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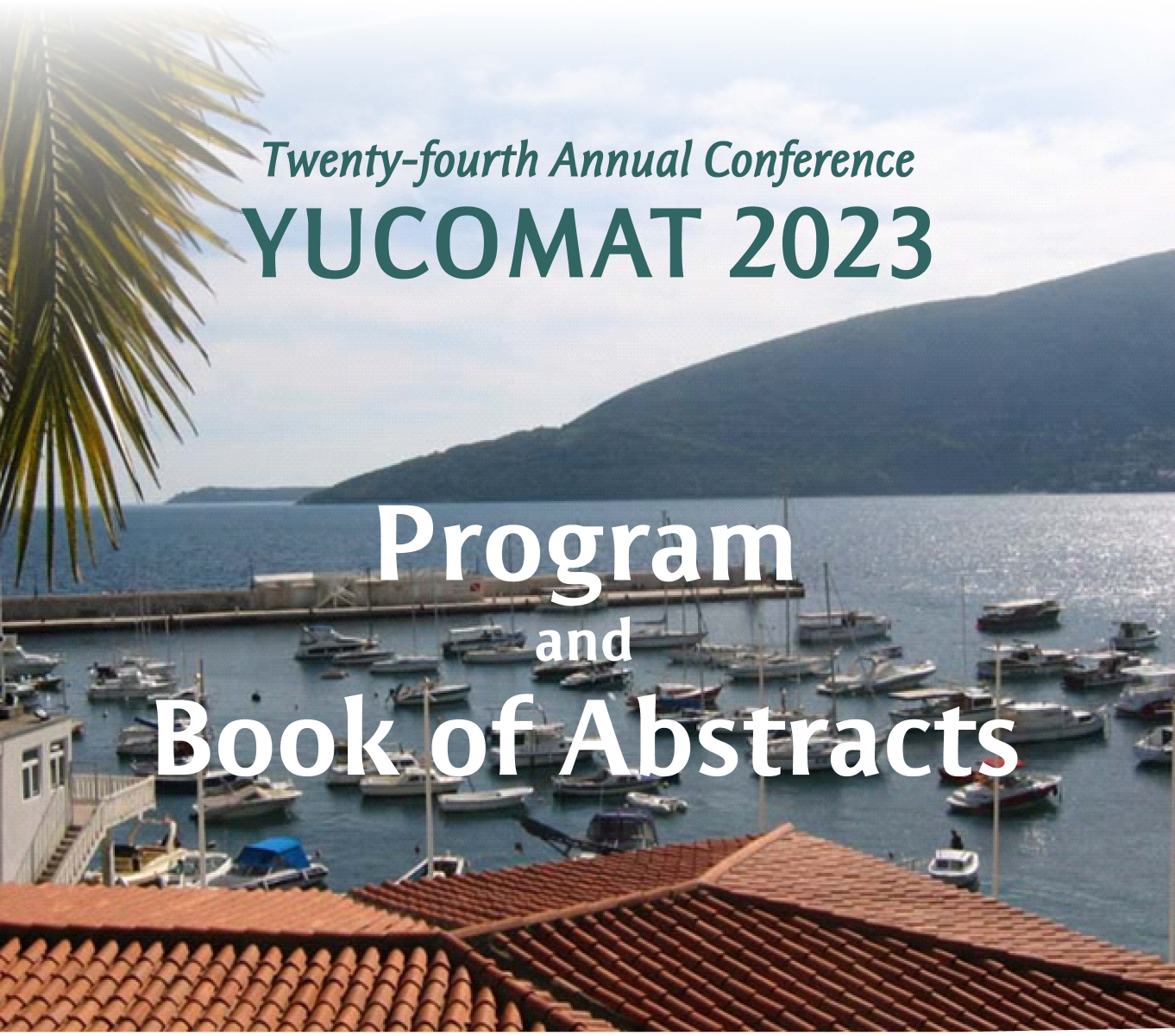

Twenty-fourth Annual Conference

YUCOMAT 2023

Program and Book of Abstracts

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FEDERATION OF EUROPEAN MATERIALS SOCIETIES

Materials Research Society of Serbia

24 conference

SERBIA MRS

YUCOMAT 2023

Herceg Novi, Montenegro :: September 4-8, 2023

TWENTY-FOURTH ANNUAL CONFERENCE

YUCOMAT 2023

Hunguest Hotel Sun Resort, Herceg Novi, Montenegro
September 4 - 8, 2023

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Endorsed by
Federation of European Material Societies

CIP – Каталогизација у публикацији
Народна библиотека Србије, Београд

66.017/.018(048)
621.762.5)048)

DRUŠTVO za istraživanje materijala Srbije (Beograd). Godišnja konferencija (24 ; 2023 ; Herceg Novi)
Programme ; and The Book of Abstracts / Twenty-fourth Annual Conference YUCOMAT 2023, Herceg Novi, Montenegro, September 4 - 8, 2023 ; organized by Materials Research Society of Serbia ; [editor Dragan P. Uskoković]. – Belgrade : Materials Research Society of Serbia, 2023 (Herceg Novi : Biro Konto). - XLVII, 183 str. : ilustr. ; 24 cm

Tiraž 220. – Bibliografija uz pojedine apstrakte. - Registar.

ISBN 978-86-919111-8-8

a) Наука о материјалима -- Апстракти b) Технички материјали -- Апстракти
v) Синтеровање -- Апстракти

COBISS.SR-ID 122486537

Title: THE TWENTY-FOURTH ANNUAL CONFERENCE **YUCOMAT 2023**
Program and Book of Abstracts

Publisher: Materials Research Society of Serbia
Knez Mihailova 35/IV, P. O. Box 433, 11000 Belgrade, Serbia
Phone: +381 11 2185-437; http://www.mrs-serbia.org.rs

Editor: Prof. Dr. Dragan P. Uskoković

Conference Secretary: Jasmina R. Jevtić

Technical editor: Dr. Ivana Dinić

Typesetting and prepress: Dr. Aleksandar Dekanski

Covers: Front cover photo: property of MRS Serbia
Back cover photo: J. Erskine-Kelli, Attribution-ShareAlike 2.0 Generic (CC BY-SA 2.0)

ISBN 978-86-919111-8-8

MRSS is member of the
Federation of European Materials Societies

Printed in: **Biro Konto,** Sutorina bb, Igalo – Herceg Novi, Montenegro
Phones: +382-31-670123, 670025, E-mail: bkonto@t-com.me

Circulation: 220 copies. The end of printing: August 2023

P.S.81.

Electrochemical detection of chloramphenicol drug based on ZnO and ZnO/graphene oxide composite nanoparticles

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The release of pharmaceuticals in the environment represents a significant ecological problem due to their complex structure making them challenge to be decomposed and removed by standard waste-water treatment processes. Zinc oxide (ZnO) represents a semiconductor compound with exceptional optical and electrochemical properties, chemical and photochemical stability, non-toxicity, biocompatibility, etc. Due to their adjustable multifunctional properties, ZnO based materials have concerned general scientific and technological attention. Nowadays these materials are used for a range of applications in electronics, opto-electronics, biosensing**,** bioimaging, drug delivery, antimicrobial and anticancer agents, implants as well as sensing in environmental applications. The main object of this study was to improve efficiency of ZnO particles toward electrochemical sensing of water pollutants and electrocatalysis. In order to modify electro-chemical properties, zinc oxide/graphene oxide (ZnO/GO) composites with different ZnO:GO weights ratio were prepared using a microwave (MW) assisted synthesis of precipitate. Two different amounts of GO (0.1 and 0.5 wt.%) were dispersed in 100 mL of distilled water. After stirring for 5 min an appropriate amount of $ZnCl_2$ was added to the GO water dispersion. Subsequently, 20 mL of 1.75 M NaOH was added dropwise to the mixture with constant stirring. After being stirred at 50 °C for 90 min in total, the as-prepared precipitate was microwave processed in a MW oven (2.45 GHz, 130 W) for 5 min. After cooling to room temperature, the precipitate was centrifuged and rinsed to remove the surface residues of the starting chemical solutions. The synthesized powder was dried in an oven at 80 °C for 24 h**.** The particles crystal structure and phase composition were investigated by X-ray diffraction and Raman spectroscopy. The particles morphology was determined with FE–SEM. The optical properties were studied using UV–Vis DRS and PL spectroscopy. The electrochemical sensing activity of ZnO and ZnO/GO electrodes was tested for detection of chloramphenicol water solution whereas electrocatalytic activity was tested for water splitting when samples were used as anode materials and evaluated by linear sweep voltammetry in 0.1M NaOH and 0.1 M H_2SO_4 electrolytes. ZnO/GO electrodes were tested as-prepared and after in situ reduction of GO at -1.4 V *vs.* SCE in 0.1 M KCl. Electrochemical activity of prepared composites was correlated with the presence of GO and reduced GO particles.