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Bimodal Distribution of Cadmium Selenide Quantum Dots Prepared by UV-Photolithography[1] AJITH DESILVA, University of West Georgia, M. KAVEH, University of Cincinnati, RAGHUVEER R. GADIPALLI, SARAH G. MARTINO, University of West Georgia, H.P. WAGNER, University of Cincinnati —
We employed wet chemical and UV photolithography methods to synthesize CdSe quantum dots (QDs). The dynamics of excitons in the QDs were studied using temperaturedependent photoluminescence (PL) ranging from 17 to 300 K The inhomogeneous shape and size of the QDs led to an asymmetric PL spectrum at 17 K, which was approximately decomposed into two Gaussian emission bands, with peak energies at 2.182 and 2.299 eV and widths of 40 and 30 meV, respectively. These bands are attributed to the existence of two CdSe QDs ensembles with differently sized QDs. With increasing temperature the PL intensities of both bands weakly change, the PL yield of the larger QDs being higher at low temperatures while the smaller QDs show the stronger emission at higher temperatures. The stronger PL quenching of the larger QDs with increasing temperature is tentatively assigned to a higher density of defects at the grain boundary compared with small QDs. TEM images of the sample revealed a distribution of nano-particles with average sizes around 10 and 15 nm supporting the existence of a bimodal QD distribution.

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Ajith DeSilva
University of West Georgia

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