Size-selected $AgInS_2$/ZnS quantum dots in mediums with different ionic strength and pH

Semiconductor nanocrystals - quantum dots (QDs) can play an important role in many applications. Indium chalcogenide - based ternary QDs combine high photostability and optical absorption, large Stokes shift, wide absorption and photoluminescence (PL) bands, long PL lifetime and visible dependence of the PL maximum on size - with no toxic metals in the composition. Despite the presence of a protective mercaptoacid layer on the QD's surface, the large surface-to-volume ratio makes colloidal QDs sensitive to the environment. Therefore, using QDs as PL nanoobjects in bioapplications requires consideration of their behavior in biological environments, characterized by different pH and ionic strength.

It is worth noting that a feature of this synthesis technique is the wide distribution of QD's size, which requires a fractionation. Size-selective precipitation allowed to discriminate of 11 $AgInS_2$/ZnS quantum dots fractions from the initial ensemble, revealing distinctly various optical properties. The effect of different pH and ionic strengths on the photoluminescent properties of $AgInS_2$/ZnS quantum dots fractions was studied. While in strong acidic and basic media the dramatic changes were observed, the pH and ionic strength range corresponding to the biological fluids showed no significant influence on the optical properties of all QDs fractions. This indicates the potential application of these nanoobjects as photoluminescent probes in various bioapplications.

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