

Stress Evolution and Interfacial Mechanics in the Solid Electrolyte Interphase

Brian W. Sheldon and Anton Tokranov

School of Engineering, Brown University, Providence, RI 02912

Xingcheng Xiao, Yue Qi, and Peng Lu

General Motors Global R&D Center, Warren, MI 48090, USA

Lithiation and delithiation processes in Li ion battery electrodes lead to significant volume changes. In addition to creating internal stresses in the active electrode materials, these dimensional changes can substantially alter the stability of the solid electrolyte interphase (SEI). It is difficult to probe the mechanical response of the SEI directly in complex electrode microstructures that consist of powdered active components and other constituents. However, thin films provide an opportunity to investigate fundamental processes more directly. To accomplish this, we employed *in situ* stress measurements, conventional *in situ* electrochemistry, and *ex situ* surface characterization with TEM, XPS, and SIMS. This work focuses on graphitic carbon anodes, where we have recently shown that substantial near-surface stresses occur during the formation of the SEI layer. The results from these experiments and corresponding models also suggest that stresses can be engineered during SEI formation, to enhance the stability of these critical passivation layers.