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**Observation of Joule heating in multi-walled carbon nanotubes by electron thermal Microscopy** KAMAL BALOCH, TODD BRINTLINGER, NORVIK VOSKANIAN, JOHN CUMINGS, University of Maryland — We report Joule heating in multi-walled carbon nanotubes under voltage bias by using an electron thermal imaging technique [1]. Briefly, the temperature profile is obtained by observing the solid to liquid phase transitions of indium islands sub-100nm in diameter, thermally deposited on the back side of an electron transparent dielectric membrane. The high spatial-resolution maps thus obtained demonstrate that in the high-voltage-bias regime the thermal dissipation occurs not at the electrode contacts but along the entire length of the nanotube as predicted in [2]. The low temperatures involved ( $<200$  C) extend previous results [3] into a new temperature regime. The implications of these results when combined with other observations in the literature will be discussed.

- [1] Brintlinger et al, Nano Lett., **8**, 582 (2008)
- [2] Yao et al, Phys. Rev. Lett., **84**, 2941 (2000)
- [3] Begtrup et al, Phys. Rev. Lett. **99**, 155901 (2007)

Kamal Baloch  
University of Maryland

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