

**SIXTEENTH ANNUAL CONFERENCE**

# **YUCOMAT 2014**

Hunguest Hotel Sun Resort Herceg Novi, Montenegro,  
September 1-5, 2014  
<http://www.mrs-serbia.org.rs>

## **Programme and The Book of Abstracts**

Organised by:  
**Materials Research Society of Serbia**

Endorsed by:  
**Federation of European Material Societies  
and  
Materials Research Society**

**Title:** THE SIXTEENTH ANNUAL CONFERENCE  
**YUCOMAT 2014**  
Programme and The Book of Abstracts

**Publisher:** Materials Research Society of Serbia  
Knez Mihailova 35/IV, 11000 Belgrade, Serbia  
Phone: +381 11 2185-437; Fax: + 381 11 2185-263  
<http://www.mrs-serbia.org.rs>

**Editors:** Prof. Dr. Dragan P. Uskoković and Prof. Dr. Velimir Radmilović

**Technical editor:** Aleksandra Stojičić

**Cover page:** Aleksandra Stojičić and Milica Ševkušić  
Back cover photo: Author: Rudolf Getel  
Source: Flickr ([www.flickr.com/photos/rudolfgetel/4280176487](http://www.flickr.com/photos/rudolfgetel/4280176487))  
Licence: CC BY 2.0

**Copyright** © 2014 Materials Research Society of Serbia

**Acknowledgments:** This conference is held in honour of Prof. Dragan Uskoković's 70<sup>th</sup> birthday.



**Printed in:** Biro Konto  
Sutorina bb, Igalo – Herceg Novi, Montenegro  
Phones: +382-31-670123, 670025, E-mail: [bkonto@t-com.me](mailto:bkonto@t-com.me)  
Circulation: 220 copies. The end of printing: August 2014

O.S.C.7

## PHOTOCATALYTIC ACTIVITY OF ZnO-PEO COMPOSITES

Smilja Marković, V. Rajić, A. Stanković, D. Uskoković  
*Institute of Technical Sciences of SASA, Belgrade, Serbia*

The removal of organic pollutants from wastewater is very important for environmental protection. During the years different methods have been developed and applied on wastewater treatment. Between those methods a heterogeneous photocatalysis has received extensive attention since it allows a complete mineralization of pollutants. ZnO-based materials has established role in heterogeneous photocatalysis. However, major drawback of ZnO is a band energy gap of 3.37 eV (368 nm) which restricts the material to absorb only UV light. Since sunlight is a source of clean and cheap energy, where UV light makes no more than 3–5% while visible light is about 45% of the total sunlight, it is highly desirable to synthesize ZnO-based materials capable for visible light photocatalysis. To modify the optical absorption properties and improving the visible light photocatalytic activity of ZnO materials several approaches have been applied: (1) metal ion doping, (2) nonmetal doping, (3) defect induced doping, (4) surface sensitization of ZnO particles to extend the spectral response into the visible region, (5) band gap modification by creation of oxygen vacancies and oxygen sub-stoichiometry, etc.

In this study, ZnO powder with nanospherical morphology was synthesized by microwave processing. In the continuation, the synthesized powder was used for preparation of composites with polyethylene oxide (PEO). PEO powders with three different molecular mass (200.000, 600.000 and 900.000) were used for composites preparation. The phase purity and crystal structure of the composites were investigated by X-ray diffraction and Raman spectroscopy. The particles morphology and size distributions were studied by FE–SEM and laser diffraction particle size analyzer, respectively. The optical properties were studied using UV–Vis diffuse reflectance and photoluminescence spectroscopy. The photocatalytic activity of ZnO-PEO composites was examined *via* decomposition of methylene blue (MB) under direct sunlight irradiation. A large efficiency of MB degradation was found after 6 h of irradiation. An enhanced optical and photocatalytical properties of ZnO-PEO composites were attributed to: (1) lattice defects introduced in crystal structure of ZnO by fast microwave processing, and (2) surface sensitization by polyethylene oxide (PEO).