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G-15

THEORETICAL AND EXPERIMENTAL STUDIES OF THE OPTICAL PROPERTIES OF ORGANIC MATERIALS WITH A HIGH LUMINESCENCE YIELD USED IN BIOMEDICAL APPLICATIONS

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In the study and testing of biological systems, organic materials with a high luminescence yield are often used. Such molecules can be various polymers, substrates derived from photoproteins, xanthene dyes, etc. For the targeting synthesis of new materials and modification of the existing ones, it is advisable, before the experiment, to apply the methods of computer simulation. Calculations provide valuable information about the optical properties of materials. The data obtained can be used in the development of new bioluminescent technologies for biology, medicine, and the pharmaceutical industry. In this work, quantum-chemical calculations were carried out, absorption and luminescence spectra were calculated taking into account the solvent by GAMESS program. A comparative analysis of the influence of solvents and the environment on the shift of the absorption spectra of various organic molecules was carried out. Also, when required, energy decomposition was carried out in order to find out the nature of interactions between chromophore groups and the environment. It has been found how different factors (dielectric constant, environment, substituent) affect the optical properties of emitters separately, thereby making it possible to create biosensors with specified parameters. This work was supported by 19-02-00450-a.

G-16

EFFICIENCY OF THE PHASOR PLOT APPROACH FOR THE ANALYSIS OF THE ANTIMICROBIAL PROPERTIES OF NANOPARTICLES USING TWO PHOTON MICROSCOPY

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Two-photon microscopy methods have been actively developing in the last two decades. In particular, various approaches are being developed to analyze metabolic activity obtained by laser microscopy with high temporal resolution. One such approach is ploting the autofluorescence lifetime signal data to the phasor plot and observe deviations from the normal state. This tool has proven itself well for analyzing the metabolic activity of biological objects, including bacteria. This study analyzes the antimicrobial activity for MRSA bacteria by phasor plot approach. It was possible to show that, the lifetime of autofluorescence in the phasor plane changes depending on the type of nanoparticles used, with which bacteria are incubated. This result can be used in the future for rapid assessment of the antimicrobial activity of nanoparticles.

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