

Exponent[®] Engineering & Scientific Consulting

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Professional Profile

Dr. Morales is a physicist with a background in energy storage, spectroscopy, microscopy and physical modeling. He specializes in failure analysis and quality assessment of batteries, including those used in consumer electronics and consumer products.

To that end, Dr. Morales utilizes his knowledge in design of commercial and novel secondary battery systems, as well as materials characterization techniques such as X-ray computed tomography (CT) and Scanning Electron Microscopy (SEM). He also has extensive experience in other non-destructive techniques such as Nuclear Magnetic Resonance (NMR) and Raman spectroscopy.

Prior to joining Exponent, Dr. Morales performed his Ph.D. work at the City University of New York (CUNY). There, he worked on the application of solid and liquid state NMR spectroscopy techniques to novel energy storage materials. His previous works included structural characterizations of glass-ceramic polymer composite electrolytes for Li-ion batteries, transport studies of electrolytes for Na-ion batteries and Electric Double-Layer Capacitors (EDLCs), as well as mapping the local magnetic environment of transition metal phosphate cathode materials for Li-ion batteries. Using Python and MATLAB, he developed pipelines to expedite the processing of transport data and developed models to simultaneously fit large volumes of spectral data sets.

Academic Credentials & Professional Honors

Ph.D., Physics, City University of New York, 2021

M.A., Physics, Hunter College, 2019

B.S., Physics, Boston College, 2015

NIH RISE Graduate Scholar, 2018 - 2021

Licenses and Certifications

Six Sigma Yellow Belt Certification (CSSYB) (MA)

Academic Appointments

Adjunct Lecturer, Physics, CUNY Hunter College 2017 - 2021

Prior Experience

Physics Adjunct Lecturer, CUNY Hunter College, 2017 - 2021

Graduate Researcher, City University of New York, 2016 - 2021

Languages

Japanese

Publications

E.C. Self, P.H. Chien, L.O'Donnell, D.J Morales, J. Liu, T. Brahmbhatt, S. Greenbaum, J. Nanda. "Investigation of Glass-Ceramic Lithium Thiophosphate Solid Electrolytes Using NMR and Neutron Scattering" Materials Today Physics, 2021, https://doi.org/10.1016/j.mtphys.2021.100478

D.J. Morales, L. Gomes Chagas, D. Paterno, S. Greenbaum, S. Passerini, S. Suarez. "Transport studies of NaPF6 carbonate solvents-based sodium ion electrolytes." Electrochimica Acta, 2021, https://doi.org/10.1016/j.electacta.2021.138062.

Morales, D.J.; Greenbaum, S. NMR Investigations of Crystalline and Glassy Solid Electrolytes for Lithium Batteries: A Brief Review. Int. J. Mol. Sci. 2020, 21, 3402, https://doi.org/10.3390/ijms21093402.

D.J. Morales, R.E. Ruther, J. Nanda, and S. Greenbaum. "Ion Transport and Association Study of Glyme-Based Electrolytes with Lithium and Sodium Salts." Electrochimica Acta, 2019, https://doi.org/10.1016/j.electacta.2019.02.110.

Presentations

"Nuclear Magnetic Resonance Investigations of Li3PS4-PEO for Solid-State Lithium Batteries", SACNAS Meeting, October 2020

"Magnetic Resonance Characterization and Transport Studies of Sodium-Ion Based Electrolytes for Electrochemical Energy Storage" MRS Fall Meeting, December 2019

"Single Crystal NMR Study of LiFexMn1-xPO4" SACNAS Meeting, October 2018

"Single Crystal NMR Study of LiFexMn1-xPO4" American Chemical Society Annual Meeting, August 2018

"NMR Transport Study of Glyme-Based Electrolytes for use in Supercapacitors" Electrochemical Society Spring Meeting, May 2018