

# Stephen M. Meckler

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## Education

- University of California, Berkeley, CA** 2013 – present  
Ph. D. Physical Chemistry Cumulative GPA: 3.843  
Research Advisor: Doctor Brett Helms
- The Pennsylvania State University, State College, PA** 2009 – 2013  
B.S. with High Distinction and Honors in Chemistry Cumulative GPA: 3.94  
Research Advisor: Professor Ayusman Sen  
Thesis Title: *Salt Triggered Detection and Polymer Deposition: Towards the Repair of Microcracks*

## Research Experience

- University of California, Berkeley, Graduate Student Researcher** 2014 – Present  
Polymer/Metal-Organic Framework (MOF) Composites: Fabricated sub-micron MOF layers on porous polymer supports through the chemical conversion of sacrificial zinc oxide nanocrystals. Developed design rules for controlling the MOF film thickness and morphology. Imaged composites using scanning electron microscopy and characterized the films using synchrotron grazing incidence X-ray diffraction and X-ray absorption near edge structure spectroscopy. Customizing a membrane testing apparatus to measure the permeability and selectivity of gas separation membranes fabricated using this materials platform.
- The Pennsylvania State University, Undergraduate Researcher** 2011 – 2013  
Healing Polymers: Developed a process to transport emulsified healing agents into damage sites on a polymer surface. Emulsion motion, triggered by electrolyte leaching from the damaged polymer, was studied using optical microscopy. Crack repair was monitored with variable pressure SEM.
- NASA Jet Propulsion Laboratory, USRP Intern** 2012  
Spectroscopy of Water Ices: Identified spectroscopic signatures in UV/VIS/IR spectra of cryogenic water ice mixtures germane to the Jovian moon Europa. Deposited thin films of gaseous water/SO<sub>2</sub> mixtures onto a cryogenic stage under ultra-high vacuum and studied their spectral signatures from 10 to 150 K. Temperature dependent shifts in the spectra were correlated to crystallinity of the mixtures, providing context for interpreting existing remote sensing data.
- University of California, Berkeley, NSF REU Intern** 2011  
Negative Capacitance in Thin Films: Characterized the temperature dependent capacitance – voltage characteristics of bilayer perovskite ferroelectric-dielectric heterostructures. Compared experimental results to theory to identify negative capacitance behavior.

## Science Communication

- Alphabet Energy, Inc. Consultant** 2015  
Advised Alphabet Energy on the best global markets for low cost, high efficiency thermoelectrics based on current markets, regulatory factors, and energy costs. Collaborated with a team of MBAs as part of the Berkeley Energy & Resources Collaborative Innovation Solutions program.
- Energy Frontier Research Center (EFRC) Early Career Network, Representative** 2015 – Present  
Facilitates collaboration between early career members of the Center for Gas Separations Relevant to Clean Energy Technologies and members of other EFRCs nationwide by organizing group events and meet-ups.

## Teaching

### University of California, Berkeley

*General Chemistry Graduate Student Instructor*

Fall 2013, Spring 2015, Spring 2016

Led recitations and laboratory sections teaching the fundamentals of chemistry and experimental techniques. Responsibilities included maintaining a safe laboratory, lecturing, holding office hours, and grading lab reports, exams, and homework.

### The Pennsylvania State University

Spring 2011

*Organic Chemistry Laboratory Teaching Assistant*

Conducted a weekly laboratory course with 17 students. Taught basic organic chemistry synthesis, characterization, and safety. Graded laboratory reports and held weekly office hours.

## Publications

Maserati, L.; **Meckler, S. M.**; Li, C.; Helms, B. A. Minute-MOFs: Ultrafast Synthesis of  $M_2(\text{dobpdc})$  Metal-Organic Frameworks from Divalent Metal Oxide Colloidal Nanocrystals. *Chem. Mater.* **2016**, *28*, 1581-1588.

**Meckler, S. M.**; Li, C.; Queen, W. L.; Williams, T. E.; Long, J. R.; Buonsanti, R.; Milliron, D. J.; Helms, B. A. Sub-Micron Polymer-Zeolitic Imidazolate Framework Layered Hybrids via Controlled Chemical Transformation of Naked ZnO Nanocrystal Films. *Chem. Mater.* **2015**, *27*, 7673-7679.

Yadav V.; Pavlick, R.A.; **Meckler, S. M.**; Sen, A. Triggered Detection and Deposition: Towards the Repair of Microcracks. *Chem. Mater.* **2014**, *26*, 4647-4652.

## Presentations

“Layered Polymer-ZIF Composites Fabricated Using Sacrificial Metal-Oxide Nanocrystal Precursors.” Meckler, S. M.; Li, C.; Queen, W. L.; Williams, T. E.; Long, J. R.; Buonsanti, R.; Milliron, D. J.; Helms, B. A. Presented at the American Chemical Society Spring Meeting, San Diego, CA, March 2016.

“Metal-Organic Framework Coatings on Polymer Surfaces Accessed through the Dissolution-Precipitation of Metal Oxide Nanocrystal Precursors.” Meckler, S. M.; Li, C.; Queen, W. L.; Long, J.; Milliron, D. J.; Helms, B. A. Presented at the Materials Research Society Spring Meeting & Exposition, San Francisco, April 2015.

“Layered ZIF-Polymer Hybrid Membranes for  $\text{CO}_2/\text{N}_2$  Separation.” Meckler, S. M.; Li, C.; Helms, B. A. Graduate Research Conference seminar series, University of California, Berkeley, February 2015.

## Technical Skills

**Synthesis:** Schlenk-line and glove-box techniques for small molecule, nanocrystal, MOF and polymer synthesis

**Analytical Techniques:** Scanning electron microscopy of soft materials, profilometry, powder X-ray diffraction, thermogravimetric analysis,  $^1\text{H}$  and  $^{13}\text{C}$  nuclear magnetic resonance spectroscopy, infrared and ultraviolet spectroscopy, and gas chromatography

**Synchrotron Characterization:** Grazing incidence wide angle X-ray scattering and quantitative X-ray absorption spectroscopy

**Materials Processing:** Spin coating and thin film liftoff

**Computer Proficiencies:** Very experienced in Microsoft Office, Adobe Photoshop and Illustrator, computer assembly, and use of Mac and Windows systems, proficient in Origin graphing and data analysis software

## Honors and Awards

- Schreyer Honors College Academic Excellence Scholarship
- 3M Summer Fellowship
- Cenani and Patricia Ozmeral Honors Scholarship in Science
- Fleming-Meyer Analytical Chemistry Award
- Anthony J. and Heand Johns Silvestri Scholarship in Chemistry
- Bruce V. and Elsa Ottinger Weidner Scholarship in Analytical Chemistry