

Abstract Submitted
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Water Sorption in Nanoporous Carbon Electrode Materials JOSE

ALI ESPITIA, JOSE L. BANUELOS, Department of Physics, The University of Texas at El Paso, El Paso, Texas, 7996, VOLKER PRESSER, INM - Leibniz Institute for New Materials, Saarbrücken, Germany, DAVID J WESOŁOWSKI, GERNOT ROTHER, Chemical Science Division, Oak Ridge National Laboratory, Oak Ridge, TN 37831, USA — Carbide derived carbon (CDC) has garnered much attention as a supercapacitor electrode material. A unique feature of CDC is its fine-tuned pore size in the subnanometer range, which depends on the initial carbide (TiC) and annealing conditions. Water can enter TiC-CDC pores and give filling fractions in excess of 0.6 g/g ($\text{H}_2\text{O}/\text{C}$). Recent reports of water's diffusional dynamics dependence on CDC pore size indicate confinement effects similar to observed in pores of 16 Angstroms. Though other studies have gleaned insights into the porous structure of CDC, there is currently no direct structural information on the sorption of water at intermediate stages between completely empty and full. Small-angle neutron scattering (SANS) was used to find to what degree pores are filled with water (D_2O) at intermediate stages of loading for four TiC-CDC powders, each with different pore size distributions. We present models being developed to reproduce the SANS data and extract information on 1) the structure of CDC, consisting of subnanometer and meso-pores, 2) the kinetics of water sorption in porous media. Being relevant to fundamental studies of water in confinement for its role in supercapacitors, which is still not fully understood.

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