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Strain relaxation in InAs quantum dots and its suppression by indium flushing HONGEN XIE, FERNANDO PONCE, Arizona State University — The intermediate band opens new absorption paths enhancing light harvesting and its conversion into electricity. We present direct evidence that InAs quantum dots (QDs) embedded in Al0.3Ga0.7As, designed for optimized intermediateband solar cells, are strongly affected by plastic relaxation. A transition from relaxed to strained QDs has been observed when reducing the thickness of the dots using partial capping of GaAs followed by indium flushing. Fully capped QDs exhibit moiré fringes in the transmission electron microscope, indicating significant misfit strain relaxation. QDs produced by indium flushing are found to be fully strained, and exhibit luminescent characteristics consistent with the desired intermediate band values. Critical thickness calculations, based on the equilibrium of the lattice misfit force and the dislocation line tension acting on misfit dislocation loops, are used to understand these experimental observations.

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