

Near-infrared Ag₂S quantum dots loaded in phospholipid nanostructures : physical properties, stability and cytotoxicity.

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In this paper, we report the encapsulation of near-infrared emitting Ag₂S quantum dots (QDs) in the phospholipid nanostructures with different functional head-groups of phospholipids. Ag₂S QDs were prepared using single-source precursor approach by thermal decomposition of silver diethyldithiocarbamate (Ag(DDTC)). Water dispersion of the QDs were accomplished by their encapsulation within cationic, anionic, neutral or PEGylated phospholipid nanostructures. The influence of different head-groups of phospholipids on physicochemical properties, encapsulation efficiency, luminescence efficiency, type of aggregates and stability of phospholipid nanostructures containing Ag₂S QDs was determined and discussed. The basic biocompatibility of Ag₂S QDs preparates was tested in vitro using NIH3T3 and HCT116 cell lines. In this regard the viability was assessed using MTS assay along with induction of apoptosis in cultures treated with selected phospholipid formulations of Ag₂S. The anionic and PEGylated phospholipids showed greater encapsulation efficacy, stability and lower cytotoxicity than neutral and cationic phospholipids used for QDs encapsulation. Such low-toxic phospholipid structures can be used as carriers for different types of QDs. Our study revealed that the DSPE-PEG2000-based formulations of Ag₂S QDs are well suited for applications in living biological systems. Combination of outstanding optical properties of QDs and phospholipids biocompatibility makes such particles potentially useful in fluorescent microscopy as fluorescent contrast agents.

Słowa kluczowe

Quantum dots, Ag₂S, Phospholipids, Encapsulation

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