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Spin coherence in CdS quantum dots P. NEMEC, P. NAHALKOVA, D. SPRINZL, M. SIMURDA, F. TROJANEK, P. MALY, Charles University in Prague, Ke Karlovu 3, 121 16 Prague 2, Czech Republic, J.T. DEVREESE, V.N. GLADILIN, Universiteit Antwerpen, Universiteitsplein 1, B-2610 Antwerpen, Belgium — Spin coherence in CdS quantum dots (QDs) in a glass matrix has been investigated. Time-resolved differential transmission experiments were performed to measure the decay of the degree of circular (linear) polarization DCP (DLP). We show that due to the nearly spherical shape of our QDs the properties of DCP and DLP are considerably different compared to the most often investigated self-assembled QDs that are of pyramidal shape. Namely, we observed a decay of DCP with two distinct time components (300 fs and 10 ns at 300 K) and a strong dependence of the initial values of DCP on the laser wavelength. Our theoretical analysis of the experiments implies that the slow component in the observed decay of DCP is dominated by intralevel exciton transitions with electron spin flip, which are driven by the electron–hole exchange interaction and assisted by two LO phonons. We show that two-phonon processes significantly contribute also to exciton transitions without electron spin flip, which lead to the appearance of a fast component in the decay of DCP. This work was supported by the Grant agency of the Czech Republic (grant 202/03/P150), by the Ministry of Education of the Czech Republic (project 1K03022), by IUAP and FWO-V projects G.0274.01N, G.0435.03, the WOG WO.025.99N (Belgium).

Petr Nemeč
Charles University in Prague, Ke Karlovu 3, 121 16 Prague 2

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