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Synthesis and Electrochemical Performance of SiOC-Carbon Nanotube Composite Coatings ROMIL BHANDAVAT, Kansas State University, MARCO COLOGNA, RISHI RAJ, GURPREET SINGH, University of Colorado at Boulder — Rechargeable battery anodes made from crystalline Si-based nanostructures have been shown to possess high experimental first cycle capacities (3000 mAh/g), but face challenges in sustaining these capacities beyond initial cycles mainly due to large volume expansion (400 percent) and chemical degradation (pulverization). Polymer-derived ceramic SiOC due to its high thermodynamic stability and nano domain structure could present a viable alternative. Additionally, functionalization of SiOC with carbon nanotubes could result in increased electronic and ionic conductivities in the ceramic. Here, we demonstrate synthesis and electrochemical characterization of SiOC-CNT composite coatings for use in Li-ion battery anode. Materials characterization performed using electron microscopy, Infrared (FT-IR), and X-ray photoelectron spectroscopy suggests non-covalent functionalization of CNT with oxygen moieties in SiOC. Sustained battery capacities of over 700 mAh/g and first cycle columbic efficiencies of about 75 percent were achieved. Future work will involve determination of lithium ion intercalation sites characterized by electron microscopy whereas cyclic voltammetry analysis will access the sequential change in anode chemistry.

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