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**Geometry dependence of electrical breakdown in multi-walled carbon nanotubes** HSIN-YING CHIU, VIKRAM DESHPANDE, MARC BOCKRATH, Applied Physics, California Institute of Technology — We compare the results of electrical breakdown experiments on multi-walled carbon nanotubes for substrate-supported and free-standing geometries. At a threshold power typically $\sim$50 $\mu$W, the resistance of most free-standing samples drops dramatically until it is typically $\sim$10 k$\Omega$, while this occurs only rarely in the substrate-supported geometry. This enables the electrical breakdown to occur even in samples that have a high initial contact resistance, giving a high yield to the breakdown process for free-standing tubes. Furthermore, the length of the removed shells is generally shorter for free-standing tubes. We use a model of thermal transport to account for our observations, which demonstrate that the local temperature plays an important role in the breakdown process and the decrease in conductance. Finally, breaking all the shells creates devices with nano-scaled gaps of 3-20 nm. We will discuss their electromechanical properties.

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