

# LAUREN RAE MCCULLOUGH

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## EDUCATION

- Northwestern University** Evanston, IL  
Ph.D. Candidate Chemical & Biological Engineering 2017 (expected)  
Area of study: reaction engineering & heterogeneous catalysis
- Pennsylvania State University, Schreyer Honors College** University Park, PA  
B.S. with Honors in Chemical Engineering 2012  
Minor in Environmental Engineering

## RESEARCH EXPERIENCE

- Northwestern University** Evanston, IL  
Ph.D. Researcher, Dept. Chemical & Biological Engineering 2012-current
- Adviser: Professor Justin M. Notestein
  - Thesis topic: Structure-function relationships for conversion of C2 substrates to industrially relevant products on group VI transition metal sulfide catalysts.
  - Synthesized and characterized broad range of metal sulfide materials.
  - Assembled and operated high pressure batch and atmospheric pressure flow reactor systems.
  - Communicated progress and results monthly via teleconference to contacts at the research sponsor, the Dow Chemical Company, with formal presentations biannually during site visits.
- Humboldt-Universität zu Berlin** Berlin, Germany  
Visiting Scholar, Dept. Inorganic Chemistry Sep. – Dec. 2014
- Adviser: Professor Christian Limberg
  - Synthesized and characterized novel molybdenum(V, VI) thiacalixarene complexes via standard air-free techniques.
  - Continued a cross-disciplinary and cross-cultural scientific exchange with the intention of fostering future collaborations.
- Pennsylvania State University** University Park, PA  
Undergraduate Researcher, Dept. Chemical Engineering 2010-2012
- Adviser: Professor Darrell Velegol
  - Immobilized *Moringa oleifera* antimicrobial protein on sand in an innovative water clarification system for implementation in developing communities.
  - Applied spectrophotometry, microscopy, BOD and COD measurements, spiral plating, streak plating, protein isolation, and live/dead staining to study the seed/sand system.

## SKILLS

Technical: Air-free inorganic synthesis, nuclear magnetic resonance (NMR), x-ray diffraction (XRD), x-ray photoelectron spectroscopy (XPS), temperature programmed reduction (TPR), diffuse reflectance infrared Fourier transform spectroscopy (DRIFTS), gas chromatography with mass spectrometry/flame ionization detector/thermal conductivity detector (GC-MS/FID/TCD), x-ray absorption spectroscopy (XAS) – done at Argonne National Laboratory, high pressure/high temperature batch reactor assembly/operation, high temperature flow reactor assembly/operation

Computer: Microsoft Excel, Matlab, ChemDraw, Crystal Structure Database (CSD), WinXAS, Athena, MestReNova, Reaxys, Sci-Finder

## LEADERSHIP DEVELOPMENT

### Mentoring & Management

Northwestern University

- Mentored a summer graduate student in catalysis research. Instructed the student in proper laboratory technique, the scientific method, and provided opportunities for career development based on the student's goals and interests.
- Led the in-lab segment of CHE 355 Chemical Product Design. Developed experimental protocols based on the students desired project outcomes, instructed the students on proper laboratory technique, and ensured proper data analysis.
- Managed the chemical inventory for a catalysis lab group and functioned as the lab contact for new material syntheses and reactions.

### Engineering Leadership Development Program

Pennsylvania State University

- Studied global team formation and collaboration in engineering through classroom instruction from diverse faculty and professionals in the field.
- Applied classroom lessons through collaboration with Hungarian business students at Corvinus University in Budapest, Hungary to develop a plan for a water treatment system for a small community in Haiti.
- Utilized classroom learning to overcome the challenges associated with cross-cultural, remote collaboration including trust building, accountability, and clarification of expectations.

### Resident Assistant

Schreyer Honors College, Pennsylvania State University

- Utilized ongoing training in communication, diversity, and interpersonal relations to build community and resident satisfaction for 60 undergraduate students.
- Employed crisis management skills to emergency situations such as suicide intervention, bomb threat evacuation, and medical emergencies.

## PUBLICATIONS & PRESENTATIONS

- McCullough, Lauren R.; Childers, David J.; Kilos, Beata A.; Barton, David G.; Weitz, Eric; Kung, Harold H.; Notestein, Justin M.; "Structure-function relationships of acceptorless dehydrogenative coupling of ethanol to ethyl acetate over MoS<sub>2</sub>-based catalysts," (in preparation).
- McCullough, Lauren R.; Childers, David J.; Watson, Rachel A.; Kilos, Beata A.; Barton, David G.; Weitz, Eric; Kung, Harold H.; Notestein, Justin M.; "Acceptorless dehydrogenative coupling of neat alcohols using Group VI sulfide catalysts," (submitted).
- McCullough, Lauren R.; Watson, Rachel A.; Kilos, Beata A.; Barton, David G.; Weitz, Eric; Kung, Harold H.; Notestein, Justin M.; "Group VI Sulfides for Acceptorless Dehydrogenative Coupling of Ethanol to Ethyl Acetate." 251<sup>st</sup> American Chemical Society National Meeting, San Diego, March 2016.
- McCullough, Lauren R.; Kilos, Beata A.; Barton, David G.; Notestein, Justin M.; "Studies of Metal Sulfides for Ethanol Carbonylation to Propionates." 24<sup>th</sup> North American Catalysis Society Meeting, Pittsburgh, June 2015.
- Jerri, Huda A., Adolfsen, Kristin J., McCullough, Lauren R., Velegol, Darrell, Velegol, Stephanie B. "Anti-microbial sand via adsorption of cationic Moringa oleifera protein," *Langmuir*, **28**, 2262-2268 (2012).