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Carrier Relaxation in Multi-Stacked InAs/GaAs Quantum Dots
C.L. WU, D.-J. JANG, S.-K. LU, Department of Physics, National Sun Yat-sen University, Kaoshiung, 80441, Taiwan, R.O.C., C.M. LAI, J.S. WANG, Department of Physics, Chung Yuan Christian University, Chung-Li, 32023, Taiwan, R.O.C., K.Y. HSEI, MaxIC electronics Co. Ltd, Science Park , Hsinchu , Taiwan, R.O.C, M.-E. LEE, Department of Physics, National Kaohsiung Normal University, Kaohsiung, Taiwan, R.O.C. — We report the ultrafast time-resolved photoluminescence study of multi-stacked InAs/GaAs quantum dots (MSQD) using the photoluminescence upconversion technique. MSQD with thicknesses of GaAs spacer of 30, 15, and 10 nm were studied to elucidate the dynamics of carrier coupling in both growth and lateral directions. The PL decay time decreases with the thickness of the GaAs spacer. The PL exhibits fast decay as the energy increases. We attribute the energy dependence of PL decay time to carrier tunneling in growth direction. We also found that the carrier tunneling is less effective for GaAs spacer of thickness 30 nm.

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