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Magneto-optical studies of (Zn,Mn)Se/ZnTe quantum dots[1] B. BARMAN, Y. TSAI, T. SCRACE, I. ZUTIC, B.D. MCCOMBE, A. PETROU, 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 recorded the circular polarization P of photoluminescence from (Zn,Mn)Se/ZnTe quantum dots (QDs) as function of magnetic field B. The polarization at a fixed temperature increases monotonically with B and saturates for B >3 tesla at P_{sat}. The value of P_{sat} depends strongly on the laser photon energy. When we excite above (below) the ZnMnSe gap with photons of energy of 3.81 eV (2.54 eV), we measure P_{sat} =55%(P_{sat} =20%). We interpret these results as due to the difference in the Zeeman band splitting between the magnetic (Zn,Mn)Se matrix and the non-magnetic ZnTe QDs. For 3.81 eV excitation, electron-hole pairs are generated mainly in the (Zn,Mn)Se matrix. The majority of the holes relax to the +3/2 state before capture by the ZnTe QDs. With 2.54 eV excitation, all electron-hole pairs are excited in the QDs where the Zeeman splitting is negligible. Thus, P_{sat} is determined in this case by the relatively small Zeeman splitting of ZnMnSe conduction band. We relate these findings to our previous results for magnetic type-II QDs, where P_{sat} does not depend on the exciting photon energy.

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