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Exciton binding energy and electron effective-mass in strain compensated InGaAsN/GaAs single Quantum Well[1] LIFANG XU, DINESH PATEL, CARMEN MENONI, Department of Electrical and Computer Engineering,Colorado State University, Fort Collins, CO 80523-1373, JENGYA YEH, LUKE MAWST, Reed Center for Photonics, Department of Electrical & Computer Engineering,University of Wisconsin-Madison, Madison, WI 53706, NELSON TANSU, Center for Optical Technologies, Department of Electrical and Computer Engineering,Lehigh University, Sinclair Laboratory, 7 Asa Drive, Bethlehem, PA — A detailed lineshape analysis of the temperature dependent photoluminescence spectra of $In_{0.4}Ga_{0.6}As_{1-y}N_y$/GaAs quantum well (QW) (y=0; 0.005) is carried out. The analysis extracts the binding energy of the e_1-hh_1 ground-state exciton which equals 9.72±1.24 meV and 17.5±0.9 meV for InGaAs and InGaAsN (N=0.5%) single QW sample, respectively. By using a fractional dimension exciton binding energy model, an electron effective mass of m_e*=(0.11±0.015)m_0 is determined for the highly strained dilute nitride single QW.

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