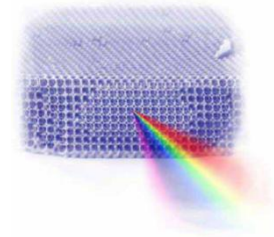


University of Belgrade  
Institute of Physics Belgrade  
Kopaonik, March 12-15, 2023



Book of Abstracts  
**16<sup>th</sup> Photonics Workshop**  
(Conference)



# 16<sup>th</sup> Photonics Workshop (2023)

## Book of abstracts

Kopaonik, Serbia, March 12-15, 2023

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**Conference program****Sunday, March 12<sup>th</sup>****Chairman: Branislav Jelenković**

16.00 – 16.30	<b>Registration &amp; opening</b>
16.30 - 17.00	<b>Goran Mashanovich</b> <i>Mid-Infrared Silicon Photonics for Sensing</i>
17.00 - 17.20	<b>Bratislav Marinković</b> <i>"Photoelectron" Spectroscopy by Electron Impact: Scattered and Ejected Electrons</i>
17.20 – 17.40	<b>Danka Stojanović</b> <i>Data enrichment and calibration for PM 2.5 low-cost optical sensors</i>
17.40 – 18.00	<b>Dušan Božanić</b> <i>Valence Band Electronic Structure of Azobenzene-Functionalized Gold Nanoparticles</i>
18.00 – 18.15	<b>Duška Popović</b> <i>Analysis of the photoelectron energy spectra at resonant two-photon ionization of hydrogen atom by intense short laser pulses</i>
18.15 – 18.30	<b>Vladimir Damljanović</b> <i>Atlas of electronic band structures in two-dimensional materials</i>

**Tuesday, March 14<sup>th</sup>****Chairman: Ljupčo Hadžievski**

16.00 - 16.30	<b>Refreshment</b>
16.30 - 17.00	<b>Vladan Vuletić</b> <i>Quantum Simulation and Computation with Neutral Atoms</i>
17.00 - 17.20	<b>Branislav Jelenković</b> <i>Squeezed light by FWM in alkali vapor – generation and application</i>
17.20 – 17.40	<b>Caterina Credi</b> <i>Straightforward integration of SERS technology within novel opto-fluidic devices for rapid liquids probing with high sensitivity</i>
17.40 – 18.00	<b>Sara Nocentini</b> <i>Temperature-controlled polymer nanopatterning for 4D tunable photonics</i>
18.00 – 18.15	<b>Jovana Petrović</b> <i>Ultra-low-loss broadband multiport optical splitters</i>
18.15 – 18.35	<b>Mehtap Ozdemir</b> <i>Optimization of Large Area Thin Films for All Solid State Electrochromic Devices</i>

**Chairman: Ivana Drvenica**

20.00 - 20.30	<b>Srdjan Antic</b> <i>The Role of Physics in Modern Neuroscience</i>
20.30 - 20.50	<b>Ljiljana Nikolić</b> <i>Application of optogenetics for studying neuronal activity via glial photostimulation</i>
20.50 - 21.05	<b>Katarina Milićević</b> <i>In vitro testing of genetically encoded voltage indicator ArcLightD for recording spontaneous electrical activity of cortical neurons</i>
21.05 – 21.25	<b>Dejan Pantelić</b> <i>Thermal radiation imaging of insects using lockin techniques</i>
21.25 – 21.40	<b>Vladimir Atanasoski</b> <i>Autocorrelation for denoising biomedical signals</i>
21.40 – 21.55	<b>Kolja Bugarski</b> <i>Localized modes in SSH photonic lattice in the presence of defects and local nonlinearity</i>
21.55 – 22.15	<b>Dragan Lukić</b> <i>Proposal for a new surveillance system for military vehicles and a new crew arrangement</i>

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## **Abstracts**

## Optical methodologies in the analysis of erythrocyte deformability and heterogeneity

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**Abstract.** Ektacytometry, a diffraction-based method, measures the deformability of entire erythrocyte populations and does not provide information on the altered deformability of individual erythrocytes or affected subpopulation induced by constant oxidative stress, physical stress, metabolic depletion, and loss of ion gradients during their 120 days life span. We introduced an approach based on ektacytometry coupled to flow cytometry analysis to monitor the deformability and heterogeneity of subpopulations of erythrocytes. The effects of *in vitro* changes of osmotic gradient (from 155 mM to 93 mM phosphate buffer) and treatment by oxidative agent (0.5 mM and 0.75 mM *tert*-butyl hydroperoxide (TBPH)) on human erythrocyte isolated from healthy male donors, were tested using RheoScan D 300 (RheoMeditech. Inc., Korea) and BD FACSCalibur flow cytometer (Becton Dickinson, USA).

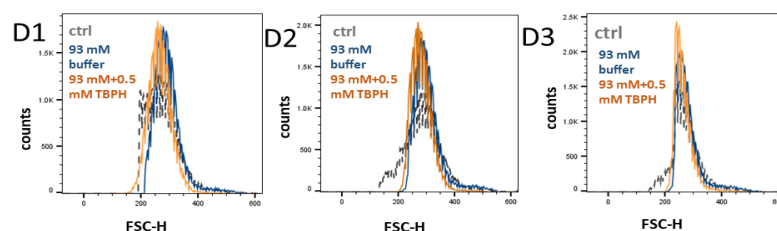


Figure 1. Effect of *in vitro* swelling and oxidation on erythrocytes FSC distribution (D-donor)

A decrease in erythrocyte deformability by changes in osmolality or treatment with TBPH *per se* was demonstrated by ektacytometry. Nevertheless, this method could not analyze the erythrocytes that underwent both treatments due to their lysis by the shear stress in the device. The samples of an equal population of normal erythrocytes and erythrocytes rigidified by 0.5 mM TBPH (slightly rigid) showed elongation indices in the physiological range, i.e., the effect of the treatments was annulled. The same result was obtained by flow cytometry. On the other hand, an altered population of oxidized cells by 0.5 mM TBPH was detected in hypoosmotic 93 mM buffer based on their forward scatter (FSC) (Figure 1) and side scatter (SSC) parameters. The subtle changes in the erythrocyte's subpopulation mechanobiology are essential to monitoring even in healthy people exposed to physical or/and environmental stress and stored erythrocytes, but some additional techniques are needed for the established optical-based approaches.

*Acknowledgement:* This study was funded by Science Fund of Republic of Serbia through HEMMAGINERO project (HEMOGLOBIN-BASED SPECTROSCOPY AND NONLINEAR IMAGING OF ERYTHROCYTES AND THEIR MEMBRANES AS EMERGING DIAGNOSTIC TOOL, No 6066079)