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**Effect of graphitic order on the electron field emission of carbon nanotube films**[1] BENJAMIN ULMEN, Michigan Tech University, VIJAYA KAYSTHA, Michigan Tech University, YOKE KHIN YAP, Michigan Tech University — Carbon Nanotubes (CNTs) are known to be excellent electron field emitters. However, the fundamental factors that contribute to the emission stability have not been well studied. Here, we found that stability of emission current from CNTs is related to their graphitic orders. We have tested various types of CNTs grown by thermal chemical vapor deposition (CVD) and plasma enhanced CVD (PECVD). Our samples were grown in a circular area of 0.385cm$^2$ on low resistance Si substrates. Field emission measurements were conducted in a planar diode configuration, with a pair of electrodes separated with a gap of 1000 $\pm$ 10 $\mu$m. The vacuum level during the measurement is $\sim$2.0 X $10^{-7}$ mbar. We found that the emission currents from PECVD grown CNTs degraded by as much as 70% within a period of 20 hours. In contrast, random CNTs grown by thermal CVD exhibit stable emission current for at least 20 hours. These CNTs also have relatively lower threshold electric field of field emission. Since all samples are tested in a same condition, the detected results are thus related to the structural order of the CNTs. Transmission electron microscopy and Raman spectroscopy confirmed that field emission stability is depends on the graphitic structures of these CNTs.

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