimal amount of oxygen vacancies in its crystal structure and homogeneous distribution of all constituting elements in the particles.

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[4] This study was financially supported by the Ministry of Science, Technological Development and Innovation of Republic of Serbia, through the agreement related to the realization and funding of scientific research work at the Institute of Technical Sciences of SASA in 2024, Contract number: 451-03-66/2024-03/200175.

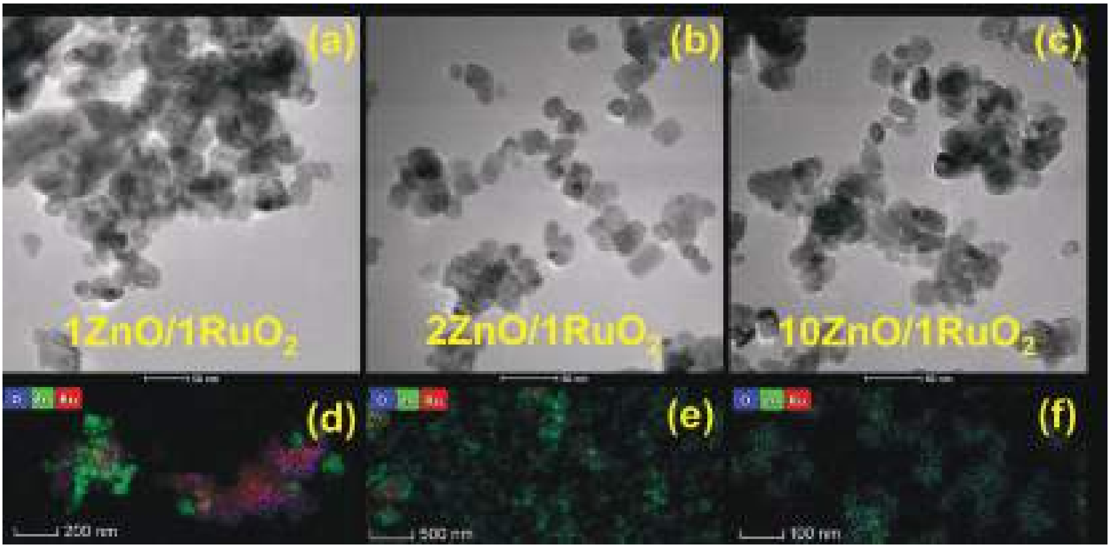

Figure 1. (a-c) TEM micrographs, and (d-f) EDXS elemental mapping of ZnO/RuO_2 composites.

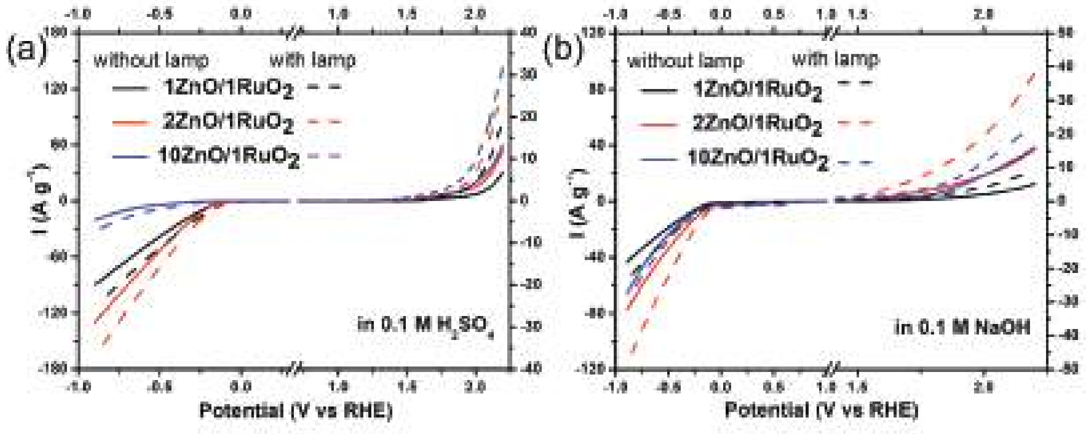

Figure 2. HER/OER LSVs of the ZnO/RuO_2 composites with different weight ratios in: (a) 0.1 M H_2SO_4, and (b) 0.1 M NaOH.

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Influence of (Poly)ionic Liquid Additives on Electronic Structure, Optical Properties and Morphology of $FAPbI_3$ Perovskite Thin Films for High Performance Solar Cells

Vladimir Rajić[1], Barbara Ramadani[1], Nemanja Latas[1], Lidija Mančić[2], Daniele Mantione[3], Ana Stanković[4] and Milutin Ivanović[1]

1 Vinča Institute of Nuclear Sciences, National Institute of the Republic of Serbia, University of Belgrade, Belgrade, Serbia

2 Institute of Technical Sciences of the Serbian Academy of Sciences and Arts, Belgrade, Serbia

3 POLYMAT, University of the Basque Country UPV/EHU, Joxe Mari Korta Center, Donostia-San Sebastián, Spain

4 Institute of Technical Sciences of SASA, Belgrade, Serbia

As the Sun is the most abundant energy source available, solar cells can become the primary source of renewable energy. Today, one of the most promising candidates to achieve this goal is perovskite solar cells (PSC) since they are solution-processable with PCE (>25%) that surpass conventional Si photovoltaics. However, the commercial potential of PSCs is still mainly limited by the low stability of perovskite active/absorbing layer to the environmental stimuli. This is also an issue in the case of formamidinium lead iodide perovskite - $CH(NH_2)_2PbI_3$ ($FAPbI_3$ or FAPI) which possesses several advantages to be an active layer of efficient PSC, in comparison to the counterpart methylammonium lead iodide- $CH_3NH_3PbI_3$ (MAPI).

It has been shown that the humidity and oxygen from the atmosphere, heat, UV light and ion migration may have detrimental influences leading to the degradation of quality of material, and corollary performance and stability of the device. The reason for this vulnerability of perovskites is the complexity of the material itself, which is a multielement and multi-component hybrid material.

To address the stability of perovskite thin films and the consequent performance of PSCs, various materials such as organic acids, metallic and organic halides, amines, organosulfur compounds, graphene, polymers, etc., have been proposed as additives or surface passivation agents. In this work, we opt for poly(ionic) (PILs) liquids additives, which are polyelectrolyte salts comprising cations and anions, with the cationic or anionic centers constrained to the repeating units in the polymer chain. PILs offer several advantages (even in comparison to their monomer counterparts), including high ionic conductivity, low vapor pressure, high hydrophobicity, excellent thermal and electrochemical stability, and a tunable chemical structure. Based on these qualities, PILs have found applications in various thin film electronic devices such as solar cells, light-emitting diodes, capacitors, etc. Aforementioned aspects make them also suitable candidates for controlling the growth of perovskite crystals, passivating grain boundaries and surface defects, improving interfacial energetics, doping the perovskite and hole transport material, and overall enhancing the stability and efficiency of PSCs. Furthermore, PILs based on TFSI pendant anion have shown potential for preparing compact grains of perovskites in

thin films with less pronounced grain boundaries, significantly reducing the J-V hysteresis index in PSCs [1]. Also, the use of TFSI-based PILs has demonstrated efficient passivation of defects at the surface of perovskite thin films, which greatly reduces interface recombination and consequently improves device efficiency and stability for different perovskite compositions and architectures [2]. Hence within this work, two poly(ionic) liquids based on polymerized anion bis(trifluoromethane)sulfonamide (TFSI) (with pendant cations Li^+ and imidazolium, namely [PLiMTFSI] Li and [PLiMTFSI] [DCMim]) are used as additives along with the counterpart salt LiTFSI. As could be seen in Fig 1. where XPS data are presented, after addition of [PLiMTFSI] [DCMim] the greatest shift towards lower binding energy was observed which is subscribed to the strongest p-doping/interaction of/with perovskite thin film found in this case. Furthermore, from UV-Vis absorption and Photoluminescence spectra of pristine perovskite thin film and with additives presented in Fig. 2 can be inferred that the highest intensity was measured in both type of spectra in the case of perovskite film with additive [PLiMTFSI] [DCMim]. Here is expected that PIL most effectively passivates defects at the surface and grain boundaries of perovskite polycrystalline thin film, which is reflected in better quality of the thin film and corollary higher absorption. Indeed, in Fig. 3 can be observed that after addition of PIL additives (in contrast to LiTFSI) [PLiMTFSI] Li and especially [PLiMTFSI] [DCMim] into the perovskite thin film, crystallites of perovskite grow bigger and the thin film becomes more homogeneous and uniform.

References:

[1] S. Mariotti *et al*, Journal of Materials Chemistry C **10** (2022) 16583-16591.
[2] P. Caprioglio *et al*, Energy & Environmental Science **14** (2021) 4508-4522.

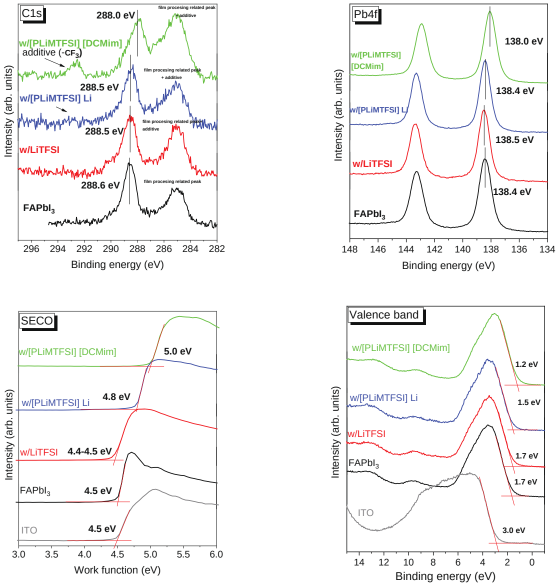

Figure 1. XPS measurements of thin films

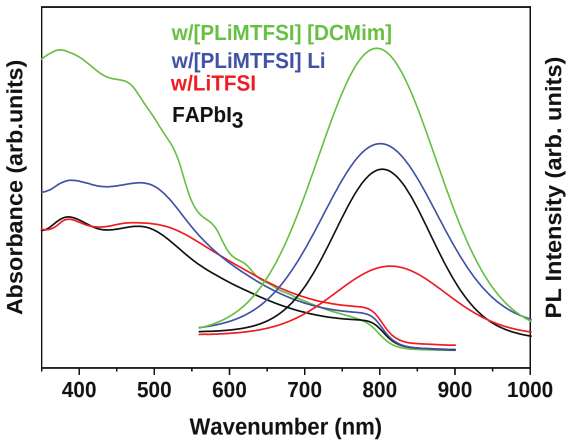

Figure 2. UV-Vis absorption and photoluminescence spectra of thin films

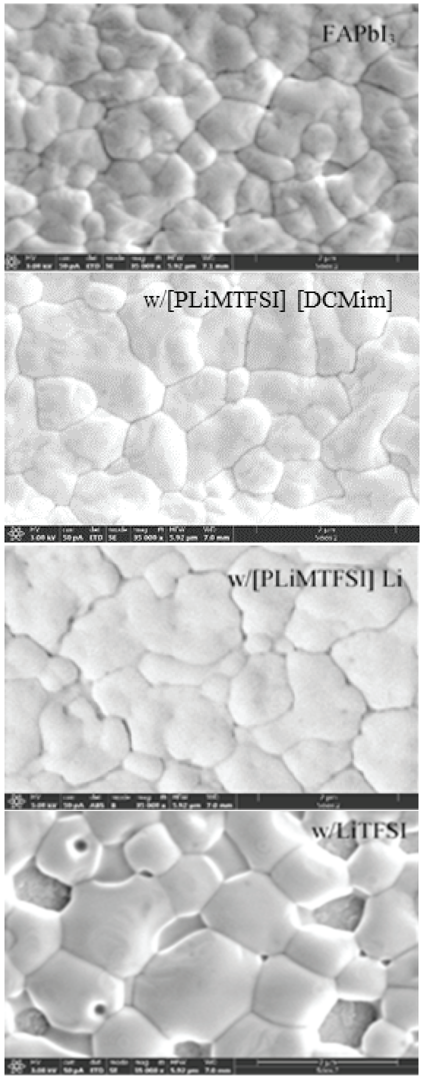

Figure 3. FESEM micrographs of thin films

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Serbian Ceramic Society Conference
ADVANCED CERAMICS AND APPLICATION XII
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Institute for Technology of Nuclear and Other Raw Mineral Materials
Institute of General and Physical Chemistry

PROGRAM AND THE BOOK OF ABSTRACTS

Serbian Academy of Sciences and Arts, Kneza Mihaila 35
Serbia, Belgrade, 18-20. September 2024.

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by this approach were characterized in detail both before and after sintering by SPS: crystallinity and phase composition were determined by the combination of XRD and Raman spectroscopy, thermal stability was analyzed by differential scanning calorimetry (DSC/TG), and, structural characterization was carried out by the electron microscopy. At the same time, mechanical properties were evaluated by micro-nano indentation.

P21

Electrochemical Sensing of Doxorubicin on ZnO/GO Modified Screen-Printed Electrodes

Katarina Aleksić[1], Iva Dimitrievska[2], Kristina Gočanin[3], Ana Stanković[1], Anita Grozdanov[2], Ivana Stojković Simatović[3], Smilja Marković[1]

[1]Institute of Technical Sciences of SASA, Belgrade, Serbia
[2]Faculty of Technology and Metallurgy, Ss Cyril and Methodius University, Skopje, North Macedonia
[3]University of Belgrade - Faculty of Physical Chemistry, Belgrade, Serbia

Electrochemical sensors (ECS) are increasingly acknowledged for their superior capability in detecting and monitoring environmental pollutants, offering distinct advantages over conventional analytical methods. The essential performance parameters of ECS, including selectivity, sensitivity, response time, and portability, can be significantly enhanced through the modification of bare electrodes. A variety of materials, such as noble metals, metal oxides, polymers, and diverse carbonaceous substances, have been employed to optimize these sensors for improved analytical performance.
The aim of our study was to modify screen-printed electrodes with a zinc oxide and graphene oxide (ZnO/GO) composite particles and test such prepared electrodes as an electrochemical sensor for detecting the anticancer drug doxorubicin (DOX) as water pollutant. The ZnO/GO composite, with 0.005 wt% of GO, was synthesized by microwave processing of precipitate. The physicochemical characteristics of the ZnO/GO composite was analyzed using X-ray powder diffraction (XRD), Raman and Fourier transform infrared (FTIR) spectroscopy, field emission scanning electron microscopy (FESEM), UV-Vis diffuse reflectance spectroscopy (DRS), and photoluminescence (PL) spectroscopy. Cyclic voltammetry (CV) was applied for electrochemical quantification of DOX using three different types of screen-printed electrodes: Au, Pt, and C. The ink was prepared by mixing 10 mg of composite material and 1.5 mg carbon black with 40 µL of 5% Nafion solution, 225 µL ethanol, and 225 µL water. CV was performed in 25 mL of phosphate buffer (0.1 M, pH = 7.0) with the addition of doxorubicin infusion solution (Ebewe Pharma, 50 mg DCF / 25 mL) in a portion of 10 µL to completely 160 µL. All measurements were done in a potential window of -0.4 – 0.6 V at a scan rate of 50 $mV \cdot s^{-1}$. The best activity, gained when screen printed carbon electrode was modified and used as ECS, was correlated with physicochemical characteristics of the ZnO/GO composite and discussed.
Acknowledgement: *This research was funded by the Ministry of Science, Technological Development and Innovation of the Republic of Serbia (contract nos. 451-03-66/2024-03/200175 and 451-03-65/2024-03/200146). The authors KA, ISS, AS and SM acknowledge the financial support from the Science Fund of the Republic of Serbia, The Program PRISMA, #7377, Water*

pollutants detection by ZnO-modified electrochemical sensors: From computational modeling via electrochemical testing to real system application – WaPoDe.

P22

Cavitation resistance of refractory coatings

Marko Pavlović[1], Marina Dojčinović[2], Anja Terzić[3], Dragan Radulović[4], Jovica Stojanović[4], Vladimir Jovanović[4], Sonja Milićević[4]

[1]Faculty of Mechanical Engineering, University of Belgrade – Innovation Center, Kraljice Marije 16, Belgrade, Serbia
[2]Faculty of Technology and Metallurgy, University of Belgrade, Karnegijeva 4, 11000 Belgrade, Serbia
[3]Institute for Testing of Materials, Bulevar vojvode Mišića 43, 11000 Belgrade, Serbia
[4]Institute for Technology of Nuclear and Other Raw Mineral Materials, Franchet d'Esperey 86, 11000 Belgrade, Serbia

In this study, the resistance to the cavitation effect of three types of refractory samples based on talc with the addition of 10%, 15% and 20% cordierite was investigated. Talc has a fine structure, low hygroscopicity, insensitivity to temperature changes, low coefficient of thermal conductivity, low coefficient of linear thermal expansion, great ability to stick and coat surfaces, good grindability, low hardness. Cordierite has high refractoriness, high hardness, high density, low value of dielectric constant, low coefficient of thermal conductivity, low coefficient of linear thermal expansion, high resistance to thermal shock, relatively high melting temperature with the possibility of application up to 1380°C, high inertness towards liquid metal. Cordierite was added in order to improve properties, primarily to increase resistance to the effect of cavitation. The prepared mixtures of refractory powders were pressed under a pressure of 1 MPa and sintered at 1200°C.To evaluate the cavitation resistance properties of the investigated refractory samples, the ultrasonic vibration method with a stationary sample was applied. The change in the mass of the samples as a function of the cavitation time was monitored and the cavitation speed was determined. The formation and development of damage to the surface of the samples was monitored using a scanning electron microscope. The mechanism of degradation and resistance to the effect of cavitation of the tested samples was monitored by measuring the mass loss and morphological analysis of the pits formed on the surface of the tested samples. Research has shown that the addition of cordierite in the composition of the tested samples based on talc significantly improves the properties of resistance to the effect of cavitation.
Acknowledgement: *This investigation is supported by The Ministry of Science, Technological Development and Innovation (Contract No. 451-03-66/2024-03/200213, 451-03-65/2024-03/200135, and 451-03-66/2024-03/200012)*

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Materials Research Society of Serbia

awards

Ana Stanković

For the best poster presentation of the Conference YUCOMAT 2007

Poster P.S.A.32, named "EFFECTS OF ORGANIC SURFACTANTS ON MECHANOCHEMICALY SYNTHESIZED ZnO PARTICLES", was declared the best poster presentation of the Conference YUCOMAT 2007, considering scientific contribution, look, graphic design and quality of presentation.

The Awards Committee

Prof. Vera Dondur | *Prof. Milenko Plavšić* | *Prof. Milorad Davidović*

The President of MRS- Serbia

Prof. Dragan Uskoković

Prilog 6

Belgrade, April 2021.

Dear Dr Ana Stankovic,

The Organizing Committee is pleased to announce that Advanced Ceramics and Application IX Conference will be held in Belgrade, Serbia, 20-22nd Sept 2021.

Based upon your significant contribution in the field of Advanced Ceramic, we will be honored if you can deliver an ***Invited lecture*** during this event.

If you accept to participate and in order to provide a progressive state of the art report, please send us as soon as possible the title and the abstract of your speech in Word format in accordance to instruction in the first call attached.

We would like to mention that as a **Invited lecturer** you will pay only 60% of conference fee, which includes entry to all conference sessions, conference bag with the program and abstract book, coffee breaks and buffet lunches during the conference.

We are waiting for your response. We will appreciate to get it in the next week.

Best regards,

Prof. Dr. Vojislav Mitić
Serbian Ceramic Society
President
E-mail: vmitic.d2480@gmail.com
Phone: (+381)63 400 250

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Датум: 12.05.2022.
Број: 641

На основу члана 33. Статута Универзитет у Београду – Факултета за физичку хемију, Наставно-научно веће Факултета, на VIII редовној седници одржаној 12.05.2022. године, доноси следећу

О Д Л У К У

1.- За менторе за израду мастер рада студента **дипл. физ.-хем. Александре Шеклер** одређују се др Ивана Стојковић Симатовић, ванредни професор Факултета за физичку хемију и Ана Станковић, научни сарадник ИТН САНУ.

2.- Прихвата се образложење теме за израду мастер рада студента, под називом **„Електрокаталитичка активност композитних честица ZnO@GO за процес електрокаталитичке разградње воде“.**

3. Именује се Комисија за одбрану мастер рада студента у саставу:

1) др Ивана Стојковић Симатовић, ванредни професор, Факултет за физичку хемију,
2) др Ана Станковић, научни сарадник, ИТН САНУ,
3) др Биљана Шљукић Паунковић, ванредни професор, Факултет за физичку хемију,
4) др Маја Милојевић-Ракић, ванредни професор, Факултет за физичку хемију,
5) др Владислав Рац, ванредни професор, Пољопривредни факултет.

Одлуку доставити:
- студенту,
- члановима Комисије,
- Служби за студентске послове,
- архиви Факултета.

Универзитет у Београду - Факултет за физичку хемију

проф. др Мирослав Кузмановић, декан

Prilog 8

Датум: 16.04.2021.
Број: 373

На основу члана 33. Статута Универзитет у Београду – Факултета за физичку хемију, Наставно-научно веће Факултета, на VII редовној седници, одржаној 16.04.2021. године, доноси следећу

О Д Л У К У

1.- За менторе за израду мастер рада студента **дипл. физ.-хем. Ивана Супића** одређују се др Ивана Стојковић Симатовић, ванредни професор Факултета за физичку хемију и др Ана Станковић, научни сарадник ИТН САНУ.

2.- Прихвата се образложење теме за израду мастер рада студента, под називом **„Фото(електро)каталитичка активност композитних честица $ZnO@BaTi_{1-x}Sn_xO_3$ (BTS, x = 0, 0.05 i 0.10)“.**

3. Именује се Комисија за одбрану мастер рада студента у саставу:

1) др Ивана Стојковић Симатовић, ванредни професор, Факултет за физичку хемију,
2) др Ана Станковић, научни сарадник, ИТН САНУ,
3) др Никола Цвјетићанин, редовни професор, Факултет за физичку хемију.

Одлуку доставити:
- студенту,
- члановима Комисије,
- Служби за студентске послове,
- архиви Факултета.

Универзитет у Београду - Факултет за физичку хемију

проф. др Гордана Ћирић-Марјановић, декан