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Artificial introduction of defects in carbon nanotubes through Argon and Hydrogen ion irradaition, and application to chemical sensors PRABHAKAR BANDARU, JEFFREY NICHOLS, MARK HOEFER, Materials Science, UC, San Diego — The goal of this study is to quantify the effect of defect density on the electrochemical properties of multi-walled CNTs. Consequently, ion irradiation, with argon (Ar) and hydrogen (H), individually, has been performed to systematically incorporate defects into vertically aligned MWCNTs. Raman spectroscopy was used to characterize the amount of disorder within the nanotube samples. The electrochemical behavior of the irradiated MWCNT samples was then characterized through cyclic voltammetry (CV) measurements. Raman spectroscopy revealed an increase in the disorder in MWCNTs with the argon and hydrogen irradiation, as evidenced by an increase in the I_D/I_G peak intensity ratio. However, Ar is intercalated into the CNTs, and charges the nanotubes (forming dangling bonds), while H treatment terminates residual CNT dangling bonds. In CV, we have seen that only the Ar treated samples exhibit *perfect* reversible Nernstian behavior characteristic of ideal electrodes. Hydrogen treated CNT electrode ensembles seem to exhibit quicker response, as glucose sensors, with exquisite (~ 1 μM) sensitivity

Prabhakar Bandaru
UC, San Diego

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