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Interface State Disorder Dominated Microwave Conductance in Silicon Nanowires CLARK HIGHSTRETE, MARK LEE, Sandia National Laboratories, DAVID H. DUNLAP, University of New Mexico, AARON L. VALLETT, SARAH M. EICHFELD, JOAN M. REDWING, THERESA S. MAYER, The Pennsylvania State University — We have developed a technique to measure the microwave conductance spectra of nanomaterials at frequencies from 100 MHz to 50 GHz and at temperatures between 4 K and 300 K. We have used this technique to measure the microwave conductance spectra of doped silicon nanowires (SiNWs) which are found to increase sublinearly with frequency as f^s, with $0.25 < s < 0.45$, indicative of disordered conduction. Additionally, the exponents are found to be nearly independent of temperature suggesting that structural disorder in nanomaterial morphology, rather than energetic trapping, dominates the AC transport. A model was developed that explains the SiNW conductance in terms of carrier confinement in a disordered electrostatic potential caused by charged Si/SiOx interface states. These results highlight the importance of topological effects in the microwave conductance of nanomaterials. Results from the measurement of other nanomaterials will also be briefly presented. Sandia is a multiprogram laboratory operated by Sandia Corporation, a Lockheed Martin Company, for the United States Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000.

Clark Highstrete
Sandia National Laboratories

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