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Introduction and Characterization of Defects in Single Wall Carbon Nanotubes

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Controllable introduction of defects in single wall carbon nanotubes (SWNT) is important for SWNT chemistry, SWNT-polymer composites, and other applications of SWNTs. Recently, we have discovered that defects in SWNT's have a specific feature in the Raman spectrum, i.e., a relatively narrow band around 1320 cm^{-1} for $\lambda_{\text{ext.}} = 633\text{ nm}$ ($\sim 20\text{ cm}^{-1}$, FWHM) which is related to the number of the defects in SWNT. The defects were introduced using various techniques, including Ar-ion beam irradiation of the purified SWNT mats ($E=5\text{keV}$, Dose, $10^{12}\text{-}10^{15}\text{ 1/cm}^2$). A Monte Carlo simulation was performed to estimate the surface defect density at the different irradiation doses.

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