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Schottky Barrier Mapping to Nanoscale Dimensions Utilizing Ballistic Electron Emission Microscopy VINCENT LABELLA, SUNY Polytechnic Institute, ROBERT BALSANO, CHRIS DURCAN, WES NOLTING, University at Albany - SUNY — The Schottky barrier is the electrostatic barrier between a metal and a semiconductor that results in rectification and is found in many types of devices such as source drain contacts to sub 20-nm-node transistors. Nanoscale fluctuations in the Schottky barrier height can occur due to variations in bonding, compositional fluctuations in the materials, and the presence of defects. Measuring and mapping these electrostatic fluctuations to nanoscale dimensions can be achieved with ballistic electron emission microscopy (BEEM) an STM based technique. This presentation will demonstrate how the Schottky barrier height can be mapped to nanoscale dimensions using BEEM at 77K and under ultra-high vacuum. The STM tip is positioned on a regularly spaced grid and BEEM spectra are acquired from which the barrier height can be extracted. Maps and histograms can be generated by measuring and fitting thousands of these spectra. These maps provide detailed insight into the electrostatic fluctuations occurring at the buried interface with nanoscale resolution that cannot be accomplished with other bulk measurements.

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