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Enhanced Lithiation of Graphitized SiC: In Situ X-ray Scattering Study at Electrolyte / Graphene / SiC(0001) Interface SUDESHNA CHATTOPADHYAY (BANDYOPADHYAY), Mater. Sci. and Eng., Northwestern University; Physics, Indian Institute of Technology Indore, ALBERT LIPSON, HUNTER KARMEL, JONATHAN EMERY, VINAYAK DRAVID, MARK HERSAM, MICHAEL BEDZYK, Mater. Sci. and Eng., Northwestern University, PAUL FENTER, TIMOTHY FISTER, MICHAEL THACKERAY, Chem. Sci. and Eng., Argonne National Laboratory — Silicon carbide is an inert material and not traditionally viewed as a promising electrode material. However, we observed a large enhancement to the electrochemical lithiation capacity for SiC anodes that were electrically activated by the combination of surface graphitization and substrate doping. In-situ X-ray scattering studies for lithiation at the electrolyte/EG/SiC interface show that the interfacial structure of the proposed anode system is stable in the electrolyte and graphene layers remain unaltered. While a decrease in the SiC Bragg peak intensity during lithiation indicates changes to the bulk crystallinity, the emergence of a diffuse scattering feature suggests that lithiation is associated with the development of substrate defects. Characterization via multiple depth resolved spectroscopies shows that Li penetrates the activated SiC upon lithiation. These results illustrate that the electrochemical capacity of a traditionally inert material can be increased substantially by effecting the surface and bulk conductivity [1].

[1] Chattopadhyay, Lipson et al., Chem. Mater. 24, 3038 (2012); Lipson, Chattopadhyay et al., J. Phys. Chem. C 116, 20949 (2012).

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