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Photoluminescence from Colloidal CdS/CdSe/CdS Quantum Wells JIANFENG XU, Dept of Physics, University of Arkansas, DAVID BATTAGLIA, Dept of Chemistry and Biochemistry, University of Arkansas, XIAOGANG PENG, Dept of Chemistry and Biochemistry, University of Arkansas, MIN XIAO, Dept of Physics, University of Arkansas — We report investigations of colloidal CdS/CdSe/CdS (core/well/shell) quantum wells (QW) by photoluminescence (PL) spectroscopy at temperatures between 77 and 300 K. PL intensity measurements show a transition from a pump-rate-limited regime at low excitation intensity to the range determined by a spontaneous emission lifetime at high excitation limit. The temperature dependences of the peak energy, linewidth and intensity of the PL have all been determined. The PL linewidth is narrower for thicker QWs and becomes broader when the temperature increases due to longitudinal optical (LO) phonon scattering. The LO-phonon scattering strength is around 30 meV, which is independent of the well thickness, and is much smaller than the value for bulk CdSe. The PL dynamic measurements show that the PL lifetimes for the 1-3 monolayer CdSe QWs increase with temperature. Such temperature dependence shows that the radiative recombination is the dominant process, indicating a high quality of the QW structures.

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