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Probing the Conductivity of Single-Walled Carbon Nanotubes by THz Time-Domain Spectroscopy YANG WU, FENG WANG, GORDANA DUKOVIC, MICHAEL LOY[1], LOUIS BRUS, TONY HEINZ — Terahertz time-domain spectroscopy has been applied to examine the transient conductivity of single-walled carbon nanotubes (SWNTs). The sample, consisting of isolated SWNTs in a polymer matrix, was interrogated by a freely propagating THz electromagnetic transient after excitation by a femtosecond laser pulse. The photo-induced change of the SWNTs is characterized by an increase in the THz absorption. This behavior suggests that the dominant contribution to the signal arises from free charge carriers, rather than strongly bound states like excitons. The decay of the THz conductivity occurs on the time scale of picoseconds, comparable to that observed for fluorescence emission.[1–3] The THz response shows a nonlinear dependence on the excitation laser fluence, with strong saturation for fluences above 0.1 J/m^2. The implications of these results for carrier dynamics in SWNTs will be considered. [1]F. Wang et al., Phys. Rev. Lett. **92**, 177401 (2004). [2]Y. Z. Ma et al., J. Chem. Phys. **120**, 3368 (2004). [3]F. Wang et al., Phys. Rev. B (in press).

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