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Photoresponse of Suspended Carbon Nanotube Networks: Single-Walled Carbon Nanotube Infrared Bolometer[1] MIKHAIL E. ITKIS, FERENC BORONDICS, AIPING YU, ROBERT C. HADDON, Center for Nanoscale Science and Engineering, University of California, Riverside, CA 92521-0403 — The photoresponse of a single-walled carbon nanotube (SWNT) film is dramatically enhanced when the nanotube film is suspended between electrical contacts in vacuum. We show that the change in electrical conductivity is bolometric (caused by heating of the SWNT network). Electron-phonon interactions lead to ultrafast relaxation of the photoexcited carriers and the energy of the incident infrared radiation is efficiently transferred to the crystal lattice. The photoinduced changes in resistance occur as result of temperature changes rather than by photoexcited holes and electrons and we consider the implications of this result for the band and exciton models in carbon nanotubes. We show that the infrared photoresponse of suspended SWNT films is sufficiently high that they may function as the sensitive element of an infrared bolometric detector. M.E.Itkis, F.Borondics, A.Yu, R.C.Haddon, *Science* **312**, 413 (2006)

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