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„International Conference of Experimental and Numerical Investigations and New Technologies“

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Programme

and

The Book of Abstracts

29 June – 02 July 2021

Zlatibor, Serbia

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CNN TECH 2021

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Hotel Mona, Miladina Pecinara 26, Zlatibor, Serbia

http://cnntechno.com

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Title:	International Conference of Experimental and Numerical Investigations and New Technologies – **CNN TECH 2021** **PROGRAMME AND THE BOOK OF ABSTRACTS**
Publisher:	Innovation Center of Faculty of Mechanical Engineering Kraljice Marije 16, 11120 Belgrade 35 tel: (+381 11) 3302-346, fax 3370364 e-mail: cnntechno@gmail.com web site: http://cnntechno.com, http://www.inovacionicentar.rs
Editors:	Dr Goran Mladenovic, Associate Professor Dr Martina Balac, Senior Scientific Researcher Dr Aleksandra Dragicevic, Scientific Researcher
Technical editor	Dr Goran Mladenovic, Associate Professor
Cover page:	Dr Goran Mladenovic, Associate Professor
Printed in:	Innovation Center of Faculty of Mechanical Engineering Kraljice Marije 16 11120 Belgrade 35 tel: (+381 11) 3302-346
Circulation:	100 copies. The end of printing: June 2021.

ISBN: 978-86-6060-077-8

“International Conference of Experimental and Numerical Investigations and New Technologies”

CNN TECH 2021

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BT/ZNO COMPOSITE MATERIALS WITH IMPROVED FUNCTIONAL PROPERTIES

Ana Stankovic[1], Suzana Filipovic[*1], Ivana Stojkovic Simatovic[2], Sreco Davor Skapin[3], Lidija Mancic[1], Smilja Markovic[1]

[1]Institute of Technical Sciences of SASA, 11000 Belgrade, Serbia

[2]University of Belgrade, Faculty of Physical Chemistry, 11000 Belgrade, Serbia

[3]Jozef Stefan Institute, 1000 Ljubljana, Slovenia

*Corresponding author e-mail: suzana.filipovic@itn.sanu.ac.rs

Abstract

Due to a high-power conversion efficiency (PCE), perovskite solar cells (PSCs) are the most developing area of research in the past decade. Although lead–based inorganic–organic PSCs has achieved the highest PCE of 25.2%, the toxic nature of lead and poor stability of organic components strongly limits its commercialization. This problem can be overcome by developing of inorganic perovskites with a high PCE. Barium titanate ($BaTiO_3$, BT) belongs to the perovskite *crystal* structure materials *with remarkable dielectric, ferroelectric and ferromagnetic properties. In this research, to enhance functional properties of BT we employed functionalization with MEMO silane followed by in-situ alloying with ZnO in different BT to ZnO wt.%. Synthesized ZnO@MEMO@BT composites were tested as photo- and photo-electro catalysts under simulated* sunlight *irradiation. An enhanced catalytic activity of ZnO@MEMO@BT composites, compared to pure BT is probably due to the modified binding energy and an optimized band structure. In order to investigate the origin of improved catalytic efficiency, pristine BT and composites were characterized using a variety of techniques, including X-ray powder diffraction (XRD), Raman and Fourier transform infrared (FTIR) spectroscopy, field emission scanning electron microscopy (FESEM), UV-Vis diffuse reflectance and photoluminescence spectroscopy. The enhanced photo(electro)catalytic activity of the composite materials can be attributed to the synergetic effect of the surface defects and the ZnO/BT heterojunction particles, which enabled charge separation, thereby hindering the recombination of photogenerated carriers.*

Keywords

Barium titanate, Zinc oxide, photo(electro)catalysis, solar cells

Acknowledgement

Funds for the realization of this work are provided by the Ministry of Education, Science and Technological Development of the Republic of Serbia, Agreement on realization and financing of scientific research work of the Institute of Technical Sciences of SASA in 2020 (Record number: 451-03-68/2020-14/200175).

CIP - Каталогизација у публикацији
Народна библиотека Србије, Београд

621(048)(0.034.2)
62:519.6(048)(0.034.2)

INTERNATIONAL Conference of Experimental and Numerical Investigations and New Technologies (2021 ; Zlatibor)

Programme [Elektronski izvor] ; and The Book of Abstracts /
International Conference of Experimental and Numerical Investigations and New Technologies - CNN TECH 2021,29 June - 02 July 2021, Zlatibor, Serbia ; organized by Innovation Center of Faculty of Mechanical Engineering [and] Faculty of Mechanical Engineering, University of Belgrade, Center for Business Trainings ; [editors Goran Mladenovic, Martina Balac, Aleksandra Dragicevic]. - Belgrade : Innovation Center of Faculty of Mechanical Engineering, 2021 (Belgrade : Innovation Center of Faculty of Mechanical Engineering). - 1 elektronski optički disk (CD-ROM) ; 12 cm

Sistemski zahtevi: Nisu navedeni. - Nasl. sa naslovne strane dokumenta. - Tiraž 100

ISBN 978-86-6060-077-8

1. Mašinski fakultet. Inovacioni centar (Beograd)

a) Машинство - Апстракти b) Техника - Нумерички методи - Апстракти

COBISS.SR-ID 41811977