SIDNEY E. CREUTZ

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Education

California Institute of Technology *Fall 2010 – Feb. 2016*
Ph.D in Chemistry
Thesis Advisor: Prof. Jonas Peters
Thesis: *Design, Synthesis, and Study of Novel Platforms for Iron-N_2 Chemistry and Photoinduced, Copper-mediated C-N Bond Formation*

Massachusetts Institute of Technology *Fall 2006 - Spring 2010*
B.S. in Chemistry
Minor in Materials Science and Engineering
Thesis Advisor: Prof. Christopher Cummins
Thesis: *Synthesis and Reactivity of Tris(enolate) Phosphine Ligands on Niobium*

Positions and Experience

Assistant Professor (Mississippi State University, Department of Chemistry) *July 2019-present*
Research focused on inorganic, bioinorganic, and materials chemistry with applications in energy and synthesis.

Postdoctoral Researcher with Professor Daniel Gamelin (University of Washington) *March 2016-present*
Development of new synthetic strategies to access colloidal nanocrystal materials, including doped semiconductor nanocrystals and metal halide perovskites; focused on materials with potential applications in photovoltaics and optoelectronics, and on the use of post-synthetic modification strategies to access challenging targets.

Graduate Research Assistant: Professor Jonas Peters (Caltech) *Jan. 2011 – March 2016*
Organometallic and organic synthesis, including the development and mechanistic studies of the first photoinduced copper-catalyzed coupling reactions, the study of temperature-dependent spin state manipulation of iron complexes, the development of the second known iron catalyst for N_2 fixation to ammonia, and inorganic model studies to elucidate the mechanism of biological nitrogen fixation.

Publications

1. **Creutz, S. E.**; Liu, H; Kaiser, M.; Li, X.; Gamelin, D. R. Structural diversity in cesium bismuth halide nanocrystals. *Submitted.*

2. De Siena, M. C.; Sommers, D.; **Creutz, S. E.;** Dunham, S. T.; Gamelin, D. R. Spinodal decomposition during anion exchange in colloidal Mn^{2+}-doped $CsPbX_3$ (X = Cl, Br) perovskite nanocrystals. *In preparation*.
3. **Creutz, S. E.**‡; De Siena, M. C.‡; Regan, A.; Malinowski, P.; Zhu, G.; De Yoreo, J. J.; Chu, J.-H.; Gamelin, D. R. Ferromagnetic nanoplatelets of CrX_3 (X = I, Br). *In preparation*. (‡ equal contribution)
4. Kroupa, D. M.; Roh, J. Y.; Milstein, T. J.; **Creutz, S. E**.; Gamelin, D. R. Quantum-cutting ytterbium-doped $CsPb(Cl_{1-x}Br_x)_3$ thin films with photoluminescence quantum yields over 190%. *ACS Energy Lett.* **2018**, *3*, 2390-2395.
5. **Creutz, S. E.;** Crites, E. N.; De Siena, M. C.; Gamelin, D. R. Anion exchange in cesium lead halide perovskite nanocrystals and thin films using trimethylsilyl halide reagents. *Chem. Mater.* **2018,** *30*, 4887-4891.
6. **Creutz, S. E.;** Crites, E. N.; De Siena, M. C.; Gamelin, D. R. Colloidal nanocrystals of lead-free double-perovskite (elpasolite) semiconductors: synthesis and anion exchange to access new materials. *Nano Lett.* **2018**, *18*, 1118-1123.
7. **Creutz, S. E.**; Fainblat, R.; Kim, Y.; De Siena, M. C.; Gamelin, D. R. A selective cation exchange strategy for the synthesis of colloidal Yb^{3+}-doped chalcogenide nanocrystals with strong broadband visible absorption and long-lived near-IR emission. *J. Am. Chem. Soc.* **2017**, *139*, 11814-11824.
8. Nelson, H.; Hinterding, S.; Fainblat, R.; **Creutz, S. E.**; Li, X.; Gamelin, D.R. Mid-gap states and normal vs inverted bonding in luminescent Cu^{+}- and Ag^{+}-doped CdSe nanocrystals. *J. Am. Chem. Soc.* **2017**, *139*, 6411-6421.
9. **Creutz, S.E**.; Peters, J.C. Exploring secondary-sphere interactions in FeN_xH_y complexes relevant to N_2 fixation. *Chem. Sci.* **2016**, *8*, 2321-2328.
10. **Creutz, S.E**.; Peters, J.C. Spin-state tuning at pseudo-tetrahedral d(6) ions: spin crossover in $[BP_3]$Fe(II)-X complexes. *Inorg. Chem.* **2016**, *55*, 3894-3906.
11. **Creutz, S.E**.; Peters, J.C. Diiron bridged-thiolate complexes that bind N_2 at the $Fe^{II}Fe^{II}$, $Fe^{II}Fe^{I}$, and $Fe^{I}Fe^{I}$ redox states. *J. Am. Chem. Soc.* **2015**, *137*, 7310-7313.
12. **Creutz, S.E**.; Peters, J.C. N_2 binding and catalytic reduction of N_2 to NH_3 by an Fe complex featuring a C_{alkyl}-atom anchor. *J. Am. Chem. Soc.* **2014***, 136*, 1105-1115.
13. Bissember, A.C.; Lundgren, R.J.‡; **Creutz, S.E**.‡; Peters, J.C.; Fu, G.C. Transition-metal catalyzed alkylations of amines with alkyl halides: Photoinduced, copper-catalyzed couplings of carbazoles. *Angew. Chem. Int. Ed.* **2013**, *125*, 5233-5237. (‡ equal contribution)
14. **Creutz, S.E**.‡; Lotito, K.J.‡; Fu, G.C.; Peters, J.C. Photoinduced Ullmann C-N Coupling: Demonstrating the Viability of a Radical Pathway. *Science* **2012**, *338*, 647-651. (‡ equal contribution)
15. **Creutz, S.E**.; Krummenacher, I.; Clough, C.R.; Cummins, C.C. A trigonal and hindered tertiary phosphine ligand rendered anionic by a niobate anchor: Formation of zwitterionic M(I) (M = Cu, Ag, Au, Rh) complexes. *Chem. Sci.* **2011**, *2*, 2166-2172.
16. Fox, A.R.; **Creutz, S.E**.; Cummins, C.C. A bimetallic uranium μ-dicarbide complex: synthesis, X-ray crystal structure, and bonding. *Dalton Trans.* **2010**, *39*, 6632-6634.

Patents

1. Gamelin, D. R.; Kroupa, D.; Roh, J. Y.; **Creutz, S. E.** *Highly emissive ytterbium-doped $CsPbCl_3$ polycrystalline thin films.* Provisional patent application filed April 2018.
2. Peters, J. C.; Anderson, J. S.; **Creutz, S. E.**; Rittle, J. D. *Catalytic Ammonia Synthesis by Transition Metal Molecular Complexes*. April 16 2015. 14/515,716.

Selected Presentations

1. Creutz, S.E.; Taylor, M.; Gamelin, D. R. "Colloidal nanocrystals and films with improved charge carrier mobilities: towards applications in flexible electronics." Intelligence Community Academic Research Symposium, Washington, D.C., September 2018 (Poster).
2. Creutz, S.E.; De Siena, M. C.; Crites, E. N.; Fainblat, R.; Kim, Y.; Gamelin, D. R. "Colloidal nanocrystals as a platform for the discovery and synthesis of new materials." Colloidal Semiconductor Nanocrystals Gordon Conference, Smithfield, RI, July 2018 (Poster).
3. Creutz, S.E.; De Siena, M. C.; Crites, E. N.; Fainblat, R.; Kim, Y.; Gamelin, D. R. "Colloidal nanocrystals as a platform for the discovery and synthesis of new materials." Inorganic Chemistry Gordon Conference, Biddeford, ME, June 2018 (Poster).
4. Creutz, S.E.; Peters, J.C. "Diiron μ-thiolate complexes that bind N_2 across multiple oxidation states: Towards new structural/functional models of nitrogenase." ACS National Meeting, Boston, MA, Aug. 19, 2015. (*Talk*).
5. Creutz, S.E.; Peters, J.C. "Tunable spin equilibria in four-coordinate iron trisphosphine phosphiniminato complexes." ACS National Meeting, Boston, MA, Aug. 19, 2015. (*Talk*).
6. Creutz, S.E.; Peters, J.C. "Design and synthesis of new iron complexes for nitrogen fixation." Gray-Hill Lecture Series, Occidental College, Jun. 19, 2015. (*Talk*).
7. Creutz, S.E.; Peters, J.C. "New ligand platforms for iron-dinitrogen chemistry." Inorganic Organometallics Seminar, Caltech, Mar. 13, 2015. (*Talk*).
8. Creutz, S.E.; Peters, J.C. "New Ligand Platforms for Iron-Dinitrogen Chemistry: More Inspiration from FeMoCo." SoCal Organometallics Meeting, Pasadena, CA, Feb. 22, 2015. (*Talk*).
9. Creutz, S.E.; Peters, J.C. "Ligand Design for Dinitrogen Binding and Functionalization at Iron." Inorganic Reaction Mechanisms Gordon Conference, Galveston, TX, Mar. 1-6, 2015. (*Poster*).
10. Creutz, S.E.; Peters, J.C. "Photoinduced, copper-catalyzed C-N Ullmann coupling." SoCal Inorganic Photochemistry Meeting, Two Harbors, CA, Sep. 26-28, 2014. (*Talk*).
11. Creutz, S.E.; Peters, J.C. "Investigating the Role of Secondary-Sphere Interactions in Iron-Nitrogen Chemistry." Iron-Sulfur Enzymes Gordon Research Conference, Stonehill, MA, Jun. 15-20, 2014. (*Poster*).
12. Creutz, S.E.; Peters, J.C. "Ligand Design for Iron-Catalyzed Nitrogen Fixation." Inorganic-Organometallics Seminar, Caltech, Apr. 11, 2014. (*Talk*).
13. Creutz, S.E.; Peters, J.C. "N_2 binding and catalytic reduction of N_2 to NH_3 by an Fe complex featuring a C_{alkyl}-atom anchor." Metals in Biology Gordon Research Conference and Bioinorganic Chemistry Gordon Research Seminar, Ventura, CA, Jan. 26-Feb. 2, 2014. (*Poster*).
14. **Selected poster talk.** Creutz, S.E.; Peters, J.C. "Binding, functionalization, and catalytic reduction of N_2 by iron in a tris(phosphino)alkyl scaffold." Gordon Research Seminar and Conference in Organometallic Chemistry, Newport, RI, July 6-12, 2013. (*Poster and talk).*

Awards and Fellowships

Intelligence Community Postdoctoral Fellowship, 2017
National Science Foundation Graduate Fellowship, 2010
Alpha Chi Sigma Award (MIT Chemistry Department award for seniors), 2010
Barry M. Goldwater Scholarship, 2009
ACS Analytical Chemistry Award (MIT Chemistry Department award for juniors), 2009
Sophomore Achievement Award (MIT Chemistry Department award for sophomores), 2008

Teaching Experience

Undergraduate Research Mentor (UW, 2016-present)
Mentored undergraduate students in research projects in the Gamelin lab; three students so far have achieved co-authorships on published or submitted papers.

Teaching Assistant, Physical Methods for Inorganic Chemistry (Ch153b, Caltech; Spring 2015)
Responsible for creating and grading problems sets and other assignments. Prepared and delivered two-hour lectures on magnetometry and tutorial on analysis of EPR and magnetometry data.

Teaching Assistant, Organometallic Chemistry (Ch154a, Caltech; Winter 2014)
Responsible for creating and grading problem sets and exams as well as weekly office hours.

Teaching Assistant, Physical Chemistry III: Statistical Thermodynamics (5.62, MIT; Spring 2010)
Responsible for one recitation lecture per week in addition to office hours and preparing and grading problem sets and exams.

Teaching Assistant, Principles of Chemical Science (5.112, MIT; Fall 2009)
Responsible for two one-hour recitation lectures per week in addition to office hours and preparing and grading problem sets and exams.

Professional Activities

Peer Reviewer
Journal of the American Chemical Society
Chemical Communications
Inorganic Chemistry
Dalton Transactions