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Microwave Conductivity of Silicon Nanowire Arrays MARK LEE, C. HIGHSTRETE, Sandia National Laboratories*, A.L. VALLETT, S.M. DILTS, J.M. REDWING, T.S. MAYER, The Pennsylvania State University — We have measured the microwave conductivity spectra of silicon nanowire (SiNW) parallel arrays from room temperature to 4K. Doped (n-type and p-type) and nominally undoped SiNWs were synthesized by vapor-liquid-solid growth and assembled by AC dielectrophoresis into parallel arrays spanning the electrodes of coplanar waveguides (CPWs). The CPW complex reflection and transmission coefficients were measured from 0.1 to 50 GHz. Measurements of identical bare CPWs were utilized to calculate the frequency dependent complex conductivity and power dissipation of the SiNW arrays and provide estimates of these quantities for individual SiNWs in this configuration. The conductivity of the undoped SiNWs is purely imaginary, indicating a bound charge response. The doped SiNWs have a real component that, upon preliminary analysis, increases with frequency consistent with free charge disorder effects. No loss is measured for the undoped SiNWs, but loss due to the doped SiNWs is consistently measured and increases with frequency. *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.

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