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Heat transport and thermal management in single walled carbon nanotubes HAREEM MAUNE, California Institute of Technology, MARC BOCKRATH, California Institute of Technology — Results from our investigation of thermal transport in CVD grown Single-Walled Carbon nanotubes (SWNT) on different substrates will be reported. Chiu et al. recently showed that multi-walled carbon nanotube devices cool by ballistic phonon heat transport. To harness the remarkable thermal properties of nanotubes for thermal management, it is of interest to understand how heat energy is transported into or out of nanotubes. In this work, we investigate the breakdown power for SWNT nanotube devices using different substrate materials to determine the effect of substrate thermal conductivity on nanotube breakdown. We compare our results with those obtained with the Si/ SiO2 substrate. Our results indicate higher power dissipation on a sapphire substrate for few micron SWNTs but lower than expected dissipation for the longer length scales. We will discuss the mechanism of power dissipation and thermal transport in our devices in light of our results.

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