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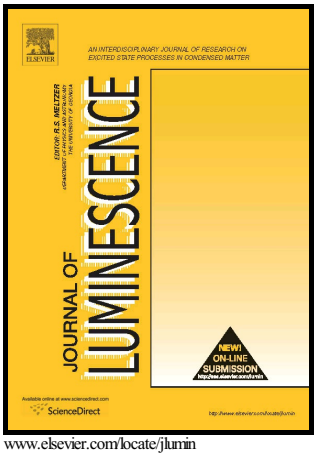

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Abstract

A simple one-pot route for the chemical synthesis of CdS colloidal quantum dots in aqueous medium was developed. In this wet chemical preparation, the anionic surfactant SDS (sodium dodecylsulfate) was used as the organic stabilizer added to the solution of chemical precursors containing the appropriate sources of the metallic cation (Cd^{2+}) and the chalcogenide anion (S^{2-}). The optical characterization was performed by means of ultraviolet-visible absorption and photoluminescence spectroscopy. Particle size distributions were obtained from the statistical analysis of atomic force microscopy (AFM) images generated for several quantum dot samples. The maximum of each AFM histogram was correlated to the size determined from absorption onset measurements combined with a well-established effective mass model for the size-dependent bandgap of spherical semiconductor quantum dots. An alternative theoretical model capable of providing improved size estimates was also proposed and implemented. From a simple experimental protocol based on the variation of the chalcogenide precursor concentration in the reaction medium, CdS quantum dots with size-tunable optical absorption and emission were synthesized.

KEYWORDS: CdS quantum dots, Chemical synthesis, Quantum confinement effect, Bandgap equation, Particle size calculation, Size distribution analysis.