

Nanocomposites and nanomaterials

Investigation of the interaction between CdCoS diluted magnetic semiconductor quantum dots with albumin by optical spectroscopic techniques

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In recent decades, semiconductor nanoparticles or quantum dots have attracted intense research interest in biological and biomedical applications [1]. The advantages of QDs for biomedical applications are size-dependent emission spectra, high quantum yield, multicolor excitation, surface functionality and good photostability. These advantages make them an alternative to play an important role in fluorescence imaging (FI) technique which can provide high sensitivity and high spatial resolution [2]. As a significant type of agent for FI imaging Co-doped II-VI semiconductor based QDs are the most promising because of their chemical stability and strong fluorescence in visible region.

In this work, we report of optical studies of interactions between CdCoS quantum dots and proteins type human serum albumin (HSA). For this purpose, UV-vis absorption, photoluminescence, micro-Raman and Fourier Transform Infrared (FTIR) spectra were investigated. The obtained results show the gradual change of absorption and broadening of exciton structure after adding of protein in appropriate solution. In luminescence spectra of solution QDs and HSA so-called quenching effect has been observed. As a result of study of the CdCoS QD energy transfer effect was observed. These findings provide crucial information on a toxicity of NPs in human blood components and potential target organs.

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2. Wegner K. D., Hildebrandt N. Quantum dots: bright and versatile in vitro and in vivo fluorescence imaging biosensors //Chem. Soc. Rev. – 2015. DOI: 10.1039/c4cs00532e.