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Influence of Mg on the formation of CdSe self-assembled quantum dots on ZnCdMgSe barriers MARIA NOEMI PEREZ-PAZ, XUECONG ZHOU, City College and Graduate Center of CUNY, HONG LU, MOHAMMED SOHEL, City College and Graduate Center, MARIA C. TAMARGO, City College — CdSe self-assembled quantum dots (QDs) with ZnCdMgSe barriers lattice-matched to InP have been recently reported[1]. Under constant growth conditions, the size and consequently, the photoluminescence emission of the QDs (ranging from blue to red) is controllable and reproducible by changing the CdSe deposition time. Comparison of the optical properties (PL peak position and PL intensity) between the well-known CdSe/ZnSe QDs system and this new system, suggests chemical effects on the formation of CdSe/ZnCdMgSe QDs. In this work, we studied systematically the influence of Mg content on the optical properties of the QDs. Very small variations of Mg concentration in the near-lattice-matched ZnCdMgSe barrier result in a significant shift in QDs PL peak position (170 meV for $\sim$3.3 % change in Mg). We propose that Mg could act as a nucleation site in the formation of the QDs. For an equal CdSe deposition time (equal amount of material), more Mg in the ZnCdMgSe barrier originated more nucleation centers, and consequently, smaller CdSe/ZnCdMgSe QD's.
[1]N. M. Perez-Paz, X. Zhou, M. Muñoz, Hong Lu, M. Sohel, and M. C. Tamargo. Appl. Phys. Lett. 85, 6395 (2004).

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