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Hierarchical Pore Structure of Engineered Carbon Nanospaces for Use in Hydrogen Storage. MICHAEL KRAUS, JACOB BURRESS, MATTHEW BECKNER, CARLOS WEXLER, PETER PFEIFER, Dept. of Physics and Astronomy, Univ. of Missouri — High-surface-area activated carbons are promising material for hydrogen storage. Mapping the pore structure at the nanometer scale is fundamental for the understanding of adsorptive properties. Structural analyses of pore spaces in nanoporous carbons, using subcritical nitrogen adsorption, supercritical methane adsorption, and small-angle x-ray scattering (SAXS), are presented. Adsorption isotherms provide pore-size distributions, while SAXS provides information about the spatial arrangement of pores. At large length scales, ∼20-2000 nm, our samples exhibit an extended regime of surface fractal behavior with a fractal dimension of ∼2.3, corresponding to a mild external roughness of the samples. At small length scales, the samples exhibit an abundance of pores 0.5-1.5 nm wide. An illustrative case exhibits cylindrical pores with average width of 0.9 nm and average length 1.6 nm, in excellent agreement with structural data inferred from adsorption isotherms. Comparison of pore data from SAXS and nitrogen isotherms will be compared with hydrogen uptake isotherms. This material is based on work supported by the U.S. Department of Energy under Award No. DE-FG-08GO18142. Use of the Advanced Photon Source was supported by the U.S. Department of Energy under Contract No. DE-AC02-06CH11357.

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