Probing the Reversibility Limit of Lithium Ion Transport in Solid Film Batteries

HOWARD WANG, LIWEI HUANG, KAIKUN YANG, Institute for Material Research and Department of Mechanical Engineering, State University of New York, Binghamton, NY 13902, GREGORY DOWNING, Material Measurement Laboratory, National Institute of Standards and Technology, Gaithersburg, MD 20899, ALEC TALIN, PAUL NANEY, Center for Nanoscale Science and Technology, National Institute of Standards and Technology, Gaithersburg, MD 20899, JASON ZHANG, Energy and Environment Directorate, Pacific Northwest National Laboratory, Richland, WA 99352, JON OWEEJAN, JEFFREY GAGLIARDO, JEANETTE OWEEJAN, Electrochemical Energy Research Laboratory, General Motors Company, Honeoye Falls, NY 14472 — Time-resolved neutron depth profiling (TR-NDP) has been used to measure the lithium distribution in electrode layers of thin film batteries during charge/discharge cycles. TR-NDP data demonstrate quantitatively that ionic transport in electrodes follows the electric current in the external circuits under normal charge/discharge conditions whereas deviates upon sudden structural changes. The reversibility limit of ionic transport has been quantified to indicate the onset of battery failure.

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Howard Wang
State University of New York, Binghamton

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