Preparation and optical properties of mesomorphic nanocomposites based on cadmium caprylate with Ag/CdS heteronanoparticles.

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At present time there have been actively in develop of the optical and nonlinear-optical composites containing heteronanoparticles such as core/shell. Presence of a metal and semiconductor nanoparticles simultaneously in same nanomaterial in the form of their alloy or a formation such as core/shell would allow the control of luminescence and opical nonlinearity of the optoelectronic devices [1].

Nanocomposites with Ag/CdS heteronanoparticles were obtained by melting previously prepared composites based on cadmium caprylate, containing 4 % mol cadmium sulfide and silver single nanoparticles, which mean size ranged 2 nm for CdS and 15 nm for Ag. The ratio CdS:Ag has been varied in the concentration range (x CdS + (4-x Ag, where x = 1 - 3, mol.%), however total amount was unchanged and had been 4 mol%. After 3-hour exposition of composition mixture in the range from 100 °C to 150°C, melts were cooled to room temperature and glassy mesomorphic nanocomposites with Ag/CdS nanoparticles were obtained. The nanocomposites colour had fluctuated from light brown to light yellow.

The obtained samples were studied by UV-Vis and fluorescence spectroscopy and transmission electron microscopy (TEM). It was established that a broad absorption bands of obtained nanocomposites with Ag/CdS heteronanoparticles are characterized by a red shift relating to absorption bands of Ag single nanoparticles as well as CdS nanoparticles.

By fluorescence spectroscopy it was established that excitonic luminescence depend on quantitative heteronanoparticle compound (the molar ratio CdS:Ag), yet excitonic luminescence band is more intensive than surface emission.

Thus, in the work new heteronanoparticles kind of Ag/CdS such as core/shell were prepared in liquid-crystalline matrix by cascade synthesis technique. Similar nanocomposites are promising for a creation of nonlinear-optical materials.

1. *Zhang J.,Tang Y.,Lee K.,Ouyang M.*, Tailoring light–matter–spin interactions in colloidal hetero-nanostructures // Science.-2010.-**327**.-P.1634-1638.