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Absolute Absorptivity of Single-walled Carbon Nanotubes Employing a Pyroelectric Detector KATHERINE HURST, National Institute of Standards and Technology, ANNE DILLON, National Renewable Energy Laboratory, JOHN LEHMAN, National Institute of Standards and Technology — Optical properties are important for determining fundamental characteristics of carbon single-walled nanotube (SWNT) samples including purity, chirality, and tube diameter. Previously, we have estimated the volume fraction of metallic versus semiconducting tubes for highly purified SWNT bucky-paper on a pyroelectric detector from spectral responsivity measurements and an effective medium approximation to determine the dielectric function (1). Pyroelectric detector-based measurements are based on the thermalization of photons within the SWNT coating and provide a robust technique for measuring absolute absorptivity at normal incidence. Alternatively, we perform transmissivity measurements of SWNTs by employing a gold-black coated pyroelectric detector. Spectral responsivity measurements are made by direct substitution against a NIST calibrated detector such that quantitative changes in the volume fraction and purity of SWNT samples are revealed. These results will be compared to specular transmissivity measurements made by UV-VIS spectrometry. Raman spectroscopy will also serve to verify nanotube properties. (1) K.E.H. Gilbert, J.H. Lehman, A.C. Dillon and J.L. Blackburn Appl. Phys. Lett. 88, 143122 (2006).

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