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Lara Dienemann, Ph.D.

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Professional Profile

Dr. Dienemann is a material scientist and mechanical engineer who specializes in battery science and technology. She has extensive experience in researching next-generation lithium metal batteries (LMBs), including synthesis and characterization of cell components and failure analysis. She specializes in assessing mechanical behaviors of electrodes along with their relationships to battery cycle life. At Exponent, Dr. Dienemann supports clients by performing quality evaluations, root cause failure analysis, and performance assessments across battery applications ranging from consumer electronics to electric vehicles and beyond. Outside of Exponent, Dr. Dienemann organizes monthly open-source Battery Forums (formerly known as “Battery Brunch”) as Project Director for the Volta Foundation.

Dr. Dienemann’s doctoral research investigated lithium metal dendrite suppression by a hybrid composite separator and an artificial solid electrolyte interphase. To understand relevant mechanisms, she conducted micro-computed tomography (CT), mechanical characterization, and pouch cell performance evaluations. As her work was carried out at Ionic Materials in collaboration with their Battery group, she gained experience in polymerization techniques such as atom transfer radical polymerization and click chemistry as well as in manufacturing techniques such as extrusion in an industrial dry room.

Academic Credentials & Professional Honors

Ph.D., Mechanical Engineering and Materials Science, Tufts University, 2023

B.S., Mechanical Engineering, Tufts University, 2018

Experimental Mechanics Competition Finalist, IMECE2019

Prior Experience

Project Director, Volta Foundation, 2023-current

Research Assistant, Ionic Materials, 2018-2023

Publications

Dienemann, L. L.; Yin, R.; Liu, T.; Stejer, A.; Kempkes, V.; Li, S.; Zenyuk, I. V.; Matyjaszewski, K.; Panzer, M. J. Hybrid Particle Brush Coatings with Tailored Design for Enhanced Dendrite Prevention and Cycle Life in Lithium Metal Batteries. ACS Appl. Energy Mater. 2023, 6 (22), 11602–11612. https://doi.org/10.1021/acsaem.3c02051.

Dienemann, L. L.; Geller, L. C.; Huang, Y.; Zenyuk, I. V.; Panzer, M. J. Understanding Lithium Dendrite

Suppression by Hybrid Composite Separators: Indentation Measurements Informed by Operando X-Ray Computed Tomography. ACS Appl. Mater. Interfaces 2023, 15 (6), 8492–8501. https://doi.org/10.1021/acsami.2c20787.

Dienemann, L. L.; Saigal, A.; Zimmerman, M. A. Creep and Anisotropy of Free-Standing Lithium Metal Foils in an Industrial Dry Room. Journal of Electrochemical Energy Conversion and Storage 2021, 18 (040908). https://doi.org/10.1115/1.4052043.

Dienemann, L. L.; Saigal, A.; Zimmerman, M. A. Elastic-Viscoplastic Mechanics of Lithium in a Standard Dry Room; American Society of Mechanical Engineers Digital Collection, 2021. https://doi.org/10.1115/IMECE2020-23894.

Dienemann, L. L.; Saigal, A.; Zimmerman, M. A. Low-Cost Measurement Technique of Poisson's Ratio of Thin, Solvent-Sensitive Polymer Membranes; American Society of Mechanical Engineers Digital Collection, 2020. https://doi.org/10.1115/IMECE2019-11655.

Presentations

Fall 2022 Materials Research Symposium (MRS) Meeting, Boston, MA. Talk. Dienemann, L.L., Geller, L.C., Huang, Y., Zenyuk, I.V. & Panzer, M.J. (Dec. 2022). Understanding Lithium Dendrite Suppression by Hybrid Composite Separators: Indentation Measurements Informed by Operando X-Ray Computed Tomography.

International Symposium on Polymer Electrolytes (ISPE) 17, Niagara, Canada. Talk. Dienemann, L.L., Geller, L.C., Huang, Y., Clarkson, D., Greenbaum, S., Zenyuk, I.V. & Panzer, M.J. (Oct. 2022). Understanding Lithium Metal Stability with Particle-Polymer Composite Separators & X-Ray Computed Tomography.

International Symposium on Polymer Electrolytes (ISPE) 17, Niagara, Canada. Poster. Dienemann, L.L., Liu, T., Stejer, A., Zenyuk, I.V., Matyjaszewski, K. & Panzer, M.J. (Oct. 2022). Densification of Lithium Metal via Particle Brush Artificial SEI Interpreted by X-Ray Computed Tomography.

Gordon Research Seminar & Conference (GRS/GRC): Batteries. Ventura, CA. Poster. Dienemann, L.L., Al-Obeidi, A., Stejer, A., Zenyuk, I.V. & Panzer, M.J. (June 2022). Lithium Metal Conditioning & Cell Design Informed by Micro-Computed Tomography.

Fall 2021 Materials Research Symposium (MRS) Meeting, Boston, MA. Talk. Dienemann, L.L., Saigal, A. & Zimmerman, M.A. (Dec. 2021). Creep and Anisotropy of Free-Standing Lithium Metal Foils in an Industrial Dry Room.

Fall 2021 Materials Research Symposium (MRS) Meeting, Boston, MA. Poster. Geller, L.C. & Dienemann, L.L. (Dec. 2021). Optimization of Ceramic – Poly(vinylidenefluoride-co-hexafluoropropylene) (PVDF-HFP) Composite Separators for Lithium Metal Batteries.

International Mechanical Engineering Congress & Exposition (IMECE) 2020, virtual. Talk. Dienemann, L.L., Saigal, A. & Zimmerman, M.A. (Nov. 2020). Elastic-Viscoplastic Mechanics of Lithium in a Standard Dry Room.

International Mechanical Engineering Congress & Exposition (IMECE) 2019, Salt Lake City, UT. Talk. Dienemann, L.L., Saigal, A. & Zimmerman, M.A. (Nov. 2019). Low-cost Measurement Technique of Poisson's Ratio of Thin, Solvent-Sensitive Polymer Membranes.

Project Experience

- Performed cell and pack level quality assessments and root cause failure analysis, including recall investigations.
- Developed novel techniques analyzing battery material properties.
- Conducted prior art reviews of battery technologies and product deconstruction to provide technical expertise in intellectual property disputes.