P 79

Carbon nanotube coated thermal detectors*

John Lehman
National Institute of Standards and Technology, Boulder, Colorado 80305
lehman@boulder.nist.gov

Nearly all of the radiometric standards for laser power and energy measurements at NIST and elsewhere in the world are based on thermal detectors. These detectors usually rely on a thermal absorber coating to enhance the detector responsivity. Ideally the composite detector and coating has low thermal mass (not exceeding that of the detector material) and high absorption efficiency (> 99 %) over a broad range of wavelengths (0.2 μm to 20 μm). We present investigations of the optical absorption and thermal efficiency of advanced coatings based on carbon nanotubes (CNTs). Growth of CNTs on a variety of platforms is accomplished by either laser vaporization or chemical vapor deposition. Our detector development is the first step of determining thermal properties of CNTs based on the detector responsivity as a function of thermal modulation frequency. These results may be applied to thermal emitters as well as absorbers and have the advantage of being independent of invasive contacts or probes. We present a summary of published results and opportunities for future research to quantify the thermal properties of CNTs based on the evaluation of thermal detectors to which the CNTs are applied.