Eli Hoenig elihoenig@manchester.ac.uk · Google Scholar

Research Focus

Suspended 2D materials and heterostructures; nanofabrication; ion gating, transport and coupled electronic- electrochemical phenomena.

Research Appointments

2024–present	**University of Manchester** Postdoctoral Researcher, Condensed Matter Physics (Lozada-Hidalgo group), National Graphene Institute
2018–2023	**University of Chicago** Graduate Student, Pritzker School of Molecular Engineering (Liu group)
2017–2018	**National Institute of Standards and Technology (Boulder)** Research Associate, Fiber Sources and Applications (Newbury group)
2016–2017	**Williams College** Honors Undergraduate Researcher, Department of Physics (Majumdar group)

Education

2018–2023	**University of Chicago** PhD in Molecular Engineering Committee: Chong Liu (advisor), Giulia Galli and Paul Nealey
2013–2017	**Williams College** BA in Physics with Honors

Awards and Fellowships

2023 & 2020	First Place, AMEWS-EFRC PhD Presentation Award, Argonne National Laboratory
2021	Materials Research Center Fellowship, University of Chicago
2020	NSF GRFP Honorable Mention
2017	Nomination to Sigma Xi Research Honor Society, Williams College
2017	Purple Key Award, Williams College
2016	Summer Science Research Fellowship, Williams College
2016	NCAA D-1 All-American in Nordic Skiing
2015	Alumni Sponsored Internship Program Grant, Williams College
2013–2017	Dean's List, Williams College

Teaching and Leadership

2024–present	PhD student mentor, Condensed Matter Physics, University of Manchester
2021	Co-organizer, Early Career Journal Club, AMEWS-EFRC, Argonne National Laboratory
2020	Teaching assistant, "The Science, History, Policy and Future of Water", Pritzker School of Molecular Engineering, University of Chicago
2018–2019	Teaching assistant, "Honors Mechanics" and "Electricity and Magnetism", Department of Physics, University of Chicago
2017	Captain, Williams College Nordic Ski Team
2015–2016	Tutor, "Electricity and Magnetism", "Newtonian Mechanics", "Principles of Modern Physics", Math and Science Resource Center, Williams College

CONFERENCE TALKS

2023	Ion Transport in MoS_2 Nanochannels (invited), EFRC-Hub PI meeting (virtual)
2022	Mechanisms of Selective Ion Transport in Layered MoS_2 and Graphene Oxide, MRS Fall Meeting, Boston
2022	Controlling the Structure of Restacked Two-Dimensional Materials for Ion-Selective Separations, MRS Spring Meeting, Honolulu
2020	Desalination with Laminar MoS_2 Membranes, EFRC annual review, Argonne National Laboratory
2017	A Precise Measurement of the Electric Quadrupole Amplitude in the $6s^2 6p^2\ 3P^0 \rightarrow 3P^2$ Transition in Pb — Poster, DAMOP Spring Meeting, Sacramento
2017	Precise Measurements of Atomic Structure in Heavy Atoms Using Vapor Cell Spectroscopy — Poster, New England Section APS Meeting, MCLAs

SKILLS

- *Nanofabrication* – dry and wet etching, photolithography, e-beam lithography, 2D transfer of vdW heterostructures, PVD/PECVD/CVD
- *Characterization* – AFM (peak-force, tapping, liquid), Raman/PL, FIB/SEM/TEM, XRD
- *Electronic and electrochemical measurement* – Keithley 2600-series SMUs, Zurich Instruments lock-in amplifiers, Bio-Logic potentiostats
- *Data and control* – Python (QCodes, NumPy, SciPy, pandas, Matplotlib), LabVIEW, MATLAB; automated instrument control, fitting, and modeling

PUBLICATIONS

Z. Liu, Y. Tan, J. Qian, M. Cao, **E. Hoenig**, *et al.* "Robust and tuneable ion selectivity in vermiculite membranes intercalated with unexchangeable ions," *Nature Communications* (accepted)

Y.-C. Soong, H. Li, Y. Fu, J. Tong, S. Huang, X. Zhang, E. Griffin, **E. Hoenig**, *et al*. "Mechanism of the electrochemical hydrogenation of graphene," *Nature Communications* (accepted)

M. Wang, Q. Xiong, X. Yue, G. Yan, Y. Han, Z. Lyu, Z. Li, L. Sun, **E. Hoenig**, *et al*. "Cooperative and inhibitory transport in functionalized angstrom-scale two-dimensional channels," *Nature Communications,* 2025

E. Hoenig, *et al*. "In situ generation of (sub) nanometer pores in MoS_2 membranes for ion selective transport," *Nature Communications*, 2024

M. Wang, Q. Xiong, M. Wang, N. Lewis, D. Ying, G. Yan, **E. Hoenig**, *et al*. "Lanthanide transport in angstrom-scale MoS_2-based two-dimensional channels," *Science Advances*, 2024.

M. Wang, T. Sadhukhan, N. Lewis, M. Wang, X. He, G. Yan, D. Yin, **E. Hoenig**, *et al*. "Anomalously enhanced ion transport and uptake in functionalized angstrom-scale two-dimensional channels," *Proceedings of the National Academy of Sciences*, 2024.

J. Ip, Q. Gao, K. Nguyen, C. Yan, G. Yan, **E. Hoenig**, *et al*. "Preservation of Topological Surface States in Millimeter-Scale Transferred Membranes," *Nano Letters*, 2024.

G. Yan, G. Kim, R. Yuan**, E. Hoenig**, *et al*. "The role of solid solutions in iron phosphate-based electrodes for selective electrochemical lithium extraction," *Nature communications*, 2022.

M. Wang, X. He, **E. Hoenig**, G. Yan, G. Peng, *et al*. "Tuning transport in graphene oxide membrane with single-site copper (II) cations," *iScience*, 2022.

J. Wang, Z. Jiang, G. Peng, **E. Hoenig**, *et al*. "Surface valence state effect of MoO_{2+x} on electrochemical nitrogen reduction," *Advanced Science*, 2022.

E. Barry, … **E. Hoenig**, *et al*. "Advanced materials for energy-water systems: the central role of water/solid interfaces in adsorption, reactivity, and transport," *Chemical Reviews,* 2021.

A. Suresh, G. Hill*, **E Hoenig***, and C. Liu. "Electrochemically mediated deionization: a review," *Molecular Systems Design & Engineering*, 2021.

E. Hoenig, *et al*. "Controlling the structure of MoS_2 membranes via covalent functionalization with molecular spacers," *Nano Letters*, 2020

J. Friedlein, E. Baumann, K. Briggman, G. Colacion, F. Giorgetta, A. Goldfain, D. Herman, **E. Hoenig**, *et al*. "Dual-comb photoacoustic spectroscopy," Nature Communications, 2020.

E. Baumann, **E. Hoenig**, *et al*. "Dual-comb spectroscopy with tailored spectral Broadening in Si_3N_4 nanophotonics," *Optics Express*, 2019.

C. Alden, S. Coburn, R. Wright, E. Baumann, K. Cossel, E. Perez, **E. Hoenig**, *et al*. "Single blind quantification of natural gas leaks from 1 km distance using frequency combs," *Environmental Science & Technology*, 2019.

D. Maser, **E. Hoenig**, *et al*. "High-precision measurement and *ab initio* calculation of the (6s2 6p2) 3P0 → 3P2 electric-quadrupole-transition amplitude in Pb^{208}," *Physical Review A*, 2019.