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Nanofissure formation during selective breakdown of m-SWNT in an aligned array UDAI BHANU, SHASHANK SHEKHAR, Nanoscience Technology Center, and Department of Physics, University of Central Florida, SAIFUL I. KHONDAKER, Nanoscience Technology Center, and Department of Physics, and School of Electrical Engineering and Computer Science University of Central Florida — Selective removal of metallic single walled carbon nanotubes (m-SWNT) in an aligned array is needed for restoring semiconducting properties and better device performance. The selective removal is done via electrical breakdown of m-SWNT while applying a large gate voltage to preserve semiconducting SWNT. In this work, we show using electrical measurements and scanning electron microscopy imaging that in a sufficiently dense array, not only the m-SWNT breaks down but also s-SWNT breaks down in a correlated fashion giving rise to a nano fissure pattern. This is in contrast to the established understanding that SWNTs are broken in a random fashion. The origin of the correlated breakdown is due to the electrostatic field of the broken nanotubes that produces locally inhomogeneous current and Joule heating distributions in the neighboring intact nanotubes triggering their breakdowns in the vicinity of the broken nanotubes

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