

Abstract Submitted
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Photoconductivity of Single-Walled Carbon Nanotubes Measured by Terahertz Time-Domain Spectroscopy HUGEN YAN, YANG WU, GORDANA DOKOVIC, LOUIS BRUS, TONY HEINZ, Columbia University, New York, NY10027 — THz time-domain spectroscopy has been employed to probe the change in the conductivity of single-walled carbon nanotubes induced by optical excitation. Two types of ensemble samples, namely bundled and isolated HiPCO nanotubes embedded in polymer matrices, were examined. Here we report on the response for frequencies from 0.2 – 2 THz, which complements the higher frequency range probed previously by another group.¹ For our spectral range, the response was found to be Drude-like for the bundled nanotubes, but significantly different characteristics were measured for the sample of isolated nanotubes. In the latter case, a generalized Drude model.² that takes into account velocity persistence after scattering provides a better fit of the experimental conductivity data. Defects, disorder and the shorter nanotube length associated with the nanotube debundling process may account for the different behavior of the isolated nanotubes.

¹L. Perfetti, T. Kampfrath, F. Schapper, et al., Phys. Rev. Lett. **96**, 027401 (2006).

²N. V. Smith, Physical Review B **64**, 155106 (2001).

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