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Mapping the Electron Transport of Graphene Boundaries Using Scanning Tunneling Potentiometry[1] KENDAL CLARK, XIAOGUANG ZHANG, IVAN VLASSIOUK, Oak Ridge National Laboratory, GUOWEI HE, Carnegie Mellon University, GONG GU, University of Tennessee, RANDALL FEENSTRA, Carnegie Mellon University, AN-PING LI, Oak Ridge National Laboratory — The symmetry of the graphene honeycomb lattice is a key element for determining many of graphene's unique electronic properties. Topological lattice defects, such as grain boundaries and step edges, break the sublattice symmetry and can affect the electronic properties, especially the transport of graphene. A complete understanding of the physical and electronic properties of defects and boundaries of graphene is needed for future applications. Using a scanning tunneling potentiometry method with a low temperature four-probe scanning tunneling microscope, two-dimensional maps of electrochemical potentials have been measured across individual grain boundaries of graphene films on SiO_2, as well as across 1ML to 1ML substrate steps and 1ML to 2ML transitions of graphene on SiC. An Atomic Force Microscope (AFM) is implemented to image the grain boundary that forms between coalesced individual graphene flakes on insulating surfaces where as a Scanning Tunneling Microscopy (STM) is implemented for characterizing the SiC grown graphene samples. Results of the influence that various boundaries have on the electronic transport of graphene will be presented.

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