

FUNDAMENTAL BUILDING BLOCKS OF NANOPOROUS NETWORKS FROM ULTRA-SMALL-ANGLE X-RAY SCATTERING (USAXS) AND SMALL-ANGLE X-RAY SCATTERING (SAXS) EXPERIMENTS

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ABSTRACT

A new method of structural analysis that measures the nominal dimensions of pores using ultra-small-angle x-ray scattering (USAXS) and small-angle x-ray scattering (SAXS) data is presented. The characterization technique developed is applied to highly porous carbons that are used for reversible methane and hydrogen storage based on physisorption.

Data is analyzed and fit under the primary working assumption that there is only one size and shape of pore and that the number of pores present in the sample is accounted for by the sample porosity, ϕ .

The procedure presented in this study is not restricted to the analysis of carbonaceous materials. It is applicable to any porous material in which the nanopore is the fundamental building block.

The advantage of our technique in comparison to methods currently used to measure the size and shape of nanopores, is that in addition to a width, at least one additional characteristic length is determined.