Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Extreme synthesis and chemical doping of diamond aerogel PETER J. PAUZAUSKIE, JONATHAN C. CROWHURST, MARCUS A. WORSLEY, TED A. LAURENCE, YINMIN WANG, Lawrence Livermore National Laboratory, A.L.D. KILCOYNE, Advanced Light Source, LBNL, PETER K. WEBER, TREVOR M. WILLEY, KENNETH S. VISBECK, WILLIAM J. EVANS, JOE H. SATCHER, JR., Lawrence Livermore National Laboratory — Amorphous carbon aerogels have attracted much interest in recent years due to their low density, large intrinsic surface areas (>1000 m^2/g), large pore volume, low dielectric constant, and high strength. We use high-pressure (∼20 GPa) laser-heating (>600 $^\circ$C) within a diamond anvil cell (DAC) to convert the amorphous network of a low-density (40mg/cc) carbon aerogel into an ultrananocrystalline diamond aerogel. Photoluminescence spectroscopy and confocal time-correlated single-photon counting indicate the recovered material contains both negatively-charged and neutral nitrogen-vacancy (NV) complexes. Synchrotron scanning transmission x-ray microscopy (STXM) is used to compare the carbon electronic density-of-states of the amorphous starting material with the recovered diamond aerogel with ∼100 meV energy resolution. Finally, we use nanoscale secondary ion mass spectrometry to investigate doping of the resorcinol-formaldehyde starting material with the aim of chemically tuning heteroatomic point defects within this diamond material system.

Peter J. Pauzauskie
Lawrence Livermore National Laboratory

Date submitted: 07 Dec 2009 Electronic form version 1.4