

## LUMINOPHORE ORGANIC NANOCOMPOSITES ON THE BASE OF POLYMER AND ISOTHIOCIANATOHALCONIC COMPOUNDS

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The paper presents the results of technology for obtaining nanocomposite thin layers (NC) of organic luminophore compounds (OLC), particularly, those prepared by the sol-gel method. As polymer matrix, it was used copolymers from styrene and butylmethacrilate (SBMA) in the ratio (1:1). As organic luminophores we used 5 compounds of isothiocyanatohalconic luminophore group of 3-(4-dimethylamino-phenyl)-1-(4-isothiocyanato-phenyl)-propenone which was obtained by condensation 1,1-dimethyl 3-(3- or 4 -acetylphenyl) thiourea with substitution of aromatic aldehyde. The components of nanocomposites were dissolved in organic solvents. The thin layers on glass substrate were deposited by spin-coating method and then were dried. A series of thin films with the thickness from 0.2 to 2.0  $\mu\text{m}$  and concentrations of organic luminophores compounds from 1% to 20% have been prepared. The layers turn out to be transparents and their colours were yellow - oranges. Dimensions of the spheroids were less than 0.1  $\mu\text{m}$  and have not observed in microscope MII-4. We concluded from such fact that the particles are of nanodimensions.

The transmission spectra  $T(\lambda)$  of thin layers of NC SBMA/OLC are shown sharp absorption thresholds for all concentrations of OLC in NC in the range of 200 - 800 nm of spectrum. The absorption coefficient of spectra ( $\alpha(\lambda)$ ) are calculated from the transmission spectra  $T(\lambda)$  by the formula  $\alpha(\lambda) = -\ln T/d$  (where  $d$  is the thickness of NC,  $\alpha$  – absorption coefficient). The layers of polymer SBMA without the additives luminophore was transparent in visible and near ultra-violet areas of a spectrum. In nanocomposite the bands of absorption at 2.55; 3.0; 3.9; 4.8; 5.5 eV were found. The most intensive bands of absorption are at 2.55 eV.

The fluorescence spectrums in the range of 2.0 – 3.7 eV with two bands with maxima at 2.4 and 3.4 eV have been found. The Stokes displacements of luminescence are 0.1 – 0.05 eV. The value of Stokes shifts can be explained by the presence of a hydroxyl group. The model of excitation and proton transfer in molecules containing fragments of protons was used to describe the photochromic change in the emission spectra of polymer nanocompositions. According to this model, the proton remains predominantly on the nitrogen site. Upon UV excitation, in the first excited singlet state, the “phenil” is a considerably stronger acid and the “nitrogen” is a stronger base. Thus, the proton is transferred from the oxygen site to the nitrogen site, and the isomer formed ( $S^*$ ) is more stable than the isomer before proton transfer ( $S$ ).  $S^*$  can be regarded as a form of vibrational excited state  $S$ . Then the molecules are deexcited to the ground state by emitting of one photon. In the ground state the “enil” form is again the more stable and the proton will then transfer back to the oxygen. The nanocomposite can be used in various areas of optoelectronic and engineering: as indicators of UV and rigid radiation by transferring these energies in visible areas, as amplifiers and modulators of light, in solar cells elements, etc.