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Dr. Brian May is experienced in the areas of chemistry and materials science. His background encompasses a wide array of characterization techniques, such as microscopy, scattering, spectroscopy, and separations. Dr. May is also well versed in experimental design and execution, data interpretation, and communication of findings. He has published in peer-reviewed journals and given several technical presentations on his work.

Dr. May received his Ph.D. in analytical chemistry from the University of Illinois at Chicago. His dissertation focused on developing techniques to characterize the redox chemistries that occur at the cathode of lithium-ion batteries. Prior to that, he received his B.S. in chemistry from Loyola University-Chicago, where he conducted research in allosteric activation of ADP-glucose pyrophosphorylase, the enzyme that governs glycogen synthesis in bacteria and starch in plants.

Areas of Specialization

Analytical Chemistry
Data Visualization
Lab & Industrial Services
Safety
Failure Analysis
Material Compatibility
Toxin Exposure
Energy Storage

Education

Ph.D., Analytical Chemistry, University of Illinois at Chicago, 2018
B.S., Chemistry with an Emphasis in Biochemistry, Loyola University Chicago, 2013

Project Experience Highlights

Batteries

Nickel metal hydride battery pack fire – Examined the internal chemistry of battery cells to determine mechanism for failure that resulted in fires.

Alkaline battery rapid disassembly – Disassembled and characterized internal chemistry of alkaline batteries that were undergoing rapid disassembly failures.

Fire/Explosion

Chemical plant explosion – Performed analysis and testing to determine cause of an explosion that occurred in a specialty chemical manufacturing plant.

Research lab explosion – Investigated the cause of an explosion in a research laboratory by developing and testing hypotheses related to the synthesis and properties of an energetic material.

Chemical Interactions

Personal injury from chemical reaction – Determined the cause of an injury-causing chemical reaction by examining samples collected from the site and analyzing possible contaminants

Herbicide application – Investigated whether an inadvertent herbicide application left any traces remaining and whether there was any impact to nearby fruit-bearing trees.

Chemical disinfectant exposure – Investigated the root cause of an incident where livestock was exposed to chemical disinfectant and sustained injuries.

Stainless steel appliance corrosion – Characterized type of corrosion present on stainless steel appliances in industrial kitchen and offered solutions to restore items rather than perform a costly replacement.

Accelerated aging study – Established the environment for an accelerated aging study of polymeric piping materials

Materials Characterization

Collapsed swimming pool – Performed X-ray diffraction analysis on precipitate obtained from a subsurface pool deck drain to determine the source of water contributing to the heaving and ultimate failure of a pool deck.

Aluminum beverage can failure – Performed failure analysis on aluminum beverage cans, identifying leak sites via microscopic investigation and chemical analysis.

Environmental Monitoring

Apartment air quality monitoring – Monitored the air inside of a living unit for toxins and humidity following a tenant complaint.

Professional Affiliations/Honors

ASM International

Member, Failure Analysis Society, 2023-Present
Chair – Batteries and Energy Storage Session, IMAT 2024

National Association of Fire Investigators

Member, 2018 - 2022

Materials Research Society

Member, 2016 - present

Electrochemical Society

Member, 2015 - 2018

Journal of Solid State Ionics

Ad Hoc Reviewer, 2017

National School on Neutron and X-Ray Scattering

Attendee, 2016

Denver X-Ray Conference

Robert L. Snyder Student Travel Award, 2015

Positions Held

Engineering Systems Inc., Aurora, Illinois

Staff Consultant, 2018 – Present

University of Illinois at Chicago

Research Assistant, 2015 – 2018

University of Illinois at Chicago

Teaching Assistant, 2013 – 2014

Loyola University Chicago

Undergraduate Research Assistant, 2012 – 2013

Packer Engineering

Intern, 2009 – 2011

Continuing Education/Certifications

Mycometer Surface Fungi Sampling & Analysis Proficiency Training Program

October 2022

IATA Dangerous Goods Certification

February 2022

National Association of Fire Investigators Fire Investigation Training Program

March 2019

Publications/Presentations

Publications

“Origin of Rapid Delithiation In Secondary Particles of $\text{LiNi}_{0.80}\text{Co}_{0.15}\text{Al}_{0.05}\text{O}_2$ and $\text{LiNi}_y\text{Mn}_z\text{Co}_{1-y-z}\text{O}_2$ Cathodes,” M.W. Wolfman, **B.M. May**, et al. *Advanced Energy Materials* 13, 2023, 2300895.

“Forensic Evidence of Arc Tracking as an Ignition Source,” T.J. Bajzek, E.A. Burns, R.P. Baron, **B.M. May**, J.P. Sommer, 2023 IEEE International Symposium on Product Compliance Engineering (ISPCE), 1-3.

“Evaluation of Chemical and Structural Homogeneity in Single Particles of $\text{Li}_{1-x}\text{Ni}_{0.33}\text{Mn}_{0.33}\text{Co}_{0.33}\text{O}_2$,” W.J. Judge, **B.M. May**, K. Kumar, M.F. Wolfman, D.A. Shapiro, Z. Cai, M.V. Holt, J. Cabana, *Journal of Physical Chemistry C* 126 (2022), 16082-16089.

“The Implications of Post-Fire Physical Features of Cylindrical 18650 Lithium-Ion Battery Cells,” T Nagourney, J. Jordan, L. Marsh, D. Scardino, **B.M. May**, *Fire Technology* 57 (2021), 1707-1722.

“Effect of Synthetic Parameters on Defects, Structure, and Electrochemical Properties of Layered Oxide $\text{LiNi}_{0.80}\text{Co}_{0.15}\text{Al}_{0.05}\text{O}_2$,” **B.M. May**, et al., *Journal of the Electrochemical Society* 165 (2018), A3537-A3543.

“Facet-Dependent Rock-Salt Reconstruction on the Surface of Layered Oxide Cathodes,” H. Zhang, **B.M. May**, et al., *Chemistry of Materials* 30 (2018), 692-699.

“Nanoscale Detection of Intermediate Solid Solutions in Equilibrated Li_xFePO_4 Microcrystals,” **B.M. May** et al., *Nano Letters* 17 (2017), 7364-7371.

“Visualization of Electrochemical Reactions in Battery Materials with X-ray Microscopy and Mapping,” M. Wolf, **B.M. May**, J. Cabana., Chemistry of Materials 29 (2017), 3347-3362.

“Conserved Residues of the Pro103-Arg115 Loop are Involved in Triggering the Allosteric Response of the Escherichia Coli ADP-Glucose Pyrophosphorylase,” B.L. Hill, J. Wong, **B.M. May** et al., Protein Science 24 (2015) 714-728.

Presentations

“Not Worth a Nickel! A Nickel Metal Hydride Battery Failure Investigation,” **B.M. May**, presented at International Materials, Applications, and Technologies Annual Meeting, Detroit, MI, October 2023.

“Nanoscale Detection of Intermediate Solid Solutions in Equilibrated Li_xFePO_4 Microcrystals,” **B.M. May**, presented at the Advanced Light Source User Meeting, Berkeley, CA, October 2018.

“Determination of Reaction Mechanism Within Single Particle Layered Oxide Materials for Li-Ion Batteries Using Operando Diffraction Mapping,” **B.M. May** et al., presented at the Materials Research Society Fall Meeting, Boston, MA, November 2017.

“Visualization of Phase Transformations in Lithium Ion Cathode Materials: Pushing the Limits of Resolution,” **B.M. May**, presented at the Advanced Photon Source User Seminar, Argonne, IL, July 2017.

“Operando Microdiffraction Mapping of Single Particle Cathode Materials,” M. Wolf, **B.M. May**, et al., presented at the Denver X-ray Conference, Chicago, IL, August 2016.

“X-ray Nanodiffraction Study of the Delithiation Mechanism of LiFePO_4 Single Particles,” **B.M. May** et al., presented at the Materials Research Society Spring Meeting, Phoenix, AZ, March 2016.

“Portfolio of X-ray Imaging Tools for Studies of Battery Materials: Development and Scientific Insight.” **B.M. May** et al., presented at the Energy Frontier Research Centers Principal Investigators' Meeting, Washington, D.C., October 2015.

“Nanodiffraction Study of the Delithiation Mechanism of LiFePO_4 Single Particles,” **B.M. May** et al., presented at the Denver X-ray Conference, Westminster, CO, August 2015.

“X-ray Nanodiffraction Study of the Delithiation Mechanism of LiFePO_4 Single Particles,” **B.M. May** et al., presented at the Electrochemical Society Meeting, Chicago, IL, May 2015.

“Assessment of Nanodiffraction to Study Phase Transformations in Crystals of Battery Materials,”
B.M. May et al., presented at the Advanced Photon Source Users' Meeting, Argonne, IL,
May 2015.