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Composite MnO2-Carbon Electrodes for High Energy Density Storage BRAD CORSO, ISRAEL PEREZ, PHILIP COLLINS, Department of Physics and Astronomy, Univ. of California at Irvine, Irvine, CA 92697 — The development of batteries with ever higher power densities is challenged by fundamental materials limitations that might be solved with hybrid combinations of materials. For example, metal oxides with high lithium ion capacities lack the conductivity to be good battery anodes, but composites that add graphitic carbon can achieve both capacity and conductivity. In this case, fast interfacial electron transfer between the materials is critical to achieving high performance. Here, we describe an electrochemical synthesis that achieves precise, conformal MnO2 films on graphitic surfaces. Furthermore, by using single-walled nanotubes as the carbon support, we can control defect densities with single defect resolution. Charge-discharge cycling of these electrodes, combined with control over point defects, directly distinguishes the enhanced charge transfer of defects and illuminates the structure-function relationship in interfacial electron transfer. This research is supported by the NEES Energy Frontier Research Center of the U.S. DOE Office of Basic Energy Sciences (#DESC0001160).

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