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Probing excited states in self-assembled quantum dots with resonant Raman scattering AMENSISA ABDI, THANG B. HOANG, SEBASTIAN MACKOWSKI, LEIGH M. SMITH, HOWARD E. JACKSON, University of Cincinnati, JAN YARRISON-RICE, Miami University, JACEK KOSSUT, GRZEGORZ KARCZEWSKI, Institute of Physics, PAS, Warsaw, Poland — We investigate the distribution of excited states in as-grown and annealed CdTe self-assembled quantum dots grown by molecular beam epitaxy using room temperature resonant Raman scattering (RRS). We observe that the Raman intensity of the first LO ZnTe phonon at 202 cm^{-1} is strongly dependent on the laser excitation energy. For the as-grown sample, the RRS intensity peaks at an energy of 2.08 eV with a width of 90 meV. For the annealed sample, the RRS intensity peaks at a higher energy, 2.11 eV, with a narrower width of 70 meV. The widths reflect the distribution of excited state energies. The peak positions indicate an energy separation between excited and ground states of ∼80 meV and ∼60 meV for the as-grown and annealed CdTe quantum dots respectively. The smaller separation for the annealed dots suggests that interdiffusion results in a weaker confining potential. We acknowledge the support of NSF DMR 0071797 (U.S.) and PBZ-KBN-044/P03/2001 (Poland).

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