Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Ultrafast Mid-Infrared Intra-Excitonic Response of Individualized Single-Walled Carbon Nanotubes[1] JIGANG WANG, Ames Laboratory and Department of Physics and Astronomy, Iowa State University, MATT GRAHAM, YINGZHONG MA, GRAHAM FLEMING, Department of Chemistry, University of California at Berkeley and Physical Biosciences Division, E. O. Lawrence Berkeley National Laboratory, ROBERT KAINDL, Materials Sciences Division, E.O. Lawrence Berkeley National Laboratory — We report a femtosecond mid-infrared study of the broadband low-energy response of individualized (6,5) and (7,5) single-walled carbon nanotubes. Strong photoinduced absorption is observed around 200 meV, whose transition energy, oscillator strength, chirality enhancement and dynamics manifest the observation of quasi-1D intra-excitonic transitions. A model of the nanotube $1s$-$2p$ intra-excitonic cross section yields excellent agreement. Our study further reveals a saturation of the photoinduced absorption with increasing phase-space filling of the correlated $e-h$ pairs.

[1]the Offce of Science, U.S. DOE via contract DE-AC02-05CH11231, Ames Laboratory, DOE contract DE-AC02- 07CH11358, NSF

Jigang Wang
Ames Laboratory and Department of Physics
and Astronomy, Iowa State University

Date submitted: 06 Dec 2009 Electronic form version 1.4