

# Brandon Wood

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CONTACT INFORMATION	1 Cyclotron Rd Berkeley, CA 94720 USA	<i>e-mail:</i> <a href="mailto:bwood@lbl.gov">bwood@lbl.gov</a>
EDUCATION	<b>Ph.D. — University of California, Berkeley</b> Applied Science and Technology (AS&T) — Emphasis in Applied Physics Dissertation: Structural Insights for Molecular Design of Conjugated Molecules and Polymers Advisor: Kristin A. Persson	<b>2013 - 2019</b>
	<b>M.S. — University of Minnesota</b> Microbial Engineering Advisor: Ken Valentas	<b>2010 - 2012</b>
	<b>B.S. — University of Minnesota Duluth</b> Biology with Chemistry Minor Degree Honor: Magna Cum Laude	<b>2005 - 2009</b>
SKILLS	<ul style="list-style-type: none"><li>• Simulation and multiscale modeling of molecules and materials: <a href="#">Code</a></li><li>• High-throughput quantum chemistry: <a href="#">Code</a></li><li>• Open-source collaborative programming: <a href="#">Code</a></li><li>• Machine learning: <a href="#">Code</a></li><li>• Programming languages: Python, C++, Mathematica</li><li>• Python packages: NumPy, SciPy, Pandas, Jupyter, PyTorch, scikit-learn, Keras</li></ul>	
RESEARCH EXPERIENCE	<b>NERSC, Lawrence Berkeley National Lab</b> <i>NESAP for Learning Postdoctoral Fellow, PI: Jack Deslippe</i> Deep learning for molecular systems on NERSC's high performance computing resources. <ul style="list-style-type: none"><li>• Hyperparameter optimization of a crystal graph CNN for catalysis materials</li><li>• Inverse design of catalysts using a variational autoencoder</li></ul>	<b>2019 - Present</b>
	<b>Persson Group, Lawrence Berkeley National Lab</b> <i>Graduate Student Researcher, PI: Kristin A. Persson</i> Quantum calculations and molecular modeling of ion and electron conducting polymers for electrochemical applications. <ul style="list-style-type: none"><li>• Modeling conjugated polymer structure as a function of doping and excitation</li><li>• Atomistic MD simulations of polymer electrolytes</li><li>• Development of high-throughput framework for quantum calculations</li></ul>	<b>2014 - 2019</b>
	<b>Doyle Group, University of California Berkeley</b> <i>Graduate Student Researcher, PI: Fiona Doyle</i> Experimental research on electrochemical double layer capacitors. <ul style="list-style-type: none"><li>• Materials characterization of a variety of carbon materials</li><li>• Fabrication and electrochemical characterization of pouch cell capacitors</li></ul>	<b>2013 - 2014</b>
	<b>Valentas Group, University of Minnesota</b>	<b>2010 - 2012</b>

*Graduate Research Assistant, PI: Ken Valentas*

Development of a symbiotic process that combines thermochemistry and microbiology to upgrade a liquid waste stream from the corn ethanol industry.

- Operation and analysis of thermochemical and microbial experiments
- Statistical design of experiments

PROFESSIONAL  
EXPERIENCE

**Biotechnology Institute, University of Minnesota**

**2012 - 2013**

*Assistant Scientist*

Exploration of the physical, chemical, and biological properties of the materials generated from thermochemical and microbial processing of low value liquid streams.

- Testing the utility of materials for uses as additives, filters, sorbents, and electrodes
- Communicating with academic and industrial partners

**Biogenic Reagents, Minneapolis Based Startup**

**Fall 2012**

*Consultant*

Design and management of demonstration-scale testing of renewable carbon materials at a coal-fired power plant in Marquette, MI.

PUBLICATIONS

**Wood, B.M.**; Forse, A.C.; Persson, K.A.; Aromaticity as a Guide to Planarity in Conjugated Molecules and Polymers. *J. Phys. Chem. C* **2020**. Preprint DOI: [10.1021/acs.jpcc.0c01064](https://doi.org/10.1021/acs.jpcc.0c01064)

He, C.; Christensen, P.R.; Seguin, T.J.; Dailing, E.A.; **Wood, B.M.**; Walde, R.K.; Persson, K.A.; Russell, T.P.; Helms, B.A. Conformational Entropy as a Means to Control the Behavior of Poly (diketoenamine) Vitrimers In and Out of Equilibrium. *Angew. Chem. Int. Ed.* **2020**, 59, 2, 735-739, DOI: [10.1002/anie.201912223](https://doi.org/10.1002/anie.201912223)

**Wood, B.M.**; Shin, Y.; Persson, K.A.; Torsional and Conformational Changes in Doped and Excited Conjugated Polymers. Resubmission to *Proceedings of the National Academy of Sciences of the United States of America* in preparation, preprint available upon request.

Fong, K.D.; Self, J.; Diederichsen, K.M.; **Wood, B.M.**; McCloskey, B.D.; Persson, K.A. Ion Transport and the True Transference Number in Nonaqueous Polyelectrolyte Solutions for Lithium-Ion Batteries. *ACS Cent. Sci.* **2019**, 5, 1250-1260, DOI: [10.1021/acscentsci.9b00406](https://doi.org/10.1021/acscentsci.9b00406)

Rajput, N.N.; Seguin, T.J.; **Wood, B.M.**; Qu, X.; Persson, K.A. Elucidating Solvation Structures for Rational Design of Multivalent Electrolytes - A Review. *Top. Curr. Chem.* **2018**, 376, 19, DOI: [10.1007/s41061-018-0195-2](https://doi.org/10.1007/s41061-018-0195-2)

Self, J.; **Wood, B.M.**; Rajput, N.N.; Persson K.A. The Interplay between Salt Association and the Dielectric Properties of Low Permittivity Electrolytes: The Case of LiPF<sub>6</sub> and LiAsF<sub>6</sub> in Dimethyl Carbonate. *J. Phys. Chem. C* **2018**, 122 (4), 1990-1994, DOI: [10.1021/acs.jpcc.7b11060](https://doi.org/10.1021/acs.jpcc.7b11060)

Mathew, K.; Montoya, J.H.; Faghaninia, A.; Dwarakanath, S.; Aykol, M.; Tang, H.; Chu, I.; Smidt, T.; Bocklund, B.; Horton, M.; Dagdelen, J.; **Wood, B.**; Liu, Z.; Neaton, J.; Ong, S.P.; Persson, K.; Jain, A. Atomate: A high-level interface to generate, execute, and analyze computational materials science workflows. *Comput. Mater. Sci.* **2017**, 139, 140-152, DOI: [10.1016/j.commatsci.2017.07.030](https://doi.org/10.1016/j.commatsci.2017.07.030)

Delgado, P.A.; Brutman, J.P.; Masica, K.; Molde, J.; **Wood, B.M.**; Hillmyer, M.A. High Surface

Area Carbon Black (BP-2000) as a Reinforcing Agent for Poly[(2)-lactide]. *J. Appl. Polym. Sci.* **2016**, 133 (45), 43926 DOI: [10.1002/app.43926](https://doi.org/10.1002/app.43926)

Vozhdayev, G.V.; Spokas, K.A.; Molde, J.S.; Heilmann, S.M.; **Wood, B.M.**; Valentas, K.J. Response of Maize Germination and Growth to Hydrothermal Carbonization Filtrate Type and Amount. *Plant Soil* **2015**, 396, 127–136 DOI: [10.1007/s11104-015-2577-3](https://doi.org/10.1007/s11104-015-2577-3)

Heilmann, S.M.; Molde, J.S.; Timler, J.G.; **Wood, B.M.**; Mikula, A.L.; Vozdayev, G.V.; Colosky, E.C.; Spokas, K.A.; Valentas, K.J. 2014. Phosphorus Reclamation through Hydrothermal Carbonization of Animal Manures. *Environ. Sci. Technol.* **2014**, 48, 10323–10328 DOI: [10.1021/es501872k](https://doi.org/10.1021/es501872k)

**Wood, B.M.**; Jade, L.R.; Schendel, F.J.; Hahn, N.J.; Valentas, K.J.; McNamara, P.J.; Novak, P.J.; Heilmann, S.M. Industrial Symbiosis: Corn Ethanol Fermentation, Hydrothermal Carbonization, and Anaerobic Digestion. *Biotechnol. Bioeng.* **2013**, 110 (10), 2624-2632 DOI: [10.1002/bit.24924](https://doi.org/10.1002/bit.24924)

#### PATENTS

Schendel, F.J.; Keitz, M.V.; Valentas, K.J.; Heilmann, S.M.; Jader, L.R.; **Wood, B.M.** Methods of producing coal and fertilizers from fermentation residues, US Patent Application US 13/967,523, filed August 2013

Heilmann, S.M.; Schendel F.J.; Von Keitz, M.G.; Valentas, K.J.; Mikula, A.L.; **Wood, B.M.** Hydrothermal carbonization of sewage wastes. US Patent Application PCT/US2013/029842, filed March 2013

#### CONFERENCE PRESENTATIONS

**Wood, B.M.**; Shin, Y.; Persson, K.A. Structural changes in doped and excited conjugated polymers. Berkeley Statistical Mechanics Meeting 2019 Berkeley, CA.

**Wood, B.M.**; Shin, Y.; Persson, K.A. Modeling Chain Configurations of Conjugated Polymers as a Function of Charge Concentration. American Physical Society March Meeting 2017 New Orleans, LA.

**Wood, B.M.**; Shin, Y.; Persson, K.A. Modeling Chain Configurations of Conjugated Polymers. Berkeley Statistical Mechanics Meeting 2017 Berkeley, CA.

**Wood, B.M.**; Mathew, K.; Persson, K.A. Developing Computational Resources for the Study of Multivalent Polymer Electrolyte Systems. Polymer Physics Gordon Conference 2016 Mount Holyoke College in South Hadley, MA.

#### ACTIVITIES

Founded <a href="#">Earth Action Initiative</a>	<b>2016 - 2018</b>
Taught energy literacy in Oakland elementary school with <a href="#">SEED</a>	<b>2013 - 2016</b>
University of Minnesota Duluth Football	<b>2005 - 2009</b>