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ABSTRACTS

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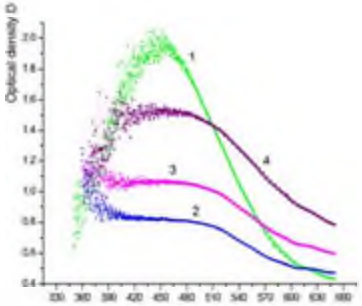
Four mixed aqueous solutions were prepared:
1) $AgNO_3$ + peppermint extract + $Eu^{3+}NO_3$ (concentration 4 mg/ml);
2) $AgNO_3$ + peppermint extract + $Eu^{3+}NO_3$ (concentration 8 mg/ml);
3) $AgNO_3$ + mint extract + $Eu^{3+}NO_3$ (concentrated 16 Mg/ml);
4) $AgNO_3$ + mint extract.

Spectra of optical absorption of silver nanoparticles were obtained (Figure) and analyzed using known techniques [3].

The absorption spectrum of mixed solution 4 has a peak of 460 nm, which is characteristic for silver nanoparticles. The absorption spectra of solutions 1, 2, and 3, in comparison with the absorption spectrum of 4, are more broadened, do not have a pronounced peak, and the magnitude of the maximum of the spectrum is below the solution.



As a result of the studies, the following results were obtained: the height of the absorption spectra of mixed aqueous solutions increases nonlinearly with increasing concentration of the solution $Eu^{3+}NO_3$, the absorption spectra are more broad, indicating an increase in the size of silver nanoparticles.

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B-8

PROTON PHOTOTRANSFER IN CARBOSTYRILS

O.N. Tchaikovskaya[1,2], O.V. Vusovich[1], G.V. Mayer[1], and I.V. Sokolova[1]

[1]Tomsk State University, 36 Lenin Ave., 634050 Tomsk, Russia, tchon@phys.tsu.ru;
[2]Institute of Organic Synthesis UrB RAS, 22 S. Kovalevskaya Str., 620990 Ekaterinburg, Russia, admin@ios.uran.ru

The increased interest in the creation of various optical devices based on organic molecules is due to their wide use as active media for tunable lasers, laser limiters, and optical sensors in various fields of science and technology. Considerable attention is also paid to the possibility of creating new, more efficient photosensitizers of singlet oxygen, which are necessary for successful use in photodynamic therapy (PDT) in the fight against infectious and oncological diseases, as well as photocatalysis of oxidative reactions.

In this paper, the dependence of the fluorescence efficiency of carbostyril and fluorocarbostyril on the pH of the medium is obtained and explained, due to a change in the efficiency of nonradiative processes in directed specific intermolecular interactions in the solvated shell of the excited complex. It was found that along with the charged forms of carbostyril in the excited state, there exists a tautomeric form with a strong charge separation (zwitterionic form), which has the longest

wavelength fluorescence. The introduction of the CF_3 group leads to an increase in the probability of detachment of the hydrogen proton from the OH group in the excited state and, as a result, the absence of neutral form fluorescence in aqueous solutions of fluorocarbostyril.

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ORGANIC DYES AND QUANTUM DOTS AS MODERN FLUORESCENT MARKERS

E.A. Slyusareva and M.A. Gerasimova

Siberian Federal University, 79 Svobodniy Ave., 660041 Krasnoyarsk, Russia, ESlyusareva@sfu-kras.ru

Active over many decades of research in the field of synthesis, spectral properties and quantum chemical calculations of fluorescent organic dyes are associated with such applications as biomarking, photosensitization, the creation of active laser media. The study of semiconductor water-soluble quantum dots (QD) began about 15 years ago, but over time, they became no less popular fluorophores. The high extinction coefficient and the quantum yield of photoluminescence, photochemical stability, the variability of the stabilizing functional groups, and the possibility of adjusting the position of the emission spectra by changing the particle sizes also contribute to their successful use in telecommunications, biosensorics, biomarking. At the same time, the different nature of the fluorescent states of the considered organic and semiconductor fluorophores causes a fundamental difference in the approaches to the interpretation of the experimental results with their participation.

In this paper, we compare the absorption, photoluminescence (spectral, time-resolved, polarization) properties of organic dyes and QD solutions. As examples, the spectral properties of a number of fluoron dyes (fluorescein, eosin Y, erythrosine B) and water-soluble QDs CdTe are considered. Examples of the study of the mechanisms and spectral manifestations of the binding of both types of fluorophores to biological molecules (proteins, polysaccharides) are given, and the possibility of their joint use as an effective donor-acceptor pair in the problems of biosensorics is considered.

B-10

ON THE BASIC MODELS FOR EFFECTIVE PARAMETERS OF MEDIA WITH PARTICLES OF COMPLEX STRUCTURE

L.A. Apresyan[1], S.I. Rasmagin[1], V.I. Krasovskiy[1,2], V.I. Kryshtob[1], and M.A.Kazaryan[3]

[1]General Physics Institute RAS, 38 Vavilov Str., 119991 Moscow, Russia, rasmas123@yandex.ru;
[2]Nuclear University MEPhI, 31 Kashirskoe Shos., 115409 Moscow, Russia, krasovskii@inbox.ru;
[3]Physical Institute RAS, 53 Leninskiy Ave., 119991 Moscow, Russia

The main approximations used in calculating the effective parameters of inhomogeneous media are Bruggemann effective medium approximation and Maxwell-Garnett model [1–4], which are now widely used in describing composites containing various nanostructured objects such as graphenes and carbon nanotubes [5]. In this paper we consider a simple method for obtaining these approximations, which makes it possible to extend them to the most general case of media with particles with an arbitrary internal structure, and also to clarify the physical meaning of the approximations adopted. The results essentially depend on the choice of "effective cells" used in estimating the field and induction values averaged over the volume.

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