

18

## The Interaction of CdSe/ZnS Quantum Dot with Plasmonic Ag Nanoparticles Deposited on Amorphous Hydrogenated Carbon Thin Films\*

© D. Khmelevskaya, D.P. Shcherbinin, E.A. Konshina, M.M. Abboud, A. Dubavik, and I.A. Gladskikh

ITMO University,

197101 St. Petersburg, Russia

e-mail: khmelevskaya.dasha@yandex.ru

Received July 6, 2018

Local fields of metal nanoparticles can change quantum dots (QDs) absorption and luminescence. In this work, we have investigated the interaction of granulated Ag NPs films with CdSe/ZnS semiconductor QDs in hybrid structure with *a*-C:H thin films. We have studied hybrid structure with two *a*-C:H films on a quartz substrate having wider optical gap of 2.1 eV and narrow gap of 0.7 eV. The distribution of Ag NPs on the *a*-C:H was more ordered unlike a pure quartz surface. Homogeneous films of Ag NPs on *a*-C:H surface have narrower peaks of LSPR in spectra. The intensity magnifying and the blue shift of the LSPR peak of Ag NPs on 31 nm in the spectra has been observed with an increase in the optical gap of *a*-C:H film. We have also compared how the properties of *a*-C:H films in hybrid structures with Ag NPs affect the absorption and luminescence of CdSe/ZnS quantum dots. The absorption maximum for the QDs on Ag NPs/*a*-C:H surface was higher than on Ag NPs on pure quartz. The red shift of the absorption peak was observed. We have observed photoluminescence quenching of the CdSe/ZnS QDs on the surfaces of the studied hybrid structures. The greatest quenching of QD luminescence was observed on quartz substrate. A less significant quenching of the CdSe/ZnS QDs luminescence was obtained in the sample with *a*-C:H film having a wider optical gap.

DOI: 10.21883/OS.2018.11.46834.223-18

---

\* International Conference „PCNSPA 2018 — Photonic Colloidal Nanostructures: Synthesis, Properties, and Applications“, Saint Petersburg, Russia, June 4–8, 2018.

Полный текст статьи опубликован в английской версии журнала.