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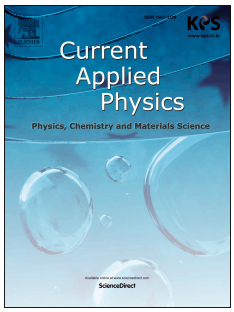


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# Emission of CdSe quantum dots according to the capping ligands

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Quantum dot nanocrystals have particular optical properties due to the quantum confinement effect and the surface effect. This study focuses on the effects of organic materials capping quantum dot on the emission properties of quantum dots. The quantum dots prepared by using 1-hexadecylamine in the synthesis show strong emission, while the quantum dots prepared by using tri-octylphosphine oxide exhibit a suppressed emission and an extra emission related with the surface energy traps. These organic materials cap the quantum dots and make the surface conditions of quantum dots different. TEM images and X-ray diffraction patterns reveal that 1-hexadecylamine constructs a layer on the surface of quantum dot during the synthesis and this surface passivation by a layer of 1-hexadecylamine reduces the surface energy traps. Differently from 1-hexadecylamine, tri-octylphosphine oxide dangles from the surface, which causes a poorly passivated surface. This generates the surface deep trap levels giving rise to a significant and broad emission in the lower energy regime. The optical mechanism is studied by measuring the emission spectra and the time-resolved spectra at various temperatures from 4 K to 300 K.

Keywords: CdSe, quantum dots, surface conditions, TOPO, HDA.

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