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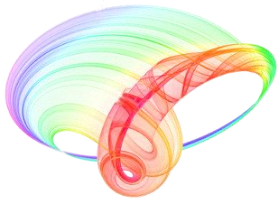

PHOTONICA2021

VIII International School and Conference on Photonics

& HEMMAGINERO workshop

23 - 27 August 2021,

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Editors

Mihailo Rabasović, Marina Lekić and Aleksandar Krmpot

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Belgrade, 2021

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

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The metal-doped TiO_2 nanoparticles as photosensitizers in photodynamic therapy of melanoma

I. D. Miler[1], M. D. Nešić[1], J. Žakula[1], L. Korićanac[1], M. Radoičić[1], A. Korać[2], M. Petković[1], M. Stepić[1]
[1]*Vinča Institute of Nuclear Sciences, National Institute of the Republic of Serbia, University of Belgrade, Belgrade, Serbia;* [2]*Faculty of Biology, University of Belgrade, Belgrade, Serbia*
e-mail:irenamiler@vin.bg.ac.rs

Melanoma is one of the most severe life-threatening diseases with a highly aggressive biologic behavior. Despite all improvements in diagnosis and therapy, most deaths from melanoma are due to metastases that are resistant to conventional treatment modalities [1].
Photodynamic therapy (PDT) is a relatively new treatment modality that has been successfully applied to many diseases and disorders, including skin cancers. PDT uses a combination of a light-sensitive substance (known as a photosensitizer, PS) and light of an appropriate wavelength. After the activation by light, PS reacts with molecular oxygen producing reactive oxygen species (ROS) and radicals, which cause intracellular biochemical changes leading to cell death [2].
Titanium dioxide nanoparticles (TiO_2 NPs) are commonly used PSs in PDT [3], but they absorb strongly in the UV light range. Doping TiO_2 NPs with ions leads to an increase in the absorption edge wavelength and a decrease in the bandgap energy, enabling the application of a less damaging visible light for the NP activation. However, to our best knowledge, metal-doped TiO_2 has not been extensively tested as PSs.
This study aimed to investigate the effects of colloidal TiO_2 NPs and prolate nanospheroids (PNSs) doped with Cu and Ni on melanoma cell lines (A375) in the dark and under blue light irradiation. In general, doped TiO_2 NPs show higher photocatalytic activity than undoped analog. Among them, the best photocatalytic activity showed TiO_2 NPs doped with Cu [4]. However, colloidal TiO_2 NPs have a diameter of 5 nm, whereas PNSs are around 20 nm long. Therefore, the cytotoxicity of cells was dependent on the dopant and the size of NPs. Still, in all cases, it is augmented by the light illumination, implying the potential use of doped TiO_2 NPs with Cu and Ni as a light-sensitive drug in PDT of melanoma. In summary, our results can contribute to the development of more efficient skin cancer treatment modalities.

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