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High power electric double-layer capacitors based on carbon with ordered 2 nm pores ADAM KAJDOS, GLEB YUSHIN, Georgia Institute of Technology — High surface area carbons find numerous applications in energy storage. In this project we were interested in investigating how we could improve the capacity retention, frequency response and power characteristics of electric double-layer capacitor (EDLC) electrodes if we employ high surface area porous carbon particles with aligned nanopores. We synthesized porous carbon replicas of zeolite Y particles using low-pressure chemical vapor deposition of carbon on a zeolite Y template, which was subsequently removed. X-Ray diffraction revealed aligned and ordered pores in the produced carbon, while scanning electron microscopy confirmed the conformation of shape during the templating process. Transmission electron microscopy showed the very uniform microstructure of the produced carbon. The zeolite-templated carbon was used as electrodes in EDLC's and showed exceptional energy storage characteristics. At low current densities the specific capacitance exceeded 200 F/g, among the highest values reported. The specific capacitance in excess of 100 F/g could be maintained at frequencies as high as 10 Hz and current densities as high as 20 A/g, which is unprecedented for carbon materials.

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