

Abstract Submitted  
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**Second Harmonic Generation in Highly Aligned Carbon Nanotubes on GaAs** D.T. MORRIS, G.L. WOODS, J. KONO, ECE Dept., Rice University, C.L. PINT, R.H. HAUGE, Chemistry Dept., Rice University — Optical properties of carbon nanotubes (CNTs) have been extensively investigated during the last decade, and much basic knowledge has been accumulated on how light emission, scattering, and absorption occur in CNTs. However, their nonlinear optical properties remain largely unexplored, except for theoretical studies predicting highly chirality-selective nonlinear optical processes. In particular, all chiral nanotubes are expected to possess finite second-order nonlinear susceptibilities due to the lack of inversion symmetry. Here, we have observed second harmonic generation (SHG) from samples consisting of highly aligned CNTs on GaAs with linearly-polarized intense mid-infrared femtosecond radiation. SHG is expected from both the CNTs and the substrate, thus the contribution of the CNTs to the overall enhanced SHG signal will be obtained by factoring out contributions from the GaAs substrate, which include any anisotropic effects (absorption, polarization) from the CNTs on the fundamental light incident in the GaAs substrate. We performed detailed angular dependent measurements to separate the two contributions, based on the crystal symmetries of the two. The results will be shown as a function of laser power and wavelength, and discussed in light of CNT band structure.

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