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"Flash" synthesis of "giant" Mn-doped CdS/ZnSe/ZnS nanocrystals with ZnSe layer as hole quantum-well RUILIN XU, JIAYU ZHANG, Advanced Photonics Center, Southeast University — Usually, exciton-Mn energy transfer in Mn-doped CdS/ZnS nanocrystals (NCs) can readily outcompete the exciton trapping by an order of magnitude. However, with the accumulation of non-radiative defects in the giant shell during the rapid growth of the thick shell (up to ~20 monolayers in no more than 10 minutes), the photoluminescence (PL) quantum yield of this kind of giant NCs is significantly reduced by the accumulation of non-radiative defects during the rapid growth of thick shell. That is because the exciton-Mn energy transfer in Mn-doped CdS/ZnS NCs is significantly inhibited by the hole trapping as the major competing process, resulting from the insufficient hole-confinement in CdS/ZnS NCs. Accordingly flash synthesis of giant Mn-doped CdS/ZnSe/ZnS NCs with ZnSe layer as hole quantum-well is developed to suppress the inhibition. Meanwhile Mn^{2+} PL peak changes profoundly from ~620 nm to ~540 nm after addition of ZnSe layer. Studies are under the way to explore the relevant mechanisms.

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