Simultaneous Ionic and Electronic Current Measurements of a $LiCoO_2$ Battery Cathode

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Electrochemical strain microscopy (ESM) is a new scanning probe microscopy technique that provides nanometer-scale analysis of electrochemical reactions and ionic transport in solids for energy storage and conversion and information technology applications. In ESM, a biased SPM tip concentrates an electric field in a nanometer-scale volume of material, inducing interfacial electrochemical processes at the tip-surface junction and diffusive and ionic currents through the solid. These changes cause small strains in the solid on the order of a few pm. The electromechanical coupling is usually small enough to require the use of the cantilever contact resonance to enhance the signal. We have combined Dual AC Resonance Tracking (DART) ESM measurements with more conventional electronic current measurements to study the both ionic and electronic current flows in a Li-ion battery cathode material.