Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Structure and Applications of Nanoporous Carbon[1] MIKAEL WOOD, JACOB BURRESS, ROBERT SCHOTT, DEMETRIUS TAYLOR, PETER PFEIFER, Physics Dept., University of Missouri, Columbia, MO 65211 — Recently fractal networks of nanopores in activated carbon have been discovered (Pfeifer et al., Phys. Rev. Lett. 88, 115502 (2002)). We study the formation and properties of these networks with the goal of using them to store methane at low pressures (Alliance for Collaborative Research in Alternative Fuel Technology, http://all-craft.missouri.edu). Van der Waals forces in the nanopores force methane into a dense fluid (supercritical adsorption). We investigate the pore structure by nitrogen and methane adsorption isotherms, small-angle x-ray scattering (SAXS), and electron microscopy, and use the data to model the formation of the pore network using probabilistic cellular automata on a lattice. The calculated scattering from our simulated networks is in close agreement with experimental SAXS data. The models are designed to give us a deeper understanding of the growth of these networks and allow us to optimize their properties. Currently our best sample stores 0.11 g methane per cm^3 monolithic carbon at 25 ^oC and 34 atm (90% of industry target).

[1]Support: National Science Foundation (EEC-0438469), University of Missouri, Midwest Research Institute, U.S. Department of Education (GAANN), and U.S. Department of Energy (W-31-109-Eng-38)

Peter Pfeifer
Dept. of Physics, University of Missouri, Columbia, MO 65211

Date submitted: 06 Jan 2006 Electronic form version 1.4