

# Michael P. Campos

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## EDUCATION

<b>Columbia University, Ph.D., M.Phil., M.A., Chemistry</b> <i>Tunable libraries of thio- and selenourea precursors to metal chalcogenide quantum dots</i> Advisor: Prof. Jonathan S. Owen	2012–2017 (expected)
Edith and Eugene Blout Fellow (awarded to 1 of 20 students in class)	2013
Dean's Fellow (highest honor upon admission)	2012
<b>Northwestern University, B.A., Chemistry</b> <i>Quantifying accessible sites and reactivity on titania-silica (photo)catalysts</i> Advisors: Profs. Justin M. Notestein (Chemical Engineering) and Kimberly A. Gray (Environmental Engineering) Concentration: Materials and Nanotechnology, Minor: Environmental Policy and Culture J.G. Nolan Scholar, A. Norman Freeman Scholar (merit- and need-based scholarships)	2008–2012    2009, 2010

## PUBLICATIONS AND PATENTS

- Campos, M. P.**, Hendricks, M. P., Beecher, A. N., Walravens, W., Swain, R. A., Cleveland, G. T., Hens, Z., Sfeir, M. Y., Owen, J. S., "A Library of Selenourea Precursors to PbSe Nanocrystals with Size Distributions Near the Homogeneous Limit," *Journal of the American Chemical Society*, **2017**, 139, 2296-2305.
- Campos, M. P.**, Owen, J. S., "Synthesis and Surface Chemistry of Cadmium Carboxylate Passivated CdTe Nanocrystals from Cadmium *bis*(Phenyltelluroate)," *Chemistry of Materials*, **2016**, 28, 227-233.
- Hendricks, M. P., **Campos, M. P.**, Cleveland, G. T., Jen-La Plante, I., Owen, J. S., "A tunable library of substituted thiourea precursors to metal sulfide nanocrystals," *Science*, **2015**, 348, 1226-1230.  
Featured in:
  - "Economical routes to colloidal nanocrystals," *Science*, 2015, 348, 1211-1212.
  - "New synthesis heralds low-cost quantum dots," *Chemistry World*, June 12<sup>th</sup>, 2015.
- Hendricks, M. P., **Campos, M. P.**, Owen, J. S., "Methods of producing metal sulfides, metal selenides, and metal sulfides/selenides having controlled particle size." Application filed June 26<sup>th</sup>, 2015.
- Hendricks, M. P., **Campos, M. P.**, Cleveland, G. T., Jen-La Plante, I., Owen, J. S., "Substituted Thiourea Precursors To Metal Sulfide Nanoparticles Including Nanocrystals." Application filed June 11<sup>th</sup>, 2015.
- Hendricks, M. P., **Campos, M. P.**, Owen, J. S., "Processes for Preparing Compositionally Graded Nanostructured Materials from Sulfur and Selenium Compounds." Application filed January 15<sup>th</sup>, 2015.
- Eaton, T. R., **Campos, M. P.**, Gray, K. A., Notestein, J. M., "Quantifying accessible sites and reactivity on titania-silica (photo)catalysts: Refining TOF calculations," *Journal of Catalysis*, **2014**, 309, 156-165.
- Hamachi, L. S., Jen-La Plante, I., Graham, A. G., Cleveland, G. T., **Campos, M. P.**, Owen, J. S., "Kinetic Control of CdS Nanocrystal Synthesis via a Library of Thiocarbonates, Thiocarbamates, and Thioureas," *In preparation*.
- Hamachi, L. S., Jen-La Plante, I., **Campos, M. P.**, Rreza, I., Owen, J. S. "Kinetic Control over Alloy Composition and Grading in CdSe<sub>1-x</sub>S<sub>x</sub> Nanocrystal Synthesis," *In preparation*.
- Campos, M. P.**, de Roo, J., Hamachi, L. S., Hendricks, M. P., Rreza, I., Owen, J. S., "Solute Concentrations and Nucleation Periods in IV-VI and II-VI Nanocrystal Synthesis," *In preparation*.

## RESEARCH EXPERIENCE

<b>Ph.D. Candidate, Columbia University</b> Advisor: Prof. Jonathan S. Owen	2012–present
<ul style="list-style-type: none"><li>Designed and developed libraries of chalcogenourea precursors to colloidal metal chalcogenide nanocrystals (ME; M = Pb, Cd, Ni, Cu, Zn, Sn; E = S, Se), where rational substituent modification tunes the conversion kinetics, number of crystals, and crystal dimensions at full conversion.</li><li>Applied rigor of inorganic synthesis to colloidal CdTe nanocrystal synthesis and characterization.</li><li>Optimized and scaled syntheses of organic precursors, metal complexes, and colloidal nanocrystals.</li><li>Led and contributed to successful collaborations involving 4 professors, 2 DOE staff scientists, and many colleagues, resulting in publications and a grant to develop QD-based LEDs.</li><li>Built and analyzed datasets containing hundreds of experiments with interdependent variables.</li><li>Held lab leadership roles including safety officer, group job coordinator, synthesis sub-group leader. Trained and advised up to 4 undergraduates simultaneously.</li><li>Developed automated robotic synthesis and characterization protocol at The Molecular Foundry.</li></ul>	

**Summer Researcher, Columbia University**

Advisor: Prof. Luis M. Campos

2012

*Project: Synthesis and functionalization of diblock copolymers for magnetic alignment*

- Synthesized and characterized block copolymers comprising poly(methyl methacrylate), polyacrylic acid, and functionalized polystyrenes.

**Research Assistant, Northwestern University**

2011–2012

Advisors: Profs. Justin M. Notestein (Chem. Engineering) and Kimberly A. Gray (Env. Engineering)

- Designed, synthesized, and tested TiO<sub>2</sub>-SiO<sub>2</sub> nanocomposites as photo-oxidation and photoreduction catalysts. Authored publication in 4-member team.
- Won \$3,000 sustainability research grant (awarded to 11 students university-wide).

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**LECTURES**

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**National Conferences**

1. "Understanding the nucleation and growth of colloidal quantum dots," American Crystallographic Association National Meeting, New Orleans, LA. May 2017 (scheduled).
2. "Understanding Nanocrystal Nucleation and Growth Using Tunable Precursor Libraries," Gordon Research Seminar on Colloidal Semiconductor Nanocrystals, West Dover, VT. July 30<sup>th</sup>, 2016. *Invited presentation.*
3. "Synthesis and Surface Chemistry of Cadmium Carboxylate Passivated CdTe Nanocrystals from Cadmium bis(Phenyltelluroate)," American Chemical Society (ACS) National Meeting and Exposition, San Diego, CA. March 17<sup>th</sup>, 2016.
4. "Tunable Libraries of Substituted Thiourea and Selenourea Precursors to Metal Chalcogenide Nanocrystals," ACS National Meeting and Exposition, San Diego, CA. March 16<sup>th</sup>, 2016.
5. "Addressing Challenges in Nanocrystal Synthesis Using Substituted Thiourea and Selenourea Precursors," ACS National Meeting and Exposition, Boston, MA. August 18<sup>th</sup>, 2015.
6. "Substituted Selenoureas: Efficient and Tunable Metal Selenide Nanocrystal Precursors," ACS National Meeting and Exposition, San Francisco, CA. August 10<sup>th</sup>, 2015.

**Columbia University**

7. "Synthesis and Surface Chemistry of Cadmium Carboxylate Passivated CdTe Nanocrystals from Cadmium bis(Phenyltelluroate)," Friday Synthesis Symposium. May 6<sup>th</sup>, 2016.
8. "Addressing Challenges in Nanocrystal Synthesis Using Tunable Precursor Platforms," Friday Synthesis Symposium. May 1<sup>st</sup>, 2015.
9. "Atomic Structure" and "Natural Resonance Theory," CHEM G4071: Graduate Level Inorganic Chemistry. September 8<sup>th</sup>/10<sup>th</sup>, 2014.
10. "Nanocrystals Week I: Better Ingredients, Better Nanocrystals," Moments in Materials Seminar. July 31<sup>st</sup>, 2014.
11. "The Mechanical Bond," Moments in Materials Seminar. June 13<sup>th</sup>, 2013.

**Northwestern University**

12. "TiO<sub>2</sub>-SiO<sub>2</sub> Nanocomposites for Solar Fuel Production." Undergraduate Research and Arts Exposition, Northwestern University. May 21<sup>st</sup>, 2012.
13. "Comparative Study of TiO<sub>2</sub>-SiO<sub>2</sub> Nanocomposites for Solar Fuel Production." Chicago Area Undergraduate Research Symposium. March 3<sup>rd</sup>, 2012.

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**SELECTED LEADERSHIP, WORK, AND VOLUNTEER EXPERIENCE**

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**Department of Chemistry, Columbia University**

2012–present

- Co-founded popular seminar series, "Moments In Materials," (30+ weekly attendance) connecting chemistry, physics, and several engineering departments.
- Budgeted and organized monthly happy hours and yearly barbecue for 200 people as Department Co-Social Chair.

**Teaching Assistant, Columbia University**

2012–2014

- Led weekly recitation/laboratory sections, gave occasional guest lectures, led large (200+ student) review sessions, wrote and graded problem sets/exams. Classes taught:
  - Organic Chemistry (Dr. Anna Ghurbanyan)
  - Advanced Inorganic Chemistry (Prof. Jonathan Owen, 2 semesters)
  - General Chemistry I (Prof. Gerard Parkin)
  - General Chemistry II (Profs. Laura Kaufman and Ruben Gonzalez)

**Outreach, New York, NY**

- Girls' Science Day at Columbia University 2012–2016
  - Led experiments for middle school girls on topics including nanoparticles and polarity.

- TAG Young Scholar's Middle School 2013
  - Taught two classes of 30 students about dye-sensitized solar cells through a short lecture followed by a hands-on experiment making solar cells from berry juice.
- Cadmium Selenide Undergraduate Laboratory Module 2012
  - Developed quantum dot synthesis experiment in Owen Lab for engineering undergraduates with limited chemistry experience.
- Northwestern University Alumni Admissions Council 2012–present
  - Conducting 3-4 undergraduate admissions interviews per year.

**Concert Production, Northwestern University** 2011–2012

- Board member of 10,000-attendee, \$250,000 music festival (“Dillo Day”).
- Piloted first admissions restrictions in Dillo Day’s 40-year history, resulting in 30% reduction in police citations and 55% reduction in medical transports.
- Raised nearly \$40,000 from student groups and administration.

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**SKILLS**

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**Language:** English (native), Spanish (intermediate proficiency)

**Computer:** Data analysis and presentation (MS Office Suite, Igor, iMovie), large data set management, image analysis and modification (ImageJ, Adobe Illustrator, ChemDraw), basic Python.

**Laboratory:** Absorbance and fluorescence spectroscopies, 1D and 2D NMR spectroscopy, mass spectrometry, electron microscopy, advanced X-ray techniques, gel permeation chromatography, gas adsorption isotherms, advanced inorganic and organic synthesis and purification techniques, airfree technique, glove box maintenance, use of highly toxic and pyrophoric compounds.

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**STUDENT RESEARCH MENTORSHIPS**

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Brandon McMurtry 2016

- Synthesis of InP nanocrystals from tunable phosphine precursors.
- Currently pursuing Ph.D. in Owen Group.

Gregory Cleveland 2015–2016

- Synthesis of thiourea precursors to metal sulfide nanocrystals. Received several honors in recognition of his work.
- Currently pursuing Ph.D. as NSF fellow with Alex Radosevich (MIT Chemistry).

Aidan Graham 2014–2016

- Synthesis of thiocarbonate and thiocarbamate precursors to metal sulfide nanocrystals.
- Currently at Pacific Light Technologies (Portland, OR).

Robert Swain 2014–2016

- Synthesis of selenourea precursors for metal selenide nanocrystal synthesis.
- Currently pursuing Ph.D. at Université Toulouse (Toulouse, France).

Rajat Chandra (Chemical Engineering) 2015

- Design and construction of flow reactors for nanocrystal synthesis.

Rebecca Siegelman (Chemical Engineering) 2013–2014

- Synthesis of biocompatible gold nanorods.
- Currently pursuing Ph.D. with Jeff Long (UC Berkeley Chemistry).

Leslie Hamachi 2013

- Synthesis of voltage-sensitive nanocrystals for Stark effect measurement and neuroimaging.
- Currently pursuing Ph.D. in Owen Group.

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**ABOUT ME**

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From Rockville, MD • National Club Baseball Association Player of the Week (134 teams in league) • Two-time Brooklyn Half-Marathon finisher (2015, 2016) • Part-time private tutor • Tuna steak enthusiast