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Carbon Evaporation from Carbon Nanotube Field Emitters Studied by Conductivity Change of CNT Anode. ALEXANDER KUZNETSOV, University ot Texas at Dallas, REN CHONG HU, MEI ZHANG, SHAOLI FANG, SERGEY LEE, RAY BAUGHMAN, ANVAR ZAKHIDOV, NANOTECH INSTITUTE TEAM — The study of degradation of carbon nanotube (CNT) electron field emitters under high current conditions allowed to reveal interesting details of carbon evaporation from the CNT cathodes. Single-wall and multi-wall CNT papers were investigated as electron field emissive cathodes. Due to high field emission currents going through small number of protruded nanotubes, only those nanotubes overheat and melt at the ends, evaporating C atoms and small clusters. Evaporated carbon atoms deposit on the anode forming spherical and elliptical patterns, which are similar in shape to the patterns, induced on phosphorescent screens by field emitted electrons. To clarify the details of carbon deposition we used transparent CNT thin films and CNT aerogel sheets [1] as anodes and found that deposited carbon layers significantly decrease the resistance of CNT films with only a small decrease in transparency. Thus this method allows to decrease the sheet resistance of T-CNT from 700 ohm/sq to 100 ohm/sq level, required for many optoelectronic applications. The structure of deposited C and origin of deposition patterns are analyzed and discussed in terms of correlated ionic and electronic flows. [1] M. Zhang et al., Science, 309,(2005) 1215.

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