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Investigation of the Silicon Solid Electrolyte Interface in Lithium Ion Batteries using the Technique of Hard X-Ray Photoelectron Spectroscopy[1] BENJAMIN YOUNG, DAVID HESKETT, MENGYUN NIE, BRETT LUCHT, University of Rhode Island, JOSEPH WOICIK, National Institute of Standards and Technology — Formation of a stable Solid Electrolyte Interface (SEI) between the anode and electrolyte material of a lithium ion battery (LIB) is essential to battery performance. Silicon anodes represent a theoretical tenfold increase in energy density over more thoroughly investigated carbonaceous anodes, but experience large volume changes during normal cycling which represents a challenge to stable SEI formation. Overcoming this challenge demands more thorough understanding of SEI formation which can be achieved through the technique of Hard X-ray Photoemission Spectroscopy (HAXPES). This work is focused on addition of ethylene carbonate (EC) and fluoroethylene carbonate (FEC) solvents to the base electrolyte $LiPF_6$ material in coin cell LIBs using binder-free silicon nanoparticle anodes. The results of HAXPES experiments carried out at beamline X24-A of the National Synchrotron Light Source at Brookhaven National Laboratory are presented, revealing depth dependent composition information at various points of SEI development.

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