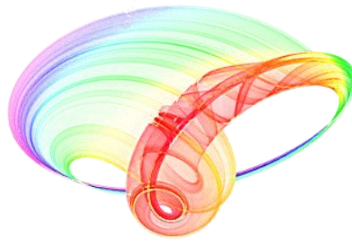


# Book of abstracts



IX International School and Conference on Photonics

## PHOTONICA2023

with joint events:

Understanding interaction light - biological surfaces: possibility for new electronic materials and devices

&

Biological and bioinspired structures for multispectral surveillance

&

Quantum sensing integration within microfluidic Lab-on-a Chips for biomedical applications

&

Advanced Biophysical Methods for Soil Targeted Fungi-Based Biocontrol Agents

August 28 - September 01, 2023, Belgrade, Serbia

*Editors*

Jelena Potočnik, Maja Popović, Dušan Božanić

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

Belgrade, 2023

ABSTRACTS OF TUTORIAL, KEYNOTE, INVITED LECTURES,  
PROGRESS REPORTS AND CONTRIBUTED PAPERS

of

IX International School and Conference on Photonics

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Dear Colleagues, friends of photonics,

We are honored by your participation at our PHOTONICA 2023 and your contribution to the tradition of this event. It is our pleasure to host you in Belgrade and in Serbia. Welcome to the world of photonics.

The International School and Conference on Photonics, PHOTONICA, is a biennial event held in Belgrade since 2007. The first meeting in the series was called ISCOM (International School and Conference on Optics and Optical Materials), but it was later renamed to PHOTONICA to reflect more clearly the aims of the event as a forum for education of young scientists, exchanging new knowledge and ideas, and fostering collaboration between scientists working within emerging areas of photonic science and technology. A particular educational feature of the program is to enable students and young researchers to benefit from the event, by providing introductory lectures preceding most recent results in many topics covered by the regular talks. In other words, tutorial and keynote speakers will give lectures specifically designed for students and scientists starting in this field. Apart from the oral presentations PHOTONICA hosts vibrant poster sessions. A significant number of best posters will be selected and the authors will have opportunity to present their work through short oral presentations – contributed talks.

The wish of the organizers is to provide a platform for discussing new developments and concepts within various disciplines of photonics, by bringing together researchers from academia, government and industrial laboratories for scientific interaction, the showcasing of new results in the relevant fields and debate on future trends.

PHOTONICA 2023 will host three joint events: PhoBioS COST Action “Understanding interaction light - biological surfaces: possibility for new electronic materials and devices”, NATO Science for Peace and Security Program (grant G5618) workshop “Biological and bioinspired structures for multispectral surveillance”, workshop on “Quantum sensing integration within microfluidic Lab-on-a Chips for biomedical applications” and BioPhysFUN workshop “Advanced Biophysical Methods for Soil Targeted Fungi-Based Biocontrol Agents”. Following the official program, the participants will also have plenty of opportunities to mix and network outside of the lecture theatre with planned free time and social events.

This book contains 130 abstracts of all presentations at the IX International School and Conference on Photonics, PHOTONICA2023. Authors from all around the world, from all the continents, will present their work at this event. There will be 4 tutorial and 7 keynote lectures to the benefits of students and early stage researches. The most recent results in various research fields of photonics will be presented through 16 invited lectures and 8 progress reports of early-stage researchers. Within the poster sessions and a number of contributed talks, authors will present 95 presentations on their new results in a cozy atmosphere of the building of Serbian Academy of Science and Arts.

Belgrade, August 2023

Editors

## **Conference Topics**

1. Quantum optics and ultracold systems
2. Nonlinear optics
3. Optical materials
4. Biophotonics
5. Devices and components
6. Optical communications
7. Laser spectroscopy and metrology
8. Ultrafast optical phenomena
9. Laser - material interaction
10. Optical metamaterials and plasmonics
11. Machine learning in photonics
12. Other topics in photonics

## **Joint Events**

PhoBioS COST Action - Understanding interaction light - biological surfaces: possibility for new electronic materials and devices

NATO Science for Peace and Security Program - Biological and bioinspired structures for multispectral surveillance

Workshop - Quantum sensing integration within microfluidic Lab-on-a Chips for biomedical applications

BioPhysFUN workshop - Advanced Biophysical Methods for Soil Targeted Fungi-Based Biocontrol Agents

## Crystal structure, optical properties and photo/electrocatalytic activity of nanostructured $\text{Zn}_{1-x}\text{Fe}_y\text{O}_{(1-x+1.5y)}$

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Zinc oxide-based materials have a great potential to be applied in photo and electro catalysts, optoelectronic (indoor illumination, LED), etc. Attractiveness of ZnO is attributed to wide bandgap energy at room temperature (3.37 eV), high electron mobility and transfer efficiency ( $115\text{-}155\text{ cm}^2\cdot\text{V}^{-1}\cdot\text{s}^{-1}$ ), large exciton binding energy (60 meV), intrinsic stability, nontoxicity, environmental compatibility and also, simple and not expensive synthesis procedure. A lot of different approaches can be used to modify the bandgap (i.e. optical absorption) of ZnO materials: metal and nonmetal ion doping, hydrogenation, the incorporation of crystalline defects in the form of V and I, modification of particles morphology and surface topology, etc.

In this study, eco-friendly and rapid microwave processing of a precipitate was used to produce Fe-doped ZnO nanoparticles with 5, 10, 15 and 20 at.% of Fe ( $\text{Zn}_{1-x}\text{Fe}_y\text{O}_{(1-x+1.5y)}$ ). The influence of different amount of Fe substituted Zn in ZnO on the crystal structure, morphological, textural, and optical properties as well as on functionality of ZnO particles was investigated. The crystal structure and phase purity of the  $\text{Zn}_{1-x}\text{Fe}_y\text{O}_{(1-x+1.5y)}$  particles were determined by X-ray diffraction (XRD), Fourier transform infrared spectroscopy (FTIR), Raman spectroscopy and X-ray photoelectron spectroscopy (XPS). Effects of the  $\text{Fe}^{3+}$  amount on particles morphology and texture properties were observed with field emission scanning electron microscopy (FE–SEM), transmission electron microscopy (TEM) and nitrogen adsorption–desorption isotherm, respectively. Optical properties were studied using UV-Vis diffuse reflectance and photoluminescence spectroscopy. Functionality of ZnO particles was studied due to their photocatalytic and electrochemical activities. Photocatalytic activity was examined via decolorization of methylene blue under direct sunlight irradiation. Electrochemical behavior of the ZnO samples as anode material was evaluated by linear sweep voltammetry in 0.5 M  $\text{Na}_2\text{SO}_4$  electrolyte.