



Exponent[®]
Engineering & Scientific Consulting

Robert M. Kasse, Ph.D.

Associate | Materials & Corrosion Engineering
149 Commonwealth Drive | Menlo Park, CA 94025
(650) 688-7132 tel | rkasse@exponent.com

Professional Profile

Dr. Kasse is a materials scientist who focuses on failure analysis of commercial lithium-ion batteries and specializes in the microstructural and electrochemical characterization of both lithium metal and lithium-ion technologies. His expertise is in investigating the roles of various battery design strategies - including electrolyte additives, applied mechanical pressure, and electrochemical cycling profiles - on the morphological formation and degradation of lithium metal and graphite anode materials.

He has experience using a wide array of structural and electrochemical analysis techniques, including laboratory and synchrotron-based X-ray diffraction (XRD), X-ray absorption spectroscopy (XAS), X-ray spectromicroscopy, X-ray photoelectron spectroscopy (XPS), small angle X-ray scattering (SAXS), scanning electron microscopy (SEM), cyclic and linear sweep voltammetry, and galvanostatic battery cycling.

Prior to joining Exponent, Dr. Kasse completed his PhD in Materials Science and Engineering at Stanford University, where his research conducted at SLAC National Accelerator Laboratory focused on using synchrotron-based X-ray surface characterization and electrochemical analysis to understand fundamental interfacial processes in lithium metal and lithium-ion batteries. Before graduate school, he worked as an engineer for the United States Air Force, developing test and evaluation hardware and software for conducting over land and over water weapons testing. He completed his BS and MS in Materials Science and Engineering at the University of Florida, where he studied rare earth-doped ceria electrolyte materials for intermediate temperature solid oxide fuel cells (SOFCs).

Academic Credentials & Professional Honors

Ph.D., Materials Science and Engineering, Stanford University, 2021

M.S., Materials Science and Engineering, University of Florida, 2013

B.S., Materials Science and Engineering, University of Florida, 2012

Prior Experience

General Engineer, United States Air Force, June 2013-August 2015.

Publications

C. Cao, T. P. Pollard, O. Borodin, J. E. Mars, Y. Tsao, M. R. Lukatskaya, R. M. Kasse, M. A. Schroeder, K. Xu, M. F. Toney, H. G. Steinrück. Toward Unraveling the Origin of Lithium Fluoride in the Solid

Electrolyte Interphase. *Chemistry of Materials* (2021); 33: 7315–7336.

N. R. Geise, R. M. Kasse, J. Nelson Weker, H. G. Steinrück, M. F. Toney. Quantification of Efficiency in Lithium Metal Negative Electrodes via Operando X-ray Diffraction. *Chemistry of Materials* (2021); 33: 7537-7545.

R. M. Kasse, N. R. Geise, J. S. Ko, J. Nelson Weker, H. G. Steinrück, M. F. Toney. Understanding additive controlled lithium morphology in lithium metal batteries. *Journal of Materials Chemistry A* (2020); 8:16960–16972.

Y. Ren, J. S. Ko, R. M. Kasse, X. Song, M. F. Toney, J. Nelson Weker. Hybrid Nanostructured Ni(OH)₂/NiO for High-Capacity Lithium-Ion Battery Anodes. *Journal of Electrochemical Energy Conversion and Storage* (2020); 17:1–9.

A. Subramaniam, J. Chen, T. Jang, N. R. Geise, R. M. Kasse, M. F. Toney, V. R. Subramanian. Analysis and simulation of one-dimensional transport models for lithium symmetric cells. *Journal of the Electrochemical Society* (2019); 166:A3806-A3819.

E. C. Miller, S. J. Kurdziel, K. N. Heath, R. M. Kasse, B. R. Perdue, M. F. Toney. Using X-ray Spectromicroscopy for Operando Characterization of Li-S Batteries. *Microscopy and Microanalysis* (2018); 24:440–441.

E. C. Miller, R. M. Kasse, K. N. Heath, B. R. Perdue, M. F. Toney. Operando spectromicroscopy of sulfur species in lithium-sulfur batteries. *Journal of the Electrochemical Society* (2018); 165:A6043-A6050.

G. Baure, R. M. Kasse, N. G. Rudawski, J. C. Nino. Across plane ionic conductivity of highly oriented neodymium doped ceria thin films. *Physical Chemistry Chemical Physics* (2015); 17:12259-12264.

R. M. Kasse, J. C. Nino. Ionic conductivity of Sm_xNd_yCe_{0.90}O_{2-δ} codoped ceria electrolytes. *Journal of Alloys and Compounds* (2013); 575:399-402.

L. Li, R. Kasse, S. Phadke, W. Qiu, A. Huq, J. C. Nino. Ionic conductivity across the disorder-order phase transition in the NdO_{1.5}-CeO₂ system. *Solid State Ionics* (2012); 221:15-21.

Presentations

R. M. Kasse, et al. Understanding Additive Controlled Lithium Morphology in Lithium Metal Batteries. Oral presentation, StorageX Tech Talk, Stanford, CA, May 26th 2020.

R. M. Kasse, et. al. Mechanistic Understanding of Highly Uniform Columnar Lithium Metal Plating Using Water as an Electrolyte Additive. Poster presentation, 22nd International Conference on Solid State Ionics, Pyeongchang, South Korea, June 17th 2019.

R. M. Kasse, et al. Shedding Some (X-Ray) Light on Li Metal Anodes. Oral presentation, GCEP and Precourt Student Energy Lectures, Stanford, CA, August 6th 2018.

R. M. Kasse, et al. Initial Formation of the Solid Electrolyte Interphase in Li Metal Batteries. Poster presentation, Gordon Research Conference on Batteries, Ventura, CA, February 25th 2018.

R. M. Kasse, et al. Ionic Conductivity of Doped Ceria Thin Films Using Different Electrode Configurations. Poster presentation, Materials Science & Technology 2012 Conference & Exhibition – Ceramic and Glass Materials, Pittsburgh, PA, Oct. 9th 2012.

R. M. Kasse, et al. Synthesis and Ionic Conductivity of Sm_xNd_yCe_{1-x-y}O_{2-δ} Codoped Ceria Electrolytes.

Poster presentation, 2011 Materials Research Society Fall Meeting & Exhibit – Advanced Materials for Fuel Cells, Boston, MA, Nov. 30th 2011.