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Electrochemical Charging of Carbon Nanotubes for Tunable Electron Field Emission Cathodes ALEXANDER KUZNETSOV, NORMAN BARISCI, NanoTech Institute, University of Texas at Dallas, ANVAR ZAKHIDOV, ALEXANDER ZAKHIDOV, Cornell University, Ithaca, New York — Carbon nanotubes (CNTs) have very promising applications as electron field emitters. Work function of CNTs greatly affects the performance of such cold electron emitters. It is possible to change emission currents by several orders of magnitude by electrochemical charging. Electrochemical charging changes work function of CNTs by creating so called double layer. It was recently demonstrated that double layer structure remains for several hours after removing the CNTs from an electrolyte [1]. The extensive study of charging single wall carbon nanotube (SWNT) paper in different electrolytes has been performed at different charging potentials Vch. Field emission currents and threshold fields dependence on the charging potential and polarity is studied for various ions, with different valency and size: Na, Mg, Cs. Clear dependence of work function on Vch is demonstrated. AFM micro-imaging with a Kelvin probe allowed to study the micropatterns of work function modulation. Also dissipation of positive charge in air was investigated and its stability was significantly increased. 1. Suh Dong-Seok, Baughman Ray, Zakhidov Anvar, US Patent 20070170071 (2007)

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