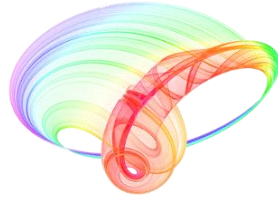


Book of abstracts



PHOTONICA2021

VIII International School and Conference on Photonics

& HEMMAGINERO workshop

23 - 27 August 2021,

Belgrade, Serbia

Editors

Mihailo Rabasović, Marina Lekić and Aleksandar Krmpot

Institute of Physics Belgrade, Serbia

Belgrade, 2021

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Visible light-responsiveness of the nanocarrier/drug complex based on the TiO₂ nanoparticles and Ru complex

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TiO₂ nanoparticles (NPs) have great potential for implementing photodynamic therapy (PDT) as a part of drug delivery therapeutical systems. PDT is an emerging anti-cancer therapy that involves the administration of photosensitizer (PS), which undergoes reversible changes upon light exposure. Next, PS can release a cytostatic drug and/or transfer its energy to molecular oxygen, generating reactive oxygen species (ROS), consequently leading to cancer cell ablation [1].

In this work, we assessed photocytotoxicity to the HeLa cell line of the nanocarrier/drug complexes–nanocomposite systems (NCSs) made of different types of carriers, TiO₂ NPs, for the delivery of Ru complex (cis-dichlorobis (2,2'-bipyridyl-4,4'-dicarboxylic acid)ruthenium(II)). One tested NCS consists of colloid TiO₂ NPs, whereas the other consists of the TiO₂ prolate nanospheroids (PNSs). Previously in our work, both TiO₂ NPs demonstrated good biocompatibility in the dark [2,3], whereas the Ru complex exhibited notable anti-proliferative, genotoxic, and antitumor effects [4]. As TiO₂ NPs are photo-active in the UV range, and the Ru complex absorbs in both UV and visible spectrum [3], herein, we have determined the optical bandgaps of the synthesized NCSs with Tauc's plot.

Calculated bandgaps of the synthesized NCSs proved that the Ru complex extends the responsiveness of TiO₂ to visible light while acts as a medicament in photo-active NCSs, allowing the absorption of the NCSs in the visible range. Thus, we have examined the photocytotoxicity of the combined treatment of the HeLa cells with NCSs and visible light. The preliminary results show that visible light, which is not harmful when applied alone to the cells, can effectively induce a cytotoxic effect in the combined therapy with the NCSs.

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