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Polarization-dependent terahertz spectroscopy of macroscopic films of aligned single-wall and multiwall carbon nanotubes XIAOWEI HE, JOHN ROBINSON, WEILU GAO, AHMED ZURBAIR, Rice University, NOE ALVAREZ, University of Cincinnati, ROBVERT H. HAUGE, JUNICHIRO KONO, Rice University — The light absorption properties of carbon nanotubes are strongly anisotropic, especially in the terahertz (THz) region of the electromagnetic spectrum due to their inherently one-dimensional intraband carrier dynamics. Macroscopic films of aligned carbon nanotubes are thus ideal for developing high-performance, low-cost THz polarizers. Here, we present results of polarization-dependent time-domain THz spectroscopy studies of large-area films of aligned single-wall carbon nanotubes (SWCNTs) and multiwall carbon nanotubes (MWCNTs) in a frequency range of 0.15-1 THz by varying the polarization of the incident beam with respect to the carbon nanotube alignment direction. The nematic order parameter (S), the extinction ratio (ER), and the degree of polarization (DOP) were calculated to establish the performance of the films as polarizers. We found the S of the SWCNT film to be 0.96. The ER of the SWCNT was found to be -12 dB. The measured value of the S for the MWCNT was 0.77, with an ER of -11 dB.

Xiaowei He
Rice University

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