27. MEDNARODNO ZNANSTVENO SREČANJE VAKUUMSKA ZNANOST IN TEHNIKA

9.–10. SEPTEMBER 2021

GOZD MARTULJEK

27 th INTERNATIONAL SCIENTIFIC MEETING ON VACUUM SCIENCE AND TECHNIQUES

9–10 SEPTEMBER 2021

GOZD MARTULJEK

PROGRAM IN KNJIGA POVZETKOV
PROGRAM AND BOOK OF ABSTRACTS

UREDNIKA / EDITORS

Gregor Primc, Alenka Vesel

Društvo za vakuumsko tehniko Slovenije

Slovenian Society for Vacuum Technique

2021

27. MEDNARODNO ZNANSTVENO SREČANJE VAKUUMSKA ZNANOST IN TEHNIKA
27th INTERNATIONAL SCIENTIFIC MEETING ON VACUUM SCIENCE AND TECHNIQUES
Program in knjiga povzetkov / Program and book of abstracts

Izdal in založil / Published by
Društvo za vakuumsko tehniko Slovenije

Za založnika / For the publisher
Alenka Vesel

Organizatorji / Organized by
Društvo za vakuumsko tehniko Slovenije

Uredila / Edited by
Gregor Primc, Alenka Vesel

Tisk / Printed by
Društvo za vakuumsko tehniko Slovenije

Naklada / Issue
60 izvodov

Ljubljana 2021

ISBN 978-961-94431-2-5

CIP - Kataložni zapis o publikaciji
Narodna in univerzitetna knjižnica, Ljubljana

533.5(082)
621.52(082)

MEDNARODNO znanstveno srečanje Vakuumska znanost in tehnika (27 ; 2021 ; Gozd Martuljek)
27. mednarodno znanstveno srečanje Vakuumska znanost in tehnika : 9.-10. september 2021, Gozd Martuljek : program in knjiga povzetkov = 27th International Scientific Meeting on Vacuum Science and Techniques : 9-10 September 2021, Gozd Martuljek : program and book of abstracts / [organizator] Društvo za vakuumsko tehniko Slovenije, Slovenian Society for Vacuum Technique ; urednika, editors Gregor Primc, Alenka Vesel. - Ljubljana : Društvo za vakuumsko tehniko Slovenije, 2021

ISBN 978-961-94431-2-5
1. Dodat. nasl.
COBISS.SI-ID 74926083

LASER ABLATION AND CHEMICAL SYNTHESIS OF BICOMPONENT ZNO NANOPARTICLES

Dejan Maletić[*1,2], Maria Čebela[3,4], Damjan Blažeka[1], Rafaela Radičić[1], Damir Pajić[4] and Nikša Krstulović[1]
[1]Institute of Physics, Bijenička c. 46, 10000 Zagreb, Croatia
[2]Institute of Physics, University of Belgrade, Pregrevica 118, 11000 Belgrade, Serbia
[3]Institute for Nuclear sciences, Centre of Excellence-CextremeLab "Vinča", University of Belgrade, 11000 Belgrade, Serbia
[4]Department of Physics, Faculty of Science, University of Zagreb, Bijenička c. 32, HR-10000 Zagreb, Croatia
dmaletic@ifs.hr

The bicomponent nano particles draw attention of the researchers because introducing the second component into the crystal lattice of the nanoparticle we can tune physical properties of the material. One of the simplest and fastest method for synthesis of various bicomponent nanoparticles is by pulsed lasers ablation of the bulk material in water. For the synthesis of our bicomponent nanoparticles we use twostep process. The first step is to deposit a thin film of metal onto ZnO substrate using pulsed laser deposition in vacuum (PLD). The second step is to produce colloidal solution of nanoparticles by laser ablation in water (LAL) of metal coated ZnO. The ablating target was then scanned with laser beam in order to avoid heating of the target and to produce the high yield of bicomponent nanoparticles. The obtained nanoparticles were characterized using UV-VIS, XPS, SEM and XRD diagnostics.

The second process that we used for synthetizing bicomponent zinc oxide nanoparticles was self-propagating room temperature reaction of zinc nitrate with sodium hydroxide with addition of (x=1; 3 and 5%) of $AgNO_3$. The chemical composition of the produced nanoparticles is $Zn_1{-}xAg_xO$ (x=0.01;0.05 and 0.05). After the reaction, obtained powder was calcinated at 1100 °C for 4 h in a furnace. The diffraction patterns were recorded at room temperature and atmospheric pressure in the absence of any re-heating of the samples. From the XRD spectra we found that no second phase were formed in the samples, the ions of silver are embedded into the crystal lattice of the nanoparticles.

The bicomponent nanoparticles produced with these two methods are tested for the photocatalytic activity. We used UV lamp for irradiation of nanoparticle and organic dye (methylene blue – MB) mixture in a cuvette. The nanoparticles synthetized with both methods show good photocatalytic activity for degradation of organic dye.