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Magnetic polarons in type-II (Zn,Mn)Se/ZnTe quantum dots[1]
J.R. MURPHY, B. BARMAN, Y. TSAI, T. SCRACE, J.M. PIENTKA, I. ZUTIC, B.D. MCCOMBE, A. PETROU, A.N. CARTWRIGHT, SUNY Buffalo, W.C. CHOU, M.H. TSOU, National Chiao Tung University, Taiwan, C.S. YANG, Graduate Institute of Electro-Optical Engineering, Tatung University, Taiwan, I.R. SELLERS, University of Oklahoma, R. OSZWALDOWSKI, A.G. PETUKHOV, South Dakota School of Mines and Technology — We have studied magnetic polaron formation dynamics in (Zn,Mn)Se/ZnTe quantum dots[2] (QDs) using time-resolved photoluminescence (TRPL) spectroscopy. The emitted light was spectrally and temporally analyzed; the emission spectra were recorded as function of time delay (Δt) from the exciting laser pulse. The recombination time at T =10 K in our samples is 2.3 ns. The peak energy of the emission red shifts with increasing Δtdue to the lowering of the hole-Mn spin complex (magnetic polaron) energy. From this shift we determined the magnetic polaron formation energy (E_{MP}) at T =10 K to be 20 meV, which is half the value observed in the ZnSe/(Zn,Mn)Te system studied previously.[3] E_{MP} decreases with increasing temperature, in contrast to the behavior of the ZnSe/(Zn,Mn)Te system[3] in which E_{MP} is temperature independent. These results are discussed in terms of a theoretical model. [2] L. Lee, et al., J. Cryst. Growth **378**, 222 (2013). [3] I. R. Sellers, et al., Phys. Rev. B **82**, 195320 (2010).

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