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Modulation of Field Electron Emission from Carbon Nanotubes by Double layer Charging ANVAR ZAKHIDOV, RASHMI NANJUNDASWAMY, RAY BAUGHMAN, SERGEY LEE, ALI ALIEV, University of Texas at Dallas — Field emission from carbon nanotubes is well known phenomenon. In this work we present a novel method of modulating the current densities and threshold voltages. We studied field emission characteristics of HIPCO Single Walled Nanotube (SWNT) paper charged in NaCl electrolyte. The charge injection was by double layer electro chemical doping and it showed significant change in the threshold electric fields and the current densities. This was attributed mostly to a change in the work function and partially due to the change in the field enhancement factor beta. The turn on field (for 1microA of emission current) was seen to change from 1.04 V/micron to 0.82 V/micron for the negatively charged paper (Na ions) and similarly on the positively charged (Cl ions) it increased from 1.01 V/micron to 2.1 V/micron. Calculated values of the work function were compared with values from Kelvin Probe measurements. The work function values showed a significant decrease in the negatively charged samples and a sharp increase in the positively charged samples as compared to the uncharged ones. Experiments were repeated by varying the charging time from 2000 sec to 3 hrs with the current being kept constant.

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