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Interdot coupling through common excited state in II-VI self-assembled quantum dots TUAN A. NGUYEN, THANG B. HOANG, SEBASTIAN MACKOWSKI, HOWARD E. JACKSON, LEIGH M. SMITH, University of Cincinnati, JACEK KOSSUT, GRZEGORZ KARCZEWSKI, Institute of Physics PAS, Warsaw, Poland — We study the excitation coupling in CdTe/ZnTe self-assembled quantum dots (QDs) by means of photoluminescence excitation (PLE) imaging. We use a solid immersion lens in combination with slit-confocal microscope and a multi-channel CCD detector to simultaneously resolve the single dot emission energy, excitation energy and position. The PLE spectra feature sets of several different single dot emission lines coupled to identical excitation resonances with energies about 100 meV above the QD emissions. This result is a signature of an excitation coupling through a common excited state between QDs. A very narrow linewidth of these high-energy resonances of 0.5 meV suggests a very efficient relaxation from these excited states. Using spatially resolved PLE imaging spectroscopy we show that these coupled QDs occur within a 500 nm spatial cluster. This suggests that there is a quasi zero-dimensional electronic state which extends across 500 nm and is coupled directly to the cluster of strongly confined CdTe dots. The work was supported by NSF grants nr 9975655 and 0071797 and PBZ-KBN-044/P03/2001.

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