OPTICAL PROPERTIES OF NORMAL AND "GIANT" MULTISHELL CDSE QUANTUM DOTS FOR POTENTIAL APPLICATION IN MATERIAL SCIENCE

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TÓM TẮT:

The results on the optical properties of the normal and 'giant' multi-shell nanocrystal quantum dots (QDs) as CdSe/ZnS, CdSe/ZnSe/ZnS and CdSe/CdS/ZnS are presented for further improvement of the QDs quality as quantum yields (QY), photobleaching and blinking. The photoluminescence (PL) of CdSe core, monoshell and multishell QDs was studied to understand the radiative and non-radiative relaxation processes at 300 K and 4 K. In this temperature range, a 5-time decrease of PL intensity with increasing temperature was clearly observed in the CdSe core and less in normal CdSe/ZnS 2.5 monolayers (ML). The shift of the PL emission with increasing shell thickness in 'giant' QDs is interpreted as a decrease in the confinement of electrons in the QDs by an outer multishell. The results show that the PL quantum efficiency can be improved and optimised by adjusting the outer shell thickness.