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Electron-phonon scattering in suspended carbon nanotubes VIKRAM DESHPANDE, Applied Physics, Caltech, ADAM BUSHMAKER, STEVE CRONIN, Electrical Engineering, USC, MARC BOCKRATH, Applied Physics, Caltech — We perform variable temperature transport measurements of individual suspended single-walled carbon nanotubes varying in length from 0.5um to 3um. To interpret our data, we use a model for electronic scattering that incorporates twiston phonons as well as radial breathing mode (RBM) phonons. We estimate the electron-phonon coupling for these phonons and find that it is in qualitative agreement with theory. At low temperatures, the RBM phonons can also be observed at finite bias voltage corresponding to characteristic RBM phonon energies. At higher bias, the mean free path is strongly reduced to ∼30 nm, suggesting the production of a non-equilibrium population of RBM phonons analogous to the non-equilibrium optical and zone-boundary phonon population observed previously to limit transport in substrate-supported and suspended nanotube devices [1-3]. Finally, we are also conducting simultaneous Raman spectroscopy and electrical measurements on our devices to study the signatures of electron-phonon scattering in Raman data. We will report our latest findings in this regard. 1. Z Yao et al, Phys Rev Lett 84, 2941 (2000) 2. E Pop et al, Phys Rev Lett 95, 155505 (2005) 3. M Lazzeri et al, Phys Rev Lett, 95, 236802 (2005)

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