



# Exponent®

Engineering & Scientific Consulting

## James Sturman, Ph.D.

Associate | Materials Science and Electrochemistry

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### Professional Profile

Dr. Sturman specializes in lithium-ion battery development and testing for battery-powered products. He assists clients with a range of lithium-ion battery issues involving characterization, failure analysis, quality, and safety testing. Dr. Sturman draws on academic experience designing electrode materials and knowledge of commercial cells to respond to the industry's most critical priorities.

Prior to joining Exponent, Dr. Sturman was a senior battery cell engineer with Milwaukee Tool where he led cell-level qualifications and supported cell design improvements to meet target performance specifications. Dr. Sturman's Ph.D. work at the University of Ottawa focused on multicomponent electrode materials including silicon-based anodes and high-entropy cathodes. Improvements to the electrochemical performance of silicon-based electrodes were achieved with composite designs involving graphite or the use of nanostructured spherical silicon encapsulated within a lithium titanium oxide ceramic or MOF-derived carbon matrix. He has also studied various water-soluble binders and their role in the cohesion of silicon-graphite electrodes.

Dr. Sturman has experience with battery characterization techniques including battery cycling, performance testing, abuse testing, Electrochemical Impedance Spectroscopy (EIS), powder X-Ray Diffraction (XRD), Scanning Electron Microscopy (SEM), Energy Dispersive X-ray Spectroscopy (EDX), and X-ray computed tomography (CT). In addition, he has employed advanced operando X-ray diffraction techniques to elucidate the lithiation mechanism of intercalation-based graphite, alloying-based silicon, and organic azaacene anodes.

### Academic Credentials & Professional Honors

Ph.D., Chemical Engineering, University of Ottawa, 2023

B.A.Sc., Chemical Engineering, University of Ottawa, 2018

Ontario Graduate Scholarship, University of Ottawa, 2022

### Prior Experience

Senior Battery Cell Engineer, Milwaukee Tool, 2024-2025

Battery Cell Engineer, Milwaukee Tool, 2023-2024

### Publications

Sturman JW, Houache MSE, do Pim WD, Baranova EA, Murugesu M, Abu-Lebdeh Y. Critical investigation of metal-organic-frameworks to improve the silicon anode of lithium-ion batteries. *ACS Applied Energy Materials* 2024; 7 (1):21-30.

Sturman JW, Grignon E, McAllister BT, Yim CH, Baranova EA, Seferos DS, Abu-Lebdeh Y. Small molecule azaacene as an anode material for lithium-ion batteries. *Energy & Fuels* 2023; 37 (17):13397-13404.

Sturman JW, Yim CH, Karkar Z, Baranova EA, Toupin M, Abu-Lebdeh Y. Investigation of xanthan gum and carboxymethyl cellulose binders for the silicon anode of lithium-ion batteries. *Journal of the Electrochemical Society* 2023; 170:020534.

Sturman JW, Baranova EA, Abu-Lebdeh Y. Review: high-entropy materials for lithium-ion battery electrodes. *Frontiers in Energy Research* 2022; 10:862551.

Sturman JW, Yim CH, Baranova EA, Abu-Lebdeh Y. Communication—design of  $\text{LiNi}_{0.2}\text{Mn}_{0.2}\text{Co}_{0.2}\text{Fe}_{0.2}\text{Ti}_{0.2}\text{O}_2$  as a high-entropy cathode for lithium-ion batteries guided by machine learning. *Journal of the Electrochemical Society* 2021; 168:050541.

Sturman JW, Zhang Y, Yim CH, Niketic S, Toupin M, Baranova EA, Abu-Lebdeh Y. Composites of  $\text{silicon@Li}_4\text{Ti}_5\text{O}_{12}$  and graphite for high-capacity lithium-ion battery anode materials. *Journal of the Electrochemical Society* 2021; 168:010524.

## **Presentations**

Sturman JW, Yim CH, Toupin M, Karkar Z, Baranova EA, Abu-Lebdeh Y. Optimizing aqueous binders for next-generation lithium-ion batteries: a practical approach. Oral Presentation, Electrochemical Society Conference 242, Atlanta, GA, October 9-13, 2022.

Sturman JW, Yim CH, Baranova EA, Abu-Lebdeh Y. Design of  $\text{LiNi}_{0.2}\text{Mn}_{0.2}\text{Co}_{0.2}\text{Fe}_{0.2}\text{Ti}_{0.2}\text{O}_2$  as a high-entropy cathode for lithium-ion batteries guided by machine learning. Poster Presentation, IUPAC | CCCE 2021—104th Canadian Chemistry Conference and Exhibition, Virtual, August 13-20, 2021.

Sturman JW, Zhang Y, Yim CH, Niketic S, Toupin M, Baranova EA, Abu-Lebdeh Y. Composites of  $\text{silicon@Li}_4\text{Ti}_5\text{O}_{12}$  and graphite for high-capacity lithium-ion battery anode materials. Poster Presentation, CCEC 2020—70th Canadian Chemical Engineering Conference, Virtual, October 26-30, 2020.