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Dynamics of the matrix in DMS Type-II quantum dot systems[1]
COLLIN R. BROWN, VINCE R. WHITESIDE, IAN R. SELLERS, Department of Physics Astronomy, University of Oklahoma, Norman, Oklahoma 73019, USA, ATHOS PETROU, Department of Physics, University at Buffalo SUNY, Buffalo, New York 14260, USA, W-C. CHOU, Department of Electro-physics, National Chiao Tung University, Hsinchu 300, Taiwan — Magnetic field, temperature, and polarization dependent continuous wave photoluminescence spectroscopy (PL) is used to study two related Type-II quantum dots (QDs). These techniques were used to study how the location of magnetic impurities affects the formation of magnetic polarons in these two (related) systems. The ZnMnTe/ZnSe system has Mn impurities located within the QDs, with (ideally) no Mn in the surrounding ZnSe matrix. The ZnTe/ZnMnSe QDs have Mn impurities grown within the matrix, which ideally is excluded from the QDs. For both these systems, the holes are confined within the dots, while the electrons are located in the surrounding matrix. The location of the Mn and its coupling with the spin of the corresponding carrier leads to distinct characteristics for each system. Due to difficulties growing these systems, some diffusion of Mn during the growth of these samples is suspected, leading to a percentage of magnetic impurities unintentionally located in the non-magnetic region for both samples. The emission from the matrix in particular was studied to determine the effect/composition of Mn in this region and its contribution to the characteristics of the QDs.

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