Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Microstructural characterization of nanoporous carbon fiber as determined by neutron scattering LILIN HE, YURI MELNICHENKO, Oak Ridge National Laboratory, SOFIANE BAUKHALFA, GLEB YUSHIN, Georgia Institute of Technology — We have applied small angle neutron scattering (SANS) technique to investigate the microstructure of nanoporous carbon fiber. The scattering curves were fitted to various models, which allowed us to estimate the structural parameters (i.e. total radii of gyration of pores as well as cross sectional radius of gyration, physical radius and lengths of cylindrical pores) in the studied samples. Chord length analysis was performed to estimate the average sizes of pores and solid matrix. The information obtained from SANS data is in general agreement with independent measurements of surface area using gas sorption carried out in this study. SANS data obtained from carbons saturated with contrast matching liquid (D_2O) indicate that the scattering with power law decay of I(Q) in the low Q domain originates from outer surface of carbon fibers. Lower than anticipated decrease in scattering intensity in the high Q domain suggests that a certain amount of nanopores are not accessible to D_2O molecules. The investigation of the isotope effect on the pore filling suggests that the H_2O is more penetrated than D_2O, which is attributed to the stronger bond network among deuterium atoms than that in hydrogen atoms.

Lilin He
Oak Ridge National Laboratory

Date submitted: 10 Nov 2012 Electronic form version 1.4