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Tuning between Quantum-Dot and Quantum-Well-Like Behaviors in Type-II Zn-Se-Te Multilayers by Controlling Tellurium Flux during MBE Growth[1] HAOJIE JI, Queens College of CUNY; Graduate Center of CUNY, BIDISHA ROY, SIDDHARTH DHOMKAR, Queens College of CUNY, RICHARD MOUG, MARIA TAMARGO, City College of CUNY, ALICE WANG, Evans Analytical Group, IGOR KUSKOVSKY, Queens College of CUNY — Type-II semiconductor quantum dots (QDs) characterized by spatial separation of charge carriers are good candidates for such applications as intermediate-band solar cells and IR photodetectors. Type-II QDs differ from type-I counterparts because one type of the carriers locates within the barrier material, so that their wavefunctions become to overlap early with increasing QD density. Thus, it is expected that type-II QDs coalescence into a - quantum well (QW) - like layer at much lower densities than similar type-I QDs with obvious consequences for device performance. We report here tuning between QD- and QW-like behaviors in the Zn-Se-Te multilayers with ZnTe sub-monolayer QDs. A set of samples, grown with increasing Tellurium flux, have been investigated. The critical density of QDs and the overlap of electron wavefunctions are estimated from secondary ion mass spectrometry, temperature dependent photoluminescence (PL), and magneto-PL measurements.

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