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Charge Transfer Resistance of a Pristine Graphitic Carbon Interface BRAD CORSO, ISRAEL PEREZ, PHILIP COLLINS, University of California, Irvine — Electron transfer to and from graphitic carbons is highly sensitive to the chemistry of the graphitic carbon surface. It is known that pristine graphitic carbon has a much higher interfacial resistance than defective carbon; however, a quantitative measure of the difference is limited by the difficulty of preparing truly pristine, defect-free surfaces. Here, we use an individual single-walled carbon nanotube (SWNT) and its single defect sensitivity to ensure that the graphitic carbon surface is pristine. The interfacial charge transfer resistance is measured in the context of a MnO2-coated SWNT, a psuedocapacitor device whose charge cycling performance is found to be limited by the chemistry of the carbon interface. In our devices, the SWNT is uniformly coated with 250-350 nm of MnO2 and cyclic voltammetry is analyzed using an equivalent circuit model to determine the charge transfer resistance. We prove that the defect-free carbon interface is less active than disordered interfaces of carbon or of metallic electrodes. 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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