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Engineering & Scientific Consulting

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Professional Profile

Dr. Cohn is an experienced materials scientist specializing in battery technology. At Exponent, he leads a team focused on helping clients navigate challenges across the entire life cycle of their batteries and battery-powered products, including projects focused on technology due diligence, battery cell and pack quality evaluations, cycling studies, charging protocol analysis, customized abuse testing, root cause failure analysis, and product recalls involving the Consumer Product Safety Commission (CPSC). He supports clients across a range of battery sectors, including consumer electronics, electric vehicles, portable battery back-up systems, and residential and utility energy storage systems. He has also guest lectured at University of California schools on lithium-ion battery technology and failure analysis techniques.

Dr. Cohn has led a range of battery intellectual property litigation projects with experience analyzing batteries from the macro scale down to the atomic scale. He has also conducted dozens of inspections and battery fire investigations.

Dr. Cohn has experience working on current and emerging battery chemistries, including lithium ion (NMC, NCA, LCO, LFP), rechargeable lithium metal, lithium thionyl chloride (Li/SOCl2), and lithium manganese dioxide (Li/MnO2). He routinely analyzes batteries using X-ray CT scanning, cell teardowns, reference electrode testing, cycling, electrical and thermal abuse testing, and battery log data, using Python to analyze large data sets. He is also skilled at characterizing battery materials using Raman spectroscopy, X-ray diffraction (XRD), scanning electron microscopy with energy dispersive X-ray spectroscopy (SEM-EDS), and particle size analysis techniques.

As a National Science Foundation Graduate Research Fellow at Vanderbilt University, Dr. Cohn's research was focused on the design, development and characterization of new battery chemistries, including sodium-ion and sodium metal systems for low-cost stationary energy storage. To help better understand underlying battery mechanisms, he conducted in-situ studies of intercalation and electrochemical plating processes. He also gained experience with a range of synthesis and deposition techniques, including sol-gel synthesis, wet-chemical synthesis, hydrothermal synthesis, solid-state synthesis, aluminum anodization, chemical vapor deposition (CVD), and atomic layer deposition (ALD).

Academic Credentials & Professional Honors

Ph.D., Mechanical Engineering, Vanderbilt University, 2018

B.S., Physics, Tufts University, 2011

NSF Graduate Research Fellowship, National Science Foundation, 2015-2018

Prior Experience

Energy Analyst, Pace Energy and Climate Center, 2011-2013

Patents

US Patent 11,287,642. Electrochemically Actuated Optical Modulator. (Valentine JG, Coppens Z, Pint CL, Cohn AP).

International Application No. PCT/US2017/059781: Electrochemical Cells and Methods of Making and Using Thereof. (Cohn AP, Pint CL).

Publications

Cohn AP, Hayes T, Harding J, Horn Q. The Low-Voltage Limits of Lithium-Ion Batteries: Overdischarge and Degradation from a Safety Perspective. ISTFA 2022: Conference Proceedings from the 48th International Symposium for Testing and Failure Analysis October 30–November 3, 2022, Pasadena Convention Center, Pasadena, California, USA, pp 47 – 50.

Hayes T, Cohn AP, Kasse R, Sanchez H. Advanced Lithium-Ion Battery Failure Analysis: An Evolving Methodology for an Evolving Technology. ISTFA 2022: Conference Proceedings from the 48th International Symposium for Testing and Failure Analysis October 30–November 3, 2022, Pasadena Convention Center, Pasadena, California, USA, pp 51 – 57.

Cohn AP, Metke T, Donohue J, Muralidharan N, Share K, Pint CL. Rethinking sodium-ion anodes as nucleation layers for anode-free batteries. Journal of Materials Chemistry 2018; 46:23875-23884.

Muralidharan N, Brock C, Cohn AP, Schauben D, Carter R, Oakes L, Walker DG, Pint CL. Tunable mechanochemistry of lithium battery electrodes. ACS Nano 2017; 11:6243-6251.

Cohn AP, Muralidharan N, Carter R, Share K, Pint CL. An anode-free sodium battery through in-situ plating of sodium metal. Nano Letters 2017; 17:1296-1301.

Carter R, Oakes L, Douglas A, Muralidharan N, Cohn AP, Pint CL. A Sugar-Derived Room-Temperature Sodium Sulfur Battery with Long Term Cycling Stability. Nano Letters 2017; 17:1863-1869.

Carter R, Oakes L, Muralidharan N, Cohn AP, Douglas A, Pint CL. Polysulfide anchoring mechanism revealed by atomic layer deposition of V2O5 and sulfur filled carbon nanotubes for lithium-sulfur batteries. ACS Applied Materials and Interfaces 2017; 9:7185-7192.

Muralidharan N, Carter R, Oakes L, Cohn AP, Pint CL. Strain Engineering to Modify the Electrochemistry of Energy Storage Electrodes. Scientific Reports 2016; 6:27542.

Share K, Cohn AP, Carter R, Rodgers B, Pint CL. Role of nitrogen doped graphene for improved high capacity potassium ion battery anodes. ACS Nano 2016; 10:9738-9744.

Cohn AP, Muralidharan N, Carter R, Share K, Oakes L, Pint CL. Durable potassium ion battery electrodes from high-rate cointercalation into graphitic carbons. Journal of Materials Chemistry A 2016; 4:14954-14959.

Share K, Cohn AP, Carter R, Pint CL. Mechanism of Electrochemical Potassium Ion Intercalation Staging in Few Layered Graphene from In-Situ Raman Spectroscopy. Nanoscale 2016; 8:16435-16439.

Cohn AP, Share K, Carter R, Oakes L, Pint CL. Ultrafast solvent-assisted sodium ion intercalation into highly crystalline few-layered graphene. Nano Letters 2016; 16:543-548.

Cohn AP, Erwin WR, Share K, Oakes L, Westover A, Carter R, Bardhan R, Pint CL. All silicon electrode photo-capacitor for integrated energy storage and conversion. Nano Letters 2015; 15:2727-2731, 2015.

Cohn AP, Oakes L, Carter R, S. Chatterjee, Westover A, Share K, Pint CL. Assessing the improved performance of freestanding, flexible graphene and carbon nanotube hybrid foams for lithium-ion battery anodes. Nanoscale 2014; 6:4669-4675.

Presentations

Cohn AP. A Discussion on Lithium Iron Phosphate Battery Safety and the Importance of Cell Quality. Oral presentation, 14th Annual Battery Safety Summit, Alexandria, Virginia, November 5, 2024.

Torelli D, Cohn AP, Hayes T. Beyond Performance Data: Evaluating Potential Safety Concerns of Alternative Cell Designs Through a Testing-Based Approach. Oral presentation, Advanced Automotive Battery Conference, Strasbourg, France, May 15, 2024

Cohn AP, Hayes T, Harding J, Horn Q. Over Discharge in Lithium-Ion Cells: Understanding the Negative Electrode Potential at Low Cell Voltages. Oral presentation, 12th Annual Battery Safety Summit, Tysons Corner, Virginia, October 13, 2022.

Hayes, TA, Cohn, AP, Sanchez, H. Advanced Failure Analysis for Lithium-Ion Batteries, Exponent Live Webinar, May 13, 2021.

Licht R, Cohn P, Beers K. The Effects of Cycling Protocols on Internal Cell Structure. Oral presentation, PlugVolt Battery Seminar 2019, Plymouth, MI, July 16, 2019.

Cohn AP, Pint CL. Developing an Anode-Free Sodium Battery. Oral presentation, Materials Research Society Fall Meeting, Boston, MA, 2016.

Cohn AP and Pint CL. Cointercalation for Alternative Ion Storage. Oral presentation Materials Research Society Fall Meeting, Boston, MA, 2016.

Cohn AP, Share K, Carter R, Oakes L, and Pint CL. Ultrafast Sodium Ion Cointercalation in Few-Layered Graphene. Poster presentation, Gordon Research Conference on Batteries, Ventura, CA, 2016.