Electronic Supplementary Material (ESI) for RSC Advances.

Visual Monitoring of Laser Power and Spot Profile in Micron Region by a Single Chip of Zn Doped CdS Nanobelts

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Supporting Information

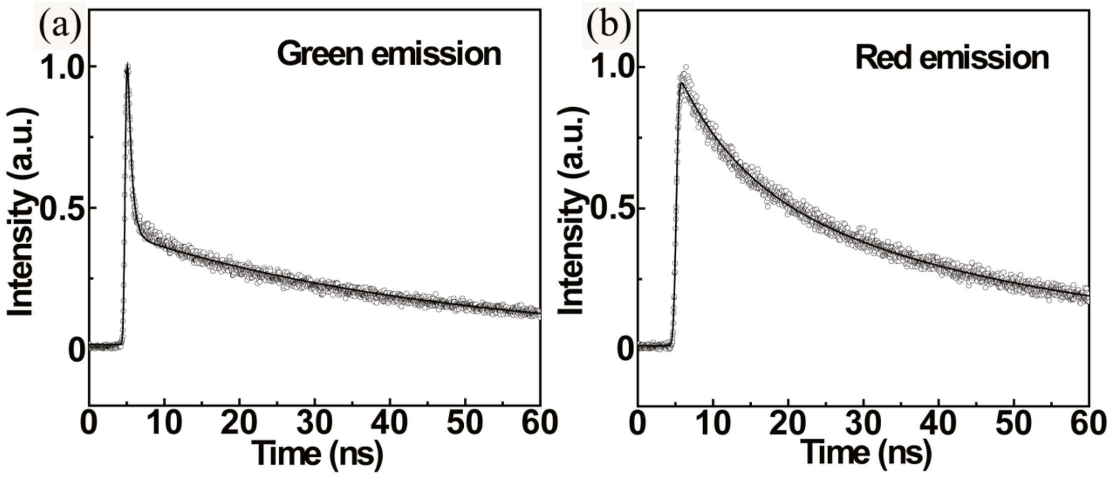

Fig. S (a) TRPL spectra at ~500 nm (green emission) for Zn doped CdS nanobelt with the pumping power of 2.87 mW; the hollow circles are the experimental data and the solid lines are the fitting curves using a biexponential decay function. (b) TRPL spectra at ~600 nm (red emission) for Zn doped CdS nanobelt with the pumping power of 2.87 mW; the hollow circles are the experimental data and the solid lines are the fitting curves using a biexponential decay function.

The TRPL spectra were measured by a single-photon counting system (TimeHarp 200), the time resolution is 40 ps. The TRPL decay profile for both the emission could be fitted with a biexponential decay function expressed as follows: $I\,(t) = A_1 e^{-t/\tau_1} + A_2 e^{-t/\tau_2}$ (1) where A_1 and A_2 are the amplitudes (or weighting factors), and τ_1 and τ_2 are the corresponding lifetimes.[1] For the green emission, τ_1 (A_1) and τ_2 (A_2) are 0.54 ns (75%) and 43.88 ns (25%), respectively. The short component τ_1 is attributed to the radiative recombination of free excitons in CdS nanobelt, as described in other references; and the weighting factor A_1 is dominant component, which means the excitons recombination is the main contribution to the green emission.[1] The long component τ_2 is attributed to the weakly bound exciton spontaneous radiative decay.[2] For the red emission, τ_1 (A_1) and τ_2 (A_2) are 8.29 ns (37%) and 43.84 ns (63%), respectively. The short component τ_1 is decay of the charge carries related to the trap states experience a complicated relax and recombination process.[3] The long component τ_2 represents that the deep trap results from strong exciton-phonon coupling in this structure as shown in earlier reported results.[4]

Reference

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4. S. Jana, B. B. Srivastava, S. Jana, R. Bose and N. Pradhan, *The Journal of Physical Chemistry Letters*, 2012, **3**, 2535-2540.