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Modification of Iron oxide nanoparticles using L-Cysteine capped CdTe quantum dots

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CdTe quantum dots (QDs) are one of the most popular nano-crystals which are derived from bulk compound semiconducting materials. The potential use of this material is determined by its size, ranging from 2 nm - 10 nm in diameter. The combination of quantum dot nano-crystals with super paramagnetic iron oxide nanoparticles (IONP) could bring about extraordinary returns in the field of biomedical science. In the current study, L-Cysteine capped CdTe quantum dots were synthesized maintaining the molar ratio of Cd²⁺ : Te²⁻ : Cysteine as, 1 : 0.24 : 4. During synthesis, the sample was refluxed at different reaction time intervals and was visualized under ultraviolet light and was characterized using FTIR and SEM analysis. Poly acrylic acid (PAA) coated magnetite nanoparticles were prepared by co-precipitation of Fe²⁺ and Fe³⁺ ions. PAA coated magnetite and QDs were conjugated using different temperature and pH combinations. All the synthesis procedures were carried out under argon atmosphere. Synthesized L-cysteine capped CdTe quantum dots presented bright yellow-orange color under UV light at 365 nm wavelength and the size of synthesized CdTe nano crystals can be determined as 3 nm – 3.5 nm. FTIR analysis of IONP-QD complex exhibited successful conjugation of magnetite nanoparticles with CdTe QDs. The modified IONP-QD complex can be further developed to be used in diagnostic assays.

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