

Terahertz, Infrared, and Optical Response of  
Macroscopically Aligned Single-Wall Carbon Nanotubes

L. Ren, Q. Zhang, X. He, X. Wang, S. Nanot, R. H.  
Hauge, and J. Kono

Department of Electrical and Computer Engineering,  
Department of Physics and Astronomy, and Department  
of Chemistry, Rice University  
6100 Main Street, Houston, Texas 7705, U.S.A.

We will present results of our spectroscopy experiments on macroscopic films of highly aligned single-wall carbon nanotubes in a wide spectral range. These samples show an extremely anisotropic electromagnetic response, especially in the long-wavelength infrared and THz ranges. We show that, although a single nanotube is an inefficient radiator due to its small diameter, a large number of nanotubes can be excited in these aligned films and cooperatively and coherently radiate at long wavelengths. Finally, we will highlight some of the basic properties of devices of aligned nanotubes for optoelectronic applications including terahertz polarizers and broadband photodetectors.