Abstract Submitted
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Dynamics of carrier populations and localized spins during magnetic-polaron formation in quantum dots[1] BIPLOB BARMAN, RAFAL OSZWALDOWSKI, LARS SCHWEIDENBACK, ANDREAS RUSS, JOSEPH MURPHY, ALEXANDER CARTWRIGHT, IGOR ZUTIC, BRUCE MCCOMBE, ATHOS PETROU, SUNY Buffalo, WU-CHING CHOU, WEN CHUNG FAN, National Chiao Tung University, IAN SELLERS, University of Oklahoma, ANDRE PETUKHOV, South Dakota School of Mines & Technology — We have extended our previous investigation of time evolution of PL from (Zn,Mn)Te/ZnSe quantum dots in a magnetic field B [1]. PL studies at T =5 K in these type-II dots reveal formation of magnetic polarons (MP). We find their formation time τ_{MP} to be 0.5 ns, which varies little with B. The circular polarization P of the emission shows a surprising behavior. For all fields, the characteristic time τ_P is longer than τ_{MP}. Furthermore, τ_P decreases from 10 ns to 1.9 ns as B increases from 1 to 4 tesla. We attribute this effect to a low-B bottleneck in the σ_+ recombination channel, due to the almost equal populations of the spin $\pm 1/2$ electrons participating in the inter-band transitions. In contrast, the $\pm 3/2$ holes in the (Zn,Mn)Te QDs, are affected mostly by the effective field due to exchange interaction between hole and Mn spins around it. This effective field is much larger than B.

[1] I.R. Sellers *et al.* Phys. Rev. B. 82, 195320 (2010)

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