

# JONATHAN MELVILLE

CHEMISTRY PH.D. CANDIDATE, MASSACHUSETTS INSTITUTE OF TECHNOLOGY

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## SUMMARY

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- Inorganic electrochemist specializing in sustainable routes to commercially-valuable small molecules
- 7+ years of experience in materials synthesis, characterization, and electroanalytic chemistry
- Compelling scientific communicator with publications in high-impact peer-reviewed scientific journals and presentations at prestigious international conferences
- Extensive and successful volunteer history in educational advocacy and student leadership

## EDUCATION

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<b>MASSACHUSETTS INSTITUTE OF TECHNOLOGY</b> <b>Ph.D. Chemistry</b> <i>Thesis: Sustainable Electrocatalytic Methods for Small Molecule Activation</i>	<i>Cambridge, MA</i> <b>Aug. 2016—May 2021</b> <i>(expected)</i>
<b>THE UNIVERSITY OF CALIFORNIA, BERKELEY</b> <b>B.S. Chemistry, High Honors</b> <i>Thesis: Synthesis and Characterization of Metal-Organic Frameworks for Gas Storage &amp; Separations</i>	<i>Berkeley, CA</i> <b>Aug. 2012—May 2016</b>

## RESEARCH EXPERIENCE

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<b>Graduate Researcher</b> , Massachusetts Institute of Technology <i>Adviser: Prof. Yogesh SURENDRANATH</i> → Optimized and explicated high-temperature electroreduction of metaphosphates to white phosphorus. → Discovered high-efficiency copper nitride catalyst activity for electroreduction of nitrogen to ammonia. → Innovated industrial product separations scheme for electrochemical methane gas-to-liquid reactors.	<i>Cambridge, MA</i> <b>Oct. 2016—present</b>
<b>Undergraduate Researcher</b> , University of California, Berkeley <i>Adviser: Prof. Jeffrey R. LONG</i> → Synthesized novel photoconductive MOF for chemiresistive detection of gaseous hydrocarbons. → Applied rational design principles to augment MOF CH <sub>4</sub> storage capacity by alkyl functionalization. → Enhanced MOF synthetic yield, framework porosity, and crystal structure using air-free techniques.	<i>Berkeley, CA</i> <b>Nov. 2013—Jun. 2016</b>

## SELECTED ACADEMIC PUBLICATIONS

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Aubrey, M.L.; Kapelewski, M.T.; **Melville, J.F.**; Oktawiec, J.; Presti, D.; Gagliardi, L.; Long, J.R. Chemiresistive detection of gaseous hydrocarbons and interrogation of charge transport in Cu[Ni(2,3-pyrazinedithiolate)<sub>2</sub>] by gas adsorption. *J. Am. Chem. Soc.*, **2019**, *141*, 5005-5013.

Jackson, M.N.; Kaminsky, C.J.; Oh, S.; **Melville, J.F.**; Surendranath, Y.. Graphite Conjugation Eliminates Redox Intermediates in Molecular Electrocatalysis. *J. Am. Chem. Soc.*, **2019**, *141*, 14160-14167.

**Melville, J.F.**; Licini, A.J.; Surendranath, Y. Graphite is a Robust Electrocatalyst for the Efficient Electroreduction of Molten Condensed Phosphate Salts to White Phosphorus. *In preparation*.

## SELECTED ACADEMIC PRESENTATIONS

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“Short-circuiting the Phosphorus Economy: Electrochemical Reduction of Metaphosphate Salts to Elemental P<sub>4</sub>” *Bridging Scales in Electrochemical Materials and Methods Applied to Organic and Inorganic Chemistry, Catalysis, Energy and Biology*, Electrochemistry Gordon Research Conference, Ventura, CA, January 2020.

“Electrochemical Phosphorus Processing” *African Sustainable Development Workshop*, Université Mohammed VI Polytechnique—MIT Research Program, Cambridge, MA, October 2019.

“Electrocatalytic Ammonia Synthesis for Distributed Agriculture” *Annual Research Symposium*, MIT Tata Center, Cambridge, MA, April 2019.

“Metal-Organic Frameworks for Photoelectrics and Gas Storage/Separations” *National Meeting and Exposition: Computers in Chemistry*, American Chemical Society, San Diego, CA, March 2016.

## LEADERSHIP, PEDAGOGY, & COMMUNITY ADVOCACY

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- Graduate Resident Advisor**, MIT Division of Student Life **Aug. 2017—present**  
→ Supported 40 undergraduates in MIT’s East Campus dorm as a mental health paraprofessional.  
→ Hosted events, counseled individual students, and provided community care through various hall crises.  
→ Appointed to student advocacy positions on Title IX oversight and mental health reform committees.
- Member, Committee for Student Life**, MIT Division of Student Life **Aug. 2018—June 2020**  
→ Advised upon and oversaw implementation of institute-wide student mindfulness initiatives.
- Chair, Housing & Community Affairs**, MIT Graduate Student Council **Jul. 2018—Jun. 2019**  
→ Oversaw supercommittee of grad student dorm governments and mediated with MIT administration.  
→ Implemented pilot programs to increase student housing stability and reduce dorm vacancy rates.
- Teaching Assistant**, MIT Department of Chemistry **Aug. 2016—Jun. 2017**  
→ Led recitation sections for 5.112 (advanced general chemistry) and 5.12 (organic chemistry).

## VOLUNTEERISM & EXTRACURRICULAR WORK

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- Volunteer Alumnus**, Department of Energy National Science Bowl **Apr. 2010—present**  
→ Wrote questions and administered regional & national science competitions for grade 6-12 students.  
→ Engaged students and parents, providing direct academic mentorship and promoting STEM education.

- Web Developer**, Freelance **Sep. 2013—present**  
→ Worked with clients to design accessible research websites for recruitment and science communication.  
→ Syncretized dynamic front-end frameworks to build unique & responsive virtual scientific profiles.

### Portfolio:

Schreier Group	UW Madison	<a href="http://engineered-interfaces.org">engineered-interfaces.org</a>
Pai Lab	UMass Medical School	<a href="http://pai-lab.org">pai-lab.org</a>
Surendranath Group	MIT	<a href="http://interphases.org">interphases.org</a>
Center for Gas Separations	Department of Energy	<a href="http://cchem.berkeley.edu/co2efrc/">cchem.berkeley.edu/co2efrc/</a>
Long Group	UC Berkeley	<a href="http://alchemy.cchem.berkeley.edu">alchemy.cchem.berkeley.edu</a>

## INSTRUMENTATION AND TECHNICAL SKILLS

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- Instrumentation skills:* NMR (incl. solid-state, MAS), IR (ATR/FTIR), UV/Vis, XAS (EXAFS, XANES, RIXS), XPS, MS (GC-, ICP-), porosimetry, TGA, XRD (single-crystal, powder)
- Electroanalytical methods:* voltammetry (CV/LSV/stripping analysis), Tafel analysis, capacitive ECSA determination, chronopotential/ampereometry, rotating-electrode (RDE, RRDE)
- Synthetic techniques:* air-free chemistry (glovebox, Schlenk), bulk electrolysis
- Software proficiencies:* Scifinder/Reaxys, Demeter suite (Athena/Artemis), FEFF, Python, MATLAB, HTML/CSS, JavaScript/jQuery, Linux, L<sup>A</sup>T<sub>E</sub>X

## AWARDS & HONORS

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2020	<b>Diversity, Equity, and Inclusion Fellow</b> , MIT Office of Graduate Education	Cambridge, MA
2019	<b>J-WAFS Seed Grant Winner</b> , Abdul Latif Jameel Water and Food Systems Lab	Cambridge, MA
2018	<b>Tata Fellow</b> , MIT Tata Center for Technology and Design	Cambridge, MA
2016	<b>Honorable Mention</b> , National Science Foundation Graduate Research Fellowship	Berkeley, CA
2016	<b>Senior Undergraduate Research Award</b> , UC Berkeley College of Chemistry	Berkeley, CA
2016	<b>Dean’s Honor List</b> , UC Berkeley College of Chemistry	Berkeley, CA
2013	<b>Dean’s Honor List</b> , UC Berkeley College of Chemistry	Berkeley, CA
2012	<b>Eagle Scout</b> , San Francisco Bay Area Council	Fremont, CA