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Carbon Nanotube Network Anti-fuses PAULO ARAUJO, Univ of Alabama - Tuscaloosa, ALBERT LIAO, JOAQUIN RODRIGUEZ-NIEVA, Massachusetts Institute of Technology, EDUARDO BARROS, Federal University of Ceara, HYUN JUNG, JI HAO, YUNG JUNG, Northeastern University, MILDRED DRESSELHAUS, Massachusetts Institute of Technology — Copper interconnects are known to fail from electromigration at $\sim 10^6$ A/cm^2. However, to continue aggressive scaling in integrated circuits (ICs), new materials that can carry much higher current densities will be required. For this reason, Carbon nanotubes (CNTs), which can carry up to 10^9 A/cm^2, are a promising replacement. We discover that after Joule breakdown, CNTs can be healed by applying a healing voltage V_H. Such a technology could be useful to repair failed interconnects, creating anti-fuses for field programmable gate array (FPGA) or memory technology. We fabricate a CNT network using a dip-coating method and then we sweep a voltage across the device until the CNT network undergoes Joule breakdown, creating a physical gap (of $\sim$ 10-40 nm) within the network. Making hysteretic $I-V$ sweeps, we observe a sudden increase in current at a voltage $\sim 50-80$ % of the breakdown voltage V_{BD}. We can reliably break and heal the device multiple times. We also observe the Raman coalescence induced mode (CIM), which is characteristic of *sp* hybridized carbon chains, after the breaking and healing process. According to our analysis, we conclude that the formation of carbon chains is key to promote the electrical restoration of the broken CNT network.

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