Leo W. Gordon

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LinkedIn | Personal Website | GitHub

EDUCATION

THE CITY COLLEGE OF NEW YORK (CCNY) | PhD, Chemical Engineering
Graduated March 2023 | New York, NY

THE CITY COLLEGE OF NEW YORK (CCNY) | MPhil, Chemical Engineering
Graduated January 2021 | New York, NY

UNIVERSITY OF EDINBURGH | MChem, Chemistry
Graduated July 2017 | Edinburgh, U.K.

RESEARCH ACTIVITIES

CLÉMENT LAB | Postdoctoral Scholar
UCSB | May 2023 - Present | Santa Barbara, CA

- Determination of ionic diffusion through polymeric materials by applications of pulsed-field gradient and electrophoretic NMR measurements
- Studying both partitioning behaviours and transport processes in multi-phasic systems using spatially-resolved NMR techniques
- Probing ion-ion and ion-solvent interactions via their coupled diffusion, as compared to equilibrium models of ion dissociation

MESSINGER LAB | PhD Student
CCNY | November 2018 – May 2023 | New York, NY

- Applying advanced solid-state NMR methodologies to establish ionic and electronic charge storage mechanisms in quinone electrodes for aluminum batteries
- NMR characterization of molten-salt electrolytes in liquid and heterogeneous samples to develop understanding of reaction processes following electrochemical cycling
- Quantum chemical calculations to determine thermochemical viability of ion generation pathways and quadrupolar NMR parameters of electroactive ions
- Evaluating reaction schemes via NMR to characterize the modification of $LiPF_6$ by P_2O_5 for long-life and low hysteresis lithium-metal batteries
- Investigating chalcogen electrodes for rechargeable aluminum batteries, studying the impacts of structure at different length-scales to the resultant reactions
- Understanding a novel non-intensive recycling process for lithium-ion battery cathodes by NMR analysis, in combination with complimentary techniques

BIDDINGER LAB | Summer Researcher
CCNY | Summer 2018 | New York, NY

- Performed preliminary work for surface-enhanced FTIR studies of reaction pathways in the electrochemical upgrading of bio-oils derived from otherwise wasted feedstocks to bio-fuels

KAMPOURIS LAB | Masters Research
University of Edinburgh | September 2016 - April 2017 | Edinburgh, U.K.

- Investigated the design of microelectrode arrays, in particular the impact of reference electrode positioning producing stacked, one-dimensional microelectrode arrays of working electrodes and coupled reference electrodes. This work was performed in the clean-room environment of the Scottish Microelectronics Centre

LEADERSHIP & WORK EXPERIENCE

TREASURER | ECS Student Chapter
ECS | 2021-2023 | New York, NY

- Key leadership position organizing and running events pertaining to electrochemistry

EXECUTIVE COMMITTEE - TREASURER | Graduate Student Council
CCNY | Academic Year 2019-2020 | New York, NY

- Created budgets to fund all graduate clubs on campus, and host a graduate student symposium
- Reworked all budgeting to match the new financial conditions brought by the COVID-19 pandemic

TEACHING ASSISTANT FOR THERMODYNAMICS I & II | Department of Chemical Engineering
CCNY | Spring 2020-Spring 2022 | New York, NY

- Delivered lectures to classes and performed weekly recitations to class of 75 people
- Addressed concerns and questions of the class through individual emails and Zoom calls
- Reevaluted teaching approach due to the COVID-19 pandemic, utilizing virtual media

TECHNICAL SPECIALIST | Genius Bar
Apple Inc. | 2014-2017 | Edinburgh, U.K.

- Troubleshooted customer issues and performed device repairs
- Aligned with customers, establishing mutual empathy to de-escalate situations

AWARDS AND FELLOWSHIPS

242ND ELECTROCHEMICAL SOCIETY MEETING TRAVEL AWARD
ECS | October 2022 | Atlanta, GA

GLOBAL NMR TWITTER CONFERENCE 2022 POSTER AWARD
Global NMR Discussions | August 2022 | Twitter

ROCKY MOUNTAIN CONFERENCE (RMC) ON MAGNETIC RESONANCE TRAVEL AWARD
RMC | July 2022 | Copper Mountain, CO

EXPERIMENTAL NUCLEAR MAGNETIC RESONANCE CONFERENCE TRAVEL AWARD
ENC | April 2022 | Orlando, FL

GROVE SCHOOL OF ENGINEERING FELLOWSHIP
CCNY | Academic Year 2020-2021 | New York, NY

ACRIVOS FELLOWSHIP
CCNY | Academic Year 2018-2019 | New York, NY

LANGUAGES

SPOKEN & WRITTEN
English - Native
German - Intermediate

PROGRAMMING
Matlab, Python - Proficient
HTML - Basic

REFERENCES

PROF. RAPHAËLE CLÉMENT
University of California, Santa Barbara
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Santa Barbara, CA 93106, USA
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PROF. JUCHEN GUO
University of California, Riverside
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PUBLICATIONS

[1] Leo W. Gordon, Rahul Jay, Ankur L. Jadhav, Snehal S. Bhalekar, and Robert J. Messinger. Elucidating Consequences of Selenium Crystallinity on Its Electrochemical Reduction in Aluminum–Selenium Batteries. ***ACS Materials Letters***, pages 2577–2581, May 2024.

[2] James T. Bamford, Seamus D. Jones, Nicole S. Schauser, Benjamin J. Pedretti, Leo W. Gordon, Nathaniel A. Lynd, Raphaële J. Clément, and Rachel A. Segalman. Improved Mechanical Strength without Sacrificing Li-Ion Transport in Polymer Electrolytes. ***ACS Macro Letters***, pages 638–643, May 2024.

[3] Theresa Schoetz, Loleth E. Robinson, Leo W. Gordon, Sarah A. Stariha, Celia E. Harris, Hui Li Seong, John-Paul Jones, Erik J. Brandon, and Robert J. Messinger. Elucidating the Role of Electrochemically Formed LiF in Discharge and Aging of Li-CF_x Batteries. ***ACS Applied Materials & Interfaces***, 16:18722–18733, Apr 2024.

[4] Oi Man Leung, Leo W. Gordon, Robert J. Messinger, Themis Prodromakis, Julian A. Wharton, Carlos Ponce de León, and Theresa Schoetz. Solid Polymer Electrolytes with Enhanced Electrochemical Stability for High-Capacity Aluminum Batteries. ***Advanced Energy Materials***, 2303285, Jan 2024.

[5] Brendan E. Hawkins, Theresa Schoetz, Leo W. Gordon, Surabh KT, Jonah Wang, and Robert J. Messinger. Reversible Zinc Electrodeposition at −60 °C Using a Deep Eutectic Electrolyte for Low-Temperature Zinc Metal Batteries. ***The Journal of Physical Chemistry Letters***, 14(9):2378–2386, Mar 2023.

[6] Leo W. Gordon, Jonah Wang, and Robert J. Messinger. Revealing impacts of electrolyte speciation on ionic charge storage in aluminum-quinone batteries by NMR spectroscopy. ***Journal of Magnetic Resonance***, 348:107374, Mar 2023.

[7] Atanu Roy, Theresa Schoetz, Leo W. Gordon, Hung-Ju Yen, Qingli Hao, and Daniel Mandler. Formation of a CoMn-Layered Double Hydroxide/Graphite Supercapacitor by a Single Electrochemical Step. ***ChemSusChem***, e202201418, Aug 2022.

[8] Leo W. Gordon, Ankur L. Jadhav, Mikhail Miroshnikov, Theresa Schoetz, George John, and Robert J. Messinger. Molecular-Scale Elucidation of Ionic Charge Storage Mechanisms in Rechargeable Aluminum–Quinone Batteries. ***The Journal of Physical Chemistry C***, 126:14082–14093, Aug 2022.

[9] Jian Zhang, Jiayan Shi, Leo W. Gordon, Nastaran Shojarazavi, Xiaoyu Wen, Yifan Zhao, Jianjun Chen, Chi-Cheung Su, Robert J. Messinger, and Juchen Guo. Performance Leap of Lithium Metal Batteries in $LiPF_6$ Carbonate Electrolyte by a Phosphorus Pentoxide Acid Scavenger. ***ACS Applied Materials & Interfaces***, 14:36679–36687, Aug 2022.

[10] Rahul Jay, Ankur L. Jadhav, Leo W. Gordon, and Robert J. Messinger. Soluble Electrolyte-Coordinated Sulfide Species Revealed in Al–S Batteries by Nuclear Magnetic Resonance Spectroscopy. ***Chemistry of Materials***, 34:4486–4495, May 2022.

[11] T. Schoetz, L.W. Gordon, S. Ivanov, A. Bund, D. Mandler, and R.J. Messinger. Disentangling faradaic, pseudocapacitive, and capacitive charge storage: A tutorial for the characterization of batteries, supercapacitors, and hybrid systems. ***Electrochimica Acta***, 412:140072, Feb 2022.

CONFERENCE PRESENTATIONS

EXPERIMENTAL NUCLEAR MAGNETIC RESONANCE (ENC) CONFERENCE | April 2024
"Spatially Resolved NMR Methods for Determination of Solute Partitioning," Experimental Nuclear Magnetic Resonance Conference (ENC), 7-11 April, 2024, Asilomar, CA.

EXPERIMENTAL NUCLEAR MAGNETIC RESONANCE (ENC) CONFERENCE | April 2023
"Impacts of Electrolyte Speciation on Ion Binding Environments in Aluminum-Quinone Batteries Elucidated by Dipolar-Mediated and Multiple-Quantum Solid-State NMR Methods," Experimental Nuclear Magnetic Resonance Conference (ENC), 16-20 April, 2023, Asilomar, CA.

BATTERY & ENERGY STORAGE (BES) CONFERENCE | October 2022
"Impacts of Electrolyte Speciation on Aluminum-Organic Battery Charge Storage," Battery and Energy Storage (BES) Workshop, 26-28 October, 2022, New York, NY.

ELECTROCHEMICAL SOCIETY (ECS) MEETING | October 2022
"Understanding Improved Lifetimes of Lithium-Metal Batteries $LiPF_6$ Carbonate Electrolyte Modified by Phosphorus Pentoxide," Electrochemical Society (ECS) Meeting, 9-13 October, 2022, Atlanta, GA.

GLOBAL NMR TWITTER CONFERENCE | August 2022
"Electrochemical Complexation of Polyatomic Aluminum Ions to Heterogeneous Organic Electrode Samples Investigated Using Solid-State Dipolar-Mediated NMR Methods," Global NMR Twitter Conference, 3-5 August, 2022, Virtual.

ROCKY MOUNTAIN CONFERENCE (RMC) ON MAGNETIC RESONANCE | July 2022
"Electrochemical Complexation of Polyatomic Aluminum Ions to Heterogeneous Organic Electrode Samples Investigated Using Solid-State Dipolar-Mediated NMR Methods," Rocky Mountain Conference on Magnetic Resonance (RMC), 25-29 July, 2022, Copper Mountain, CO.

EXPERIMENTAL NUCLEAR MAGNETIC RESONANCE (ENC) CONFERENCE | April 2022
"Molecular Structures of Reaction Products in $LiPF_6$ Carbonate Electrolyte with a Phosphorous Pentoxide Scavenger for Rechargeable Lithium Metal Batteries," Experimental Nuclear Magnetic Resonance Conference (ENC), 24-29 April, 2022, Orlando, FL.

AMERICAN INSTITUTE FOR CHEMICAL ENGINEERS (AICHE) CONFERENCE | November 2021
"Charge Storage Mechanisms of Quinone- & Flavin-Type Organic Electrodes for Rechargeable Aluminum Batteries Elucidated with Molecular-level Specificity," AIChE Annual Meeting, 7-12 November, 2021, Boston, MA.

ELECTROCHEMICAL SOCIETY (ECS) MEETING | October 2021
"Electrochemical Complexation of Polyatomic Aluminum Cations in Quinone-type Organic Battery Electrodes Revealed by Solid-state NMR," Electrochemical Society (ECS) Meeting, 10-14 October, 2021, Virtual.

EXPERIMENTAL NUCLEAR MAGNETIC RESONANCE (ENC) CONFERENCE | March 2021
"Molecular-level Insights into the Charge Storage Mechanisms of Rechargeable Aluminum-Indanthrone Quinone Batteries Revealed by Solid-state NMR Spectroscopy," Experimental Nuclear Magnetic Resonance Conference (ENC), 29-31 March, 2021, Virtual.

BATTERY & ENERGY STORAGE (BES) CONFERENCE | October 2020
"Molecular-level Investigation into the Charge-storage Mechanisms of Rechargeable Aluminum-organic Batteries," Battery and Energy Storage (BES) Workshop, 21-23 October, 2020, Virtual.

ELECTROCHEMICAL SOCIETY (ECS) MEETING | October 2020
"Molecular-Scale Understanding of Charge Storage Mechanisms in Organic Positive Electrode Materials for Rechargeable Aluminum Batteries," Electrochemical Society (ECS) Meeting, 4-9 October, 2020, Virtual.

BATTERY & ENERGY STORAGE (BES) CONFERENCE | October 2019
"Rechargeable Aluminum Batteries Using Organic Cathode Materials with High Cycle Life and Capacity," Battery and Energy Storage (BES) Workshop, 21-22 October, 2019, New York, NY.