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Opto-Electronic Properties of Nano-Structured Graphitic Carbon Measured Using Micro-Raman Spectroscopy LOGAN SCHEEL, KEVIN MEAD, JEFFERY DEMERS, JEFF SIMPSON, Towson University — Nano-structured graphitic carbon allotropes offer promise for next generation optical and electronic devices. Graphene, a single atom layer of hexagonally arranged carbon atoms, is particularly interesting as the basis for other forms of graphitic carbon, e.g., single-wall carbon nanotubes (SWCNTs). The unique linear energy versus momentum band structure of graphene leads to interesting fundamental physics and potential device applications. We report on the design and implementation of a micro-Raman spectroscopy system used to measure the opto-electronic properties of graphene and SWCNTs. Using mechanical exfoliation, single and multilayer graphene flakes are deposited on Si/SiO_2 substrates. Our Raman system consists of multiple laser sources including, HeNe, Argon, and dye lasers, which provide excitation light to samples mounted in an optical microscope. Inelastically scattered light is collected and directed to a grating spectrometer with CCD detection. Analysis of the Raman spectra reveal specific phonons known as the D, G, G'$_{2D}$ modes common to graphitic carbon. We fit the modes with Lorentzians in order to quantify the layer number and analyze electron-phonon coupling.

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