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Dangling Bond Magnetic Polaron in CdSe nanocrystals ALEXANDER EFROS, Naval Research Lab, ANNA RODINA, Ioffe Physico-Technical Institute, RAS — In this work we study theoretically the effect of the spins of the surface dangling bonds on the PL of CdSe nanocrystals (NCs). [1] We show that spins of dangling bonds open new recombination channels for the dark exciton recombination which is connected with flip-flip and flip-flop spin-assisted recombination of the dark exciton. Calculations show that at low temperatures the interaction between dangling bonds and NC excitons leads to the dynamical polarization of the dangling bond spins along the anisotropic axis following by the formation of a dangling bond magnetic polaron. An increase of the temperature, or of the external magnetic field perpendicular to the anisotropic axis, destroys the polaron state. This results in a shift of the transition energy and an increase of its recombination rate. Thus thermal depolarization of the polaron state may explain the small activation energies observed in the temperature dependences of the exciton lifetimes in CdSe NCs. The exchange interaction of the electron spin with spins of the surface dangling bonds explains also radiative recombination of the dark excitons in nanowires, nanorods and nanoplatelets. [1] A. Rodina and Al. L. Efros, Nano Lett. v. 15, 4214-4222 (2015)

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