The role of the QDs semiconducture surface on the silica coating efficiency

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Quantum dots (QDs) fluorescent semiconductor nanocrystals are widely used in various fields of electronics, analysis, and medicine. The wide absorption range and variability of high intensity fluorescence has allowed QDs to be used in many applications. However, they are insoluble in water and capable of oxidation. As a rule, QDs are synthesized in organic solvents and are not stable in other media. Modifying the QDs surface with a silanizing shell stabilizes the structure in aqueous media and allows the QDs to be attached to various structures. The success of the quantum dot coating process depends on many factors and should be carried out with optimization for a particular quantum dot architecture in mind. We have considered the silanization process by reverse microemulsion with optimization of both the quantum dot structure and size, as well as the silanization process itself. Joint and separate coating of the CdSe nucleus with CdS and ZnS shells and variations in their thickness for the QDs structure show difference in fluorescence intensity for final water soluble nanoparticle. Modification of the reverse microemulsion method significantly effects the structure of silanized shell. The success of the process was considered in terms of preserving the optical properties of the quantum dots when redissolved from organic solvents into the aqueous phase.

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