In situ analyses on solid electrolyte interphase in Li batteries

Arthur V. Cresce, David R. Baker, Selena M. Russell, Kang Xu

Electrochemistry Branch, Power and Energy Division, Sensor and Electron Devices Directorate, U. S. Army Research Laboratory, 2800 Powder Mill Road, Adelphi, MD 20783, USA

The solid electrolyte interphase (SEI) at the electrolyteelectrode interface affects the chemical and thermal properties of the Li-ion batteries. The interaction of specific electrodes and electrolytes determines the nature of the interphase, which in turn dictates the reversibility and kinetics of the cell chemistry. Electrolyte additives enhance battery performance, though the causes are not fully understood. Additives likely affect SEI growth onset voltage, composition, and morphology. Each of these factors will influence Li⁺ transport between electrolyte and electrode, and electrolyte stability with battery cycling.

With electrochemical atomic force microscopy (EC-AFM), we studied the SEI formed on graphitic anodes, from various electrolyte compositions, to deduce what role additives play at the electrode surface.