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Adsorption of supercritical carbon dioxide and propane in porous aerogel YURI MELNICHENKO, GERNOT ROTHER, GEORGE WIGNALL, Neutron Scattering Sciences Division, ORNL, Oak Ridge, TN 37831, USA, DAVID COLE, Chemical Sciences Division, ORNL, Oak Ridge, TN 37831, USA, HENRICH FRIELINGHAUS, Forschungszentrum Julich, IFF, D-52425, Germany — We demonstrate that small-angle neutron scattering (SANS) can be used to determine the density and volume fraction of the adsorbed fluid phase in porous materials. The developed methodology is used to study the adsorption of near-critical CO2 and propane in aerogel as a function of pressure and temperature. For the first time the variation of the density and volume fraction of the adsorbed phase of near-critical fluids is reported and analyzed. These parameters are used to determine the absolute fluid adsorption without additional assumptions commonly used in the literature. The adsorption of CO2 and propane (8 g/g and 1 g/g, respectively) is found to be significantly higher in aerogels than in activated carbons and silica gels. The results provide new insights in the adsorption behavior of supercritical fluids, such as a non-monotonic variation of the density of the adsorbed phase and depletion of aerogel at high pressures.

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