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Insights into heat transfer mechanisms of biased CNTs NORVIK VOSKANIAN, EVA OLSSON, Chalmers University of Technology, Applied Physics, JOHN CUMINGS, University of Maryland, Department of Materials Science and Engineering — There has been considerable interest in studying carbon nanotubes for thermal management applications and as components of electronic devices. For typical conductors, the electrical current results in temperature increase, but for the case of carbon nanotubes (CNTs) supported on SiN membranes, it has been shown that the traditional joule heating mechanisms are supplemented by remote heating of the substrate [1]. Using a thermal imaging technique based on Transmission Electron Microscopy [2], we demonstrate further evidence of this remote heating mechanism which suggests a non-equilibrium state between the electron temperature and phonon temperature of the CNT. We quantify the amount of remote heating as a ratio, β, between the power dissipation directly in the SiN divide by the total power applied. We find that initially β is high, but at higher applied voltage bias, β decreases, presumably because more hot electrons are available to scatter off carbon optical phonons, producing an increasing amount of traditional Joule heating. 1. K. Baloch, et al. *Nature Nano.* 7(5), 316-319 (2012). 2. T. Brintlinger, et. al. *Nano Lett.* **8**, 582–585 (2008).

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