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PULSED LASERS AND LASER APPLICATIONS

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ABSTRACTS

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channels for the transfer of internal energy in the system of electronically excited states in the MB are still unclear. Sensitive fluorescent probe is a fluorescent molecule that binds to proteins, biological membranes or other components of a cell by non-covalent bonds. MB is used as a probe, the luminescence parameters of which change sharply depending on the properties of the environment. If the localization of the probe in the cell is known, then the change in the MV luminescence can suggest the physical properties of the immediate microenvironment of the probe molecules. Thus, the behaviour of proteins, membranes, nucleic acids is studied. Other structure properties of a biological system become immediately clear. When the environmental conditions around the MV change, then the nature of the spectra and the quantum yield of fluorescence also change. In our work, we used electron absorption spectroscopy, stationary fluorescence, and pump-probe spectroscopy [1] to study the migration of excitation energy in MB dissolved in various solvents.

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1. *Svetlichnyi V.A.* // Instruments and Experimental Techniques. 2010. V. 53, No. 4. P. 575–580. DOI: <https://doi.org/10.1134/S0020441210040196>.

B-19

FLUORESCENT CHEMICAL SENSORS IN LASER GENERATION MODE

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Investigations aimed on the detection of harmful substances for human life are very exist. Nitrocompounds are included among many. Among numerous chemical compounds contaminating the environment, a prominent place is occupied by nitroaromatic compounds, many of which enter the composition of explosive materials. They are contained in industrial waste and are toxic for living organisms. Of the wide variety of methods for detecting chemicals, method based on the quenching of fluorescence of organic compounds is a simple and fairly sensitive.

Sensor properties of poly[9,9-dioctylfluorenyl-2,7-di-yl] compounds with end groups dimethylphenyl (ADS129), poly [9,9-dioctylfluorenyl-2,7-di-yl] with end groups polysilsexvioxane (ADS229) were studied. A thin film planar waveguide structure is formed and lasing is obtained in ADS129 and ADS229 polymer compounds under excitation by the third harmonic of a Nd³⁺:YAG laser (335 nm) in the presence of nitrotoluene (NT).

Recently, to broaden the dynamic range and increase the sensitivity of optical chemical sensors, enhanced attention has been paid to the use of thin-film organic laser active media. The thin film element radiation intensity in the threshold laser regime depends on the chemical composition of the surrounding medium, and the presence of a small amount of a material quenching the luminescence can lead to complete oscillation suppression.

In this work, it is shown that a waveguide laser in a simple planar geometry with the use of an additional layer, which improves the optical waveguide properties, has a low lasing threshold and a fast response to the presence of NT.

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SYNTHESIS AND CHARACTERISTICS OF NANOPOWDERS AND CERAMICS OF ALUMINUM–MANGANESE SPINEL DOPED WITH IRON

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A technology for the preparation of nanopowder and ceramics of aluminum–manganese spinel doped with iron has been developed. In this case, nanopowders were synthesized using a laser ablation method with subsequent condensation of vapors in a carrier gas flow.