

Abstract Submitted
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Investigation of Individual InGaAs Quantum Dots by Cross-Sectional Ballistic Electron Emission Microscopy (BEEM) S.Y. LEHMAN, The College of Wooster, J.P. PELZ, C. MARGINEAN, The Ohio State University, J.G. CEDERBERG, Sandia National Laboratories — Quantum dots (QDs) in III-V semiconductors are of great technological interest, but electronic properties of individual QDs are difficult to measure. We are using cross-sectional BEEM for this purpose. Multiple layers of InAs and $\text{In}_{0.4}\text{Ga}_{0.6}\text{As}$ QDs were grown by organometallic vapor phase epitaxy, with the thickness of deposited material ranging from subcritical to that generating 5×10^{10} dots/ cm^2 . The QD layers were separated by n-doped ($5 \times 10^{16} \text{ cm}^{-3}$) GaAs/ $\text{Al}_{0.3}\text{Ga}_{0.7}\text{As}$ layers of combined thickness ranging from 130 to 190 nm. The sample was cleaved *ex situ* and 5nm-thick Au Schottky barrier (SB) contacts were deposited on the cleaved edge using a shadow mask [1]. UHV BEEM at 300 K was used to locate and image the QDs and adjacent layers. The local conduction band energy (as measured by the SB height) ranged from ~ 0.7 eV at cleaved or near-surface QDs up to ~ 1 eV over the AlGaAs layers. Surprisingly, the BEEM current amplitude over particular QD layers appears to vary non-monotonically with In content. On-going work will be discussed to use low temperature BEEM with an applied reverse bias to measure the energy depth and physical depth of the cleaved QDs. Work supported by NSF Grant No. DMR-0505165. [1] C. Tivarus *et al.*, PRL **94**, 206803 (2005).

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