



Exponent®

Engineering & Scientific Consulting

Kathryn Holguin, Ph.D.

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Professional Profile

Dr. Holguin specializes in organic and polymer synthesis and characterization, with an emphasis on materials for applications in batteries and energy storage. Her experience in chemistry, polymer science, materials science, and battery science allows her to address a wide array of technical challenges facing the energy storage industry and provide chemistry-based solutions to clients.

As a chemist and battery scientist, Dr. Holguin is skilled in organic synthesis methods, material characterizations for structure and composition (scanning electron microscopy (SEM/EDS)), spectroscopy (FTIR, NMR, UV-Vis, and Raman) and chromatography techniques (GC-MS, HPLC, and LC-MS), as well as electrochemical testing and evaluation methods (voltammetry, impedance, and GITT). She is proficient in battery cell (and cathode, anode) engineering and design, materials synthesis, as well as battery performance and failure analysis.

Prior to joining Exponent, Dr. Holguin worked as a research assistant at George Mason University, where she focused on organic and polymer material structure engineering, characterization, and analysis for applications in alkali-ion and redox flow batteries. The goal of her research was to explore and develop sustainable batteries for the changing world. She developed several novel organic and polymer materials and demonstrated their practical applications in all organic sodium ion, potassium ion, lithium ion, and magnesium ion battery systems.

Dr. Holguin also has extensive experience working with the Army on the Land Warrior, Mounted Warrior, and Nett Warrior (formerly Ground Soldier System) programs as an analyst and program manager. She supported the testing, conducted data and failure analysis, presented technical reports, and assisted in the integration and implementation of system improvements. As a program manager, Dr. Holguin oversaw several teams in direct support of Nett Warrior, conducted and presented technical finding sessions, and ensured the compliance of government requirements.

Academic Credentials & Professional Honors

Ph.D., Chemistry and Biochemistry, George Mason University, 2022

M.S., George Mason University, 2011

B.S., George Mason University, 2009

Prior Experience

Adjunct Faculty, Department of Chemistry and Biochemistry, George Mason University, 2022-2023

Graduate Research Assistant, George Mason University, 2020-2022

Professional Affiliations

American Chemical Society

The Electrochemical Society

Publications

Qin, K., Holguin, K., Huang, J., Mohammadiroudbari, M., Chen, F., Yang, Z., Xu, G.-L., Luo, C., A Fast-Charging and High-Temperature All-Organic Rechargeable Potassium Battery. *Advanced Science* 2022, 9, 2106116.

Qin, Y., Holguin, K., Fehlau, D., Luo, C., Gao, T. Exploring Carbonyl Chemistry in Non-Aqueous Mg Flow Batteries. *Chemistry An Asian Journal* 2022, 17, e202200587.

Holguin, K., Qin, K., Huang, J., Luo, C. A Carboxylate- and Pyridine-Based Organic Anode Material for K-Ion Batteries. *New Journal of Chemistry* 2022, 46, 18890-18898.

Holguin, K., Qin, K., Kamphaus, E. P., Chen, F., Cheng, L., Xu, G.-L., Amine, K., Luo, C. Establishing Substitution Rules of Functional Groups for High-Capacity Organic Anode Materials in Na-Ion Batteries. *Journal of Power Sources* 2022, 533, 231383.

Qin, Y., Holguin, K., Fehlau, D., Luo, C., Gao, T. Nonaqueous Mg Flow Battery with a Polymer Catholyte. *ACS Applied Energy Materials* 2022, 5 (3), 2675–2678.

Holguin, K., Mohammadiroudbari, M., Qin, K., Luo, C. Organic Electrode Materials for Non-Aqueous, Aqueous, and All-Solid-State Na-Ion Batteries. *Journal of Materials Chemistry A* 2021, 9 (35), 19083–19115.

Qin, K., Holguin, K., Mohammadiroudbari, M., Luo, C. A Conjugated Tetracarboxylate Anode for Stable and Sustainable Na-Ion Batteries. *Chemical Communications* 2021, 57 (19), 2360–2363.

Qin, K., Holguin, K., Mohammadiroudbari, M., Huang, J., Kim, E. Y. S., Hall, R., Luo, C. Strategies in Structure and Electrolyte Design for High-Performance Lithium Metal Batteries. *Advanced Functional Materials* 2021, 31 (15), 2009694.

Qin, K., Huang, J., Holguin, K., Luo, C. Recent Advances in Developing Organic Electrode Materials for Multivalent Rechargeable Batteries. *Energy & Environmental Science* 2020, 13 (11), 3950–3992.

Presentations

Holguin, K., Qin, K., Kamphaus, E. P., Chen, F., Cheng, L., Xu, G.-L., Amine, K., Luo, C. Establishing Substitution Rules of Functional Groups for High-Capacity Organic Anode Materials in Na-Ion Batteries. Seminar presentation, Sustainability in a Changing World - ACS Fall Conference, Chicago, IL, 2022