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Professional Experience

Professor of Chemistry, University of Southern California	2016-Present
Joseph Meyerhoff Visiting Professor, Weizmann Institute of Science	2022
Inorganic Section Head, Department of Chemistry, University of Southern California	2021-Present
Vice Chair, Department of Chemistry, University of Southern California	2014-2021
Associate Professor of Chemistry, University of Southern California	2013-2016
Visiting Professor of Chemistry, Swiss Federal Institute of Technology Zurich	2014
Assistant Professor of Chemistry, University of Southern California	2007-2013
Postdoctoral Fellow, UCSB-MIT-Caltech Institute for Collaborative Biotechnologies	2005-2007
Graduate Researcher, Department of Chemistry, UC Berkeley	2000-2005
Undergraduate Researcher, Department of Chemistry, UC Irvine	1997-2000

Professional Preparation

B.S., Chemistry (<i>magna cum laude</i>), UC Irvine	2000
Honors thesis title: "New Polymer Precursors from Polyhedral Oligosilsesquioxane Frameworks"	
Advisor: Professor Frank J. Feher	
Ph.D., Chemistry, UC Berkeley	2005
Thesis title: "Design and Synthesis of Heterogeneous Catalysts and Catalyst Supports Derived from Molecular Precursors"	
Advisor: Professor T. Don Tilley	
Postdoctoral Fellow, Materials, UC Santa Barbara	2005-2007
Advisor: Professor Daniel E. Morse	

Honors & Awards

- Fellow, Royal Society of Chemistry, 2024
- USC Mentoring Award for Faculty Mentoring Graduate Students, 2023
- Phi Kappa Phi Faculty Recognition Award, 2021
- ACS Inorganic Nanoscience Award, 2020
- RCSA Singular Exceptional Endeavor of Discovery Award, 2020
- USC Mentoring Award for Faculty Mentoring Undergraduate Students, 2018
- RCSA Scialog® Collaborative Awards, 2014 & 2015
- Royal Society of Chemistry *Chemical Communications* Emerging Investigator, 2012
- Royal Society of Chemistry *Dalton Transactions* New Talent Honoree, 2012
- USC Raubenheimer Junior Faculty Award for Excellence in Teaching, Research & Service to the University, 2011
- Research Corporation for Science Advancement (RCSA) Cottrell Scholar Award, 2010
- National Science Foundation Graduate Research Fellowship, 2000
- Barry M. Goldwater Scholarship, 1998

- Phi Beta Kappa, 1998
- University of California Regents Scholarship, 1996

Professional Activities

- Associate Editor, *Inorganic Chemistry* (2023-present).
- Member of American Chemical Society (Division of Inorganic Chemistry), Materials Research Society, AAAS (Chemistry Section), Royal Society of Chemistry.
- Editorial advisory board member for *Chemistry of Materials* (ACS) 2014-2020 and *Inorganic Chemistry* (ACS) 2020-2022.
- Guest Editor, Virtual Issue on Inorganic Nanomaterials, *Inorganic Chemistry* (2022).
- *Ad hoc* referee for *ACS Applied Energy Materials*, *ACS Applied Engineering Materials*, *ACS Applied Materials & Interfaces*, *ACS Applied Nano Materials*, *ACS Energy Letters*, *ACS Nano*, *ACS Sustainable Chemistry & Engineering*, *ACS Omega*, *Advanced Materials*, *Advanced Functional Materials*, *Advanced Sustainable Systems*, *Angewandte Chemie International Edition*, *Applied Physics Letters*, *Chemical Communications*, *Chemical Reviews*, *Chemical Science*, *Chemical Society Reviews*, *Chemistry of Materials*, *Crystal Growth & Design*, *CrystEngComm*, *Dalton Transactions*, *Helvetica Chimica Acta*, *Inorganic Chemistry*, *Inorganic Chemistry Frontiers*, *Inorganica Chimica Acta*, *Journal of the American Chemical Society*, *Journal of Crystal Growth*, *Journal of the Electrochemical Society*, *Journal of Materials Chemistry A & C*, *Journal of Physical Chemistry C*, *Journal of Physical Chemistry Letters*, *Journal of Solid-State Chemistry*, *Langmuir*, *Physical Chemistry Chemical Physics*, *Progress in Photovoltaics*, *Nano Letters*, *Nanoscale*, *Nature Chemistry*, *Nature Communications*, *Reaction Chemistry & Engineering*, *Science*, *Science Advances*, and *Small*.
- *Ad hoc* and panel referee for NSF DMR, IIP, and CHE; *ad hoc* referee for DOE BES and panel referee for DOE EERE; *ad hoc* referee for AFOSR; *ad hoc* referee for ACS PRF; *ad hoc* referee for Research Corporation for Science Advancement (RCSA); *ad hoc* referee for NSFC/RGC (PRC/Hong Kong); *ad hoc* referee for Swiss Federal Laboratories for Materials Science and Technology (Switzerland); *ad hoc* referee for the Pazy Foundation (Israel); *ad hoc* referee for Austrian Academy of Sciences (Austria).
- Chaired symposia: Pacificchem (2010), ACS National Meeting (spring 2011), NSF-sponsored SusChEM Workshop (2012), XXIV International Materials Research Congress (2015), XXVI International Materials Research Congress (2017), ACS National Meeting (spring 2018), DOE Materials Chemistry PI Meeting (2018), XXVIII International Materials Research Congress (2019).
- Organized symposia: Inorganic Materials symposium for ACS WRM (2011), DIC symposium on Solution Processed Semiconductors for ACS National Meeting (spring 2015), DIC symposium for the ACS Award in the Chemistry of Materials for ACS National Meeting (spring 2015), DIC symposium on Inorganic Chemistry of Lead Halide Perovskites for ACS National Meeting (spring 2018), symposium on Materials and the Environment for XXVIII International Materials Research Congress (2019), DIC symposium on Tailored Precursor Design for Inorganic Material Synthesis for ACS National Meeting (fall 2023).
- Member of Board of Directors for Anton B. Burg Foundation (2015-present).
- ACS National Awards selection sub-committee chair (Inorganic Section, 3-year term), ACS Tolman Award selection committee chair (Southern California Section, 2-year term).
- External Advisory Committee member for School of Science at Hong Kong University of Science and Technology (2023-2026).
- External Review Committee member for Department of Chemistry at UC Riverside (2024).

Publications & Presentations

Key: Corresponding author(s) underlined; USC advised undergraduate, graduate, and postdoctoral student(s) asterisked*.

(a) Independent Peer Reviewed Journal Articles from USC – Manuscripts Submitted

- [1] Chairil, R.; Forsberg, A. P.*; Brutchey, R. L.; Malmstadt, N. High-Throughput Reaction Discovery for Cs-Pb-Br Nanocrystal Synthesis. **2024**, manuscript submitted.
- [2] Crans, K. D.*; Cohen, H.; Nehoray, A. A.*; Oron, D.; Kazes, M.; Brutchey, R. L. A Redox Active Ionic Liquid Surface Treatment for Healing CsPbBr₃ Nanocrystals. **2024**, manuscript submitted.

(b) Independent Peer Reviewed Journal Articles from USC – Manuscripts In Press or Published

- [3] Sun, Z.*; Mora Perez, C.; Prezhdo, O. V.; Brutchey, R. L. Colloidal AlInSe₂ (A = K, Rb, Cs) Nanocrystals with Tunable Crystal and Band Structures. *ACS Nanoscience Au* **2024**, manuscript in press.
- [4] Pan, B.; Madani, M. S.; Forsberg, A. P.*; Brutchey, R. L.; Malmstadt, N. Solvent Dependence of Ionic Liquid-Based Pt Nanoparticle Synthesis: Machine Learning-Aided In-Line Monitoring in a Flow Reactor. *ACS Nano* **2024**, *18*, 25542-25551.
- [5] Karadaghi, L. R.*; Williamson, E. M.*; To, A. T.; Forsberg, A. P.*; Crans, K. D.*; Perkins, C. L.; Hayden, S. C.; LiBretto, N. J.; Baddour, F. G.; Ruddy, D. A.; Malmstadt, N.; Habas, S. E.; Brutchey, R. L. Multivariate Bayesian Optimization of CoO Nanoparticles for CO₂ Hydrogenation Catalysis. *Journal of the American Chemical Society* **2024**, *146*, 14246-14259.
- [6] Kleinhanns, T.; Milillo, F.; Calcabrini, M.; Fiedler, C.; Horta, S.; Balazs, D.; Strumolo, M. J.*; Hasler, R.; Llorca, J.; Tkadletz, M.; Brutchey, R. L.; Ibañez, M. A Route to High Thermoelectric Performance: Solution-Based Control of Microstructure and Composition in Ag₂Se. *Advanced Energy Materials* **2024**, *14*, 2400408.
- [7] Pan, B.; Karadaghi, L. R.*; Brutchey, R. L.; Malmstadt, N. A Multistep, Multicomponent Extraction and Separation Microfluidic Route to Recycle Water-Miscible Ionic Liquid Solvents. *Industrial & Engineering Chemistry Research* **2024**, *63*, 489-497.
- [8] Williamson, E. M.*; Brutchey, R. L. Using Data-Driven Learning to Predict and Control the Outcomes of Inorganic Materials Synthesis. *Inorganic Chemistry* **2023**, *62*, 16251-16262. (most read article)
- [9] Karadaghi, L. R.*; Pan, B.; Baddour, F. G.; Malmstadt, N.; Brutchey, R. L. A Techno-Economic Approach to Guide the Selection of Flow Recyclable Ionic Liquids for Nanoparticle Synthesis. *RSC Sustainability* **2023**, *1*, 1861-1873.
- [10] Williamson, E. M.*; Sun, Z.*; Tappan, B. A.*; Brutchey, R. L. Predictive Synthesis of Copper Selenides using a Multidimensional Phase Map Constructed with a Data-Driven Classifier. *Journal of the American Chemical Society* **2023**, *145*, 17954-17964.
- [11] Crans, K. D.*; Bain, M.; Bradforth, S. E.; Oron, D.; Kazes, M.; Brutchey, R. L. The Surface Chemistry of Ionic Liquid-Treated CsPbBr₃ Quantum Dots. *Journal of Chemical Physics* **2023**, *158*, 174709.
- [12] Strumolo, M. J.*; Eremin, D. B.; Wang, S.; Mora Perez, C.; Prezhdo, O. V.; Figueroa, J. S.; Brutchey, R. L. Formation of a P₁₆²⁻ Ink from Elemental Red Phosphorus in a Thiol-Amine Mixture. *Inorganic Chemistry* **2023**, *62*, 6197-6201. (most read article)
- [13] Pan, B.; Karadaghi, L. R.*; Brutchey, R. L.; Malmstadt, N. Purification of Ionic Liquid Solvents in a Self-Optimizing, Continuous Microfluidic Process via Extraction of Metal Ions and Phase Separation. *ACS Sustainable Chemistry & Engineering* **2023**, *11*, 228-237.
- [14] Williamson, E. M.*; Sun, Z.*; Mora-Tamez, L.*; Brutchey, R. L. Design of Experiments for Nanocrystal Syntheses: A How-To Guide for Proper Implementation. *Chemistry of Materials* **2022**, *34*, 9823-9835.

- [15] Williamson, E. M.*; Ghrist, A.*; Karadaghi, L. R.*; Smock, S. R.*; Barim, G.*; **Brutchev, R. L.** Creating Ground Truth for Nanocrystal Morphology: A Fully Automated Pipeline for Unbiased Transmission Electron Microscopy Image Analysis. *Nanoscale* **2022**, *14*, 15327-15339.
- [16] Karadaghi, L. R.*; To, A. T.; Habas, S. E.; Baddour, F. G.; Ruddy, D. A.; **Brutchev, R. L.** Activating Molybdenum Carbide Nanoparticle Catalysts Under Mild Conditions Using Thermally Labile Ligands. *Chemistry of Materials* **2022**, *34*, 8849-8857.
- [17] Koskela, K. M.*; Mora Perez, C.; Eremin, D. B.; Evans, J. M.; Lewis, N. S.; Prezhdo, O. V.; **Brutchev, R. L.** Polymorphic Control of Solution Processed Cu_2SnS_3 Films with Thiol-Amine Ink Formulation. *Chemistry of Materials* **2022**, *34*, 8654-8663.
- [18] Chang, C.; Lee, S. H.; Spadaro, M. C.; Koskela, K. M.*; Kleinhanns, T.; Costanzo, T.; Arbiol, J.; **Brutchev, R. L.**; Ibáñez, M. Surface Functionalization of Surfactant-Free Particles: A Strategy to Tailor the Properties of Nanocomposites for Enhanced Thermoelectric Performance. *Angewandte Chemie, International Edition* **2022**, *61*, e202207002. (very important paper)
- [19] Cottingham, P.*; **Brutchev, R. L.** Temperature-Dependent Behavior in the Local Structure of BaTiO_3 Nanocrystals. *CrystEngComm* **2022**, *24*, 5400-5404. (HOT article)
- [20] Koskela, K. M.*; Quiton, S. J.; Sharada, S. M.; Williams, T. J.; **Brutchev, R. L.** Kinetics and Mechanistic Details of Bulk ZnO Dissolution Using a Thiol-Imidazole System. *Chemical Science* **2022**, *13*, 3208-3215.
- [21] Karadaghi, L. R.*; Madani, M. S.; Williamson, E. M.*; To, A. T.; Habas, S. E.; Baddour, F. G.; Schaidle, J. A.; Ruddy, D. A.; **Brutchev, R. L.**; Malmstadt, N. Throughput Optimization of Molybdenum Carbide Nanoparticle Catalysts in a Continuous Flow Reactor Using Design of Experiments. *ACS Applied Nano Materials* **2022**, *5*, 1966-1975.
- [22] Tappan, B. A.*; Crans, K. D.*; **Brutchev, R. L.** Formation Pathway of Wurtzite-Like $\text{Cu}_2\text{ZnSnSe}_4$ Nanocrystals. *Inorganic Chemistry* **2021**, *60*, 17178-17185.
- [23] Koskela, K. M.*; Strumolo, M. J.*; **Brutchev, R. L.** Progress of Thiol-Amine “Alkahest” Solutions for Thin Film Deposition. *Trends in Chemistry* **2021**, *3*, 1061-1073.
- [24] Koskela, K. M.*; Tadle, A. C.; Chen, K.; **Brutchev, R. L.** Solution Processing Cu_3BiS_3 Absorber Layers with a Thiol-Amine Solvent Mixture. *ACS Applied Energy Materials* **2021**, *4*, 11026-11031.
- [25] Smock, S. R.*; Alimento, R.; Mallikarjun Sharada, S.; **Brutchev, R. L.** Probing the Ligand Exchange of *N*-Heterocyclic Carbene-Capped Ag_2S Nanocrystals with Amines and Carboxylic Acids. *Inorganic Chemistry* **2021**, *60*, 13699-13706.
- [26] Tappan, B. A.*; Chu, W.; Mecklenburg, M.; Prezhdo, O. V.; **Brutchev, R. L.** Discovery of a Wurtzite-like $\text{Cu}_2\text{FeSnSe}_4$ Semiconductor Nanocrystal Polymorph and Implications for Related CuFeSe_2 Materials. *ACS Nano* **2021**, *15*, 13463-13474.
- [27] Tappan, B. A.*; Zhu, B.; Cottingham, P.*; Mecklenburg, M.; Scanlon, D. O.; **Brutchev, R. L.** Crystal Structure of Colloidally Prepared Metastable Ag_2Se Nanocrystals. *Nano Letters* **2021**, *21*, 5881-5887.
- [28] Williamson, E. M.*; Tappan, B. A.*; Mora-Tamez, L.*; Barim, G.*; **Brutchev, R. L.** Statistical Multi-Objective Optimization of Thiospinel CoNi_2S_4 Nanocrystal Synthesis via Design of Experiments. *ACS Nano* **2021**, *15*, 9422-9433.
- [29] Smock, S. R.*; Chen, Y.; Rossini, A. J.; **Brutchev, R. L.** The Surface Chemistry and Structure of Colloidal Lead Halide Perovskite Nanocrystals. *Accounts of Chemical Research* **2021**, *54*, 707-718.
- [30] Tabatabaei, K.; Sully, H. R.; Ju, Z.; Hellier, K.; Lu, H.*; Perez, C. J.; Newton, K. A.; **Brutchev, R. L.**; Bridges, F.; Carter, S. A.; Kauzlarich, S. M. Structural Insights on Microwave-Synthesized Antimony-Doped Germanium Nanocrystals. *ACS Nano* **2021**, *15*, 1685-1700.
- [31] Karadaghi, L. R.*; Malmstadt, N.; Van Allsburg, K. M.; **Brutchev, R. L.** Techno-Economic Analysis of Recycled Ionic Liquid Solvent Used in a Model Colloidal Platinum Nanoparticle Synthesis. *ACS Sustainable Chemistry & Engineering* **2021**, *9*, 246-253.

- [32] Tappan, B. A.*; **Brutchev, R. L.** Polymorphic Metastability in Colloidal Semiconductor Nanocrystals. *ChemNanoMat* **2020**, *6*, 1567-1588.
- [33] Tappan, B. A.*; Chen, K.; Lu, H.*; Mallikarjun Sharada, S.; **Brutchev, R. L.** Synthesis and Electrocatalytic HER Studies of Carbene-Ligated Cu_{3-x}P Nanocrystals. *ACS Applied Materials & Interfaces* **2020**, *12*, 16394-16401.
- [34] Tappan, B. A.*; Horton, M. K.; **Brutchev, R. L.** Ligand-Mediated Phase Control in Colloidal AgInSe₂ Nanocrystals. *Chemistry of Materials* **2020**, *32*, 2935-2945.
- [35] Koskela, K. M.*; Melot, B. M.; **Brutchev, R. L.** Solution Deposition of a Bournonite CuPbSbS₃ Semiconductor Thin Film from the Dissolution of Bulk Materials with a Thiol-Amine Solvent Mixture. *Journal of the American Chemical Society* **2020**, *142*, 6173-6179.
- [36] Chen, Y.; Smock, S. R.*; Flintguber, A. H.; Perras, F. A.; **Brutchev, R. L.**; **Rossini, A. J.** The Surface Termination of CsPbBr₃ Perovskite Quantum Dots Determined by Solid-State NMR Spectroscopy. *Journal of the American Chemical Society* **2020**, *142*, 6117-6127. (highly cited paper by Web of Science)
- [37] Wang, L.; Karadaghi, L. R.*; **Brutchev, R. L.**; **Malmstadt, N.** Self-Optimizing Parallel Millifluidic Reactor for Scaling Nanoparticle Synthesis. *Chemical Communications* **2020**, *56*, 3745-3748.
- [38] Smock, S. R.*; Tabatabaei, K.; Williams, T. J.; **Kauzlarich, S. M.**; **Brutchev, R. L.** Surface Coordination Chemistry of Germanium Nanocrystals Synthesized by Microwave-Assisted Reduction in Oleylamine. *Nanoscale* **2020**, *12*, 2764-2772.
- [39] **Baddour, F. G.**; Roberts, E. J.*; To, A. T.; Wang, L.; Habas, S. E.; Ruddy, D. A.; Bedford, N. M.; Wright, J.; Nash, C. P.; Schaidle, J. A.; **Brutchev, R. L.**; **Malmstadt, N.** An Exceptionally Mild and Scalable Solution-Phase Synthesis of Molybdenum Carbide Nanoparticles for Thermocatalytic CO₂ Hydrogenation. *Journal of the American Chemical Society* **2020**, *142*, 1010-1019. (highlighted in *C&EN*)
- [40] Greaney, M. J.*; Joy, J.; Combs, B. A.*; Das, S.; Buckley, J. J.*; **Bradforth, S. E.**; **Brutchev, R. L.** Effects of Interfacial Ligand Type on Hybrid P3HT:CdSe Quantum Dot Solar Cell Device Parameters. *Journal of Chemical Physics* **2019**, *151*, 074704.
- [41] Roberts, E. J.*; Karadaghi, L. R.*; Wang, L.; **Malmstadt, N.**; **Brutchev, R. L.** Continuous Flow Methods of Fabricating Catalytically Active Metal Nanoparticles. *ACS Applied Materials & Interfaces* **2019**, *11*, 27479-27502.
- [42] Mora-Tamez, L.*; Barim, G.*; Downes, C.; Williamson, E. M.*; Habas, S. E.; **Brutchev, R. L.** Controlled Design of Phase- and Size-tunable Monodisperse Ni₂P Nanoparticles in a Phosphonium-based Ionic Liquid through Response Surface Methodology (RSM). *Chemistry of Materials* **2019**, *31*, 1552-1560.
- [43] Cottingham, P.*; **Brutchev, R. L.** Depressed Phase Transitions and Thermally Persistent Local Distortions in CsPbBr₃ Quantum Dots. *Chemistry of Materials* **2018**, *30*, 6711-6716.
- [44] Barim, G.*; Smock, S. R.*; Antunez, P. D.*; Glaser, D.*; **Brutchev, R. L.** Phase Control in the Colloidal Synthesis of Well-Defined Nickel Sulfide Nanocrystals. *Nanoscale* **2018**, *10*, 16298-16306.
- [45] Smock, S. R.*; Williams, T. J.; **Brutchev, R. L.** Quantifying the Thermodynamics of Ligand Binding to CsPbBr₃ Quantum Dots. *Angewandte Chemie International Edition* **2018**, *57*, 11711-11715. (hot article; highlighted in *C&EN*)
- [46] Tappan, B. A.*; Barim, G.*; Kwok, J. C.*; **Brutchev, R. L.** Utilizing Diselenide Precursors Towards the Rationally Controlled Synthesis of Metastable CuInSe₂ Nanocrystals. *Chemistry of Materials* **2018**, *30*, 5704-5713.
- [47] Roberts, E. J.*; Read, C. G.; **Lewis, N. S.**; **Brutchev, R. L.** Phase Directing Ability of an Ionic Liquid Solvent for the Synthesis of Colloidal Ni₂P Nanocrystals. *ACS Applied Energy Materials* **2018**, *1*, 1823-1827.
- [48] McCarthy, C. L.*; **Brutchev, R. L.** Preparation of Electrocatalysts Using a Thiol-Amine Solution Processing Method. *Dalton Transactions* **2018**, *47*, 5137-5143.

- [49] McCarthy, C. L.*; **Brutchey, R. L.** Solution Deposited $\text{Cu}_2\text{BaSnS}_{4-x}\text{Se}_x$ from a Thiol-Amine Solvent Mixture. *Chemistry of Materials* **2018**, *30*, 304-308.
- [50] Tabatabaei, K.; Lu, H.*; Nolan, B. M.; Cen, X.; McCold, C. E.; Zhang, X.; **Brutchey, R. L.**; van Benthem, K.; Hihath, J.; Kauzlarich, S. Bismuth Doping of Germanium Nanocrystals through Colloidal Chemistry. *Chemistry of Materials* **2017**, *29*, 7353-7363.
- [51] McCarthy, C. L.*; Downes, C. A.; **Brutchey, R. L.** Room Temperature Dissolution of Bulk Elemental Ni and Se for Solution Deposition of a NiSe_2 HER Electrocatalyst. *Inorganic Chemistry* **2017**, *56*, 10143-10146.
- [52] Kunal, P.; Roberts, E. J.*; Riche, C. T.; Jarvis, K.; Malmstadt, N.; **Brutchey, R. L.**; Humphrey, S. M. Continuous Flow Synthesis of Rh and RhAg Alloy Nanoparticle Catalysts Enables Scalable Production and Improved Morphological Control. *Chemistry of Materials* **2017**, *29*, 4341-4350.
- [53] McCarthy, C. L.*; **Brutchey, R. L.** Solution Processing of Chalcogenide Materials Using Thiol-Amine “Alkahest” Solvent Systems. *Chemical Communications* **2017**, *53*, 4888-4902.
- [54] Barim, G.*; Cottingham, P.*; Zhou, S.*; Melot, B. C.; **Brutchey, R. L.** Investigating the Mechanism of Reversible Lithium Insertion into Anti-NASICON $\text{Fe}_2(\text{WO}_4)_3$. *ACS Applied Materials & Interfaces* **2017**, *9*, 10813-10819.
- [55] Lu, H.*; **Brutchey, R. L.** Tunable Room-Temperature Synthesis of Coinage Metal Chalcogenide Nanocrystals from *N*-Heterocyclic Carbene Synthons. *Chemistry of Materials* **2017**, *29*, 1396-1403.
- [56] Roberts, E. J.*; Habas, S. E.; Wang, L.; Ruddy, D. A.; White, E. A.; Baddour, F.; Griffin, M. B.; Schaidle, J. A.; Malmstadt, N.; **Brutchey, R. L.** High-Throughput Continuous Flow Synthesis of Nickel Nanoparticles for the Catalytic Hydrodeoxygenation of Guaiacol. *ACS Sustainable Chemistry & Engineering* **2017**, *5*, 632-639.
- [57] Margossian, T.; Culver, S. P.*; Larmier, K.; Zhu, F.; **Brutchey, R. L.**; Copérert, C. Composition-Dependent Surface Chemistry of Colloidal $\text{Ba}_x\text{Sr}_{1-x}\text{TiO}_3$ Perovskite Nanocrystals. *Chemical Communications* **2016**, *52*, 13791-13794.
- [58] Lu, H.*; Zhou, Z.; Prezhdo, O. V.; **Brutchey, R. L.** Elucidating the Dynamics and Energetics of the *N*-Heterocyclic Carbene-Nanocrystal Interface. *Journal of the American Chemical Society* **2016**, *138*, 14844-14847.
- [59] Culver, S. P.*; **Brutchey, R. L.** Lanthanide-Activated Scheelite Nanocrystal Phosphors Prepared by the Low-Temperature Vapor Diffusion Sol-Gel Method. *Dalton Transactions* **2016**, *45*, 18069-18073.
- [60] Cottingham, P.*; **Brutchey, R. L.** Compositionally Dependent Phase Identity of Colloidal $\text{CsPbBr}_{3-x}\text{I}_x$ Quantum Dots. *Chemistry of Materials* **2016**, *28*, 7574-7577.
- [61] Grabowski, C. A.; Fillery, S. P.; Koerner, H.; Tchoul, M.; Drummy, L.; Beier, C. W.*; **Brutchey, R. L.**; Durstock, M. F.; Vaia, R. A. Dielectric Performance of High Permittivity Nanocomposites: Impact of Polystyrene Grafting on BaTiO_3 and TiO_2 . *Nanocomposites* **2016**, *2*, 117-124.
- [62] McCarthy, C. L.*; Downes, C. A.; Schueller, E. C.*; Abuyen, K.*; **Brutchey, R. L.** Method for the Solution Deposition of Phase-Pure CoSe_2 as an Efficient HER Electrocatalyst. *ACS Energy Letters* **2016**, *1*, 607-611.
- [63] McCarthy, C. L.*; Cottingham, P.*; Abuyen, K.*; Schueller, E. C.*; Culver, S. P.*; **Brutchey, R. L.** Earth Abundant CuSbS_2 Thin Films Solution Processed from Thiol-Amine Mixtures. *Journal of Materials Chemistry C* **2016**, *4*, 6230-6233.
- [64] Zhou, S.*; Barim, G.*; Morgan, B. J.; Melot, B. C.; **Brutchey, R. L.** Influence of Rotational Distortions on Li^+ - and Na^+ -Intercalation in Anti-NASICON $\text{Fe}_2(\text{MoO}_4)_3$. *Chemistry of Materials* **2016**, *28*, 4492-4500.
- [65] Culver, S. P.*; **Brutchey, R. L.** Thermally Activated Rotational Disorder in CaMoO_4 Nanocrystals. *CrystEngComm* **2016**, *18*, 4485-4488. (cover article)
- [66] Cottingham, P.*; **Brutchey, R. L.** On the Crystal Structure of Colloidally Prepared CsPbBr_3 Quantum Dots. *Chemical Communications* **2016**, *52*, 5246-5249. (highly cited paper by Web of Science)

- [67] Lu, H.*; Joy, J.; Gaspar, R. L.*; Bradforth, S. E.; **Brutchey, R. L.** Iodide-Passivated Colloidal PbS Nanocrystals Leading to Highly Efficient Polymer:Nanocrystal Hybrid Solar Cells. *Chemistry of Materials* **2016**, *28*, 1897-1906.
- [68] Buckley, J. J.*; McCarthy, C. L.*; Del Pilar-Albaladejo, J.; Rasul, G.; **Brutchey, R. L.** Dissolution of Sn, SnO, and SnS in a Thiol-Amine Solvent Mixture: Insights into the Identity of the Molecular Solutes for Solution Processed SnS. *Inorganic Chemistry* **2016**, *55*, 3175-3180.
- [69] Riche, C. T.; Roberts, E. J.*; Gupta, M.; **Brutchey, R. L.**; Malmstadt, N. Flow Invariant Droplet Formation for Stable Parallel Microreactors. *Nature Communications* **2016**, *7*, 10780. (highlighted in *C&EN*)
- [70] **Brutchey, R. L.** Diorganyl Dichalcogenides as Useful Synthons for Colloidal Semiconductor Nanocrystals. *Accounts of Chemical Research* **2015**, *48*, 2918-2926. (most read article)
- [71] Culver, S. P.*; Greaney, M. J.*; Tinoco, A.*; **Brutchey, R. L.** Low-Temperature Synthesis of Homogeneous Solid Solutions of Scheelite-Structured $\text{Ca}_{1-x}\text{Sr}_x\text{WO}_4$ and $\text{Sr}_{1-x}\text{Ba}_x\text{WO}_4$ Nanocrystals. *Dalton Transactions* **2015**, *44*, 15042-15048.
- [72] McCarthy, C. L.*; Webber, D. H.*; Schueller, E. C.*; **Brutchey, R. L.** Solution-Phase Conversion of Bulk Metal Oxides to Metal Chalcogenides Using a Simple Thiol-Amine Solvent Mixture. *Angewandte Chemie, International Edition* **2015**, *54*, 8378-8381.
- [73] Nail, B. A.; Fields, J. M.; Zhao, J.; Wang, J.; Greaney, M. J.*; **Brutchey, R. L.**; Osterloh, F. E. Nickel Oxide Particles Catalyze Photochemical Hydrogen Evolution from Water – Nanoscaling Promotes p-Type Character and Minority Carrier Extraction. *ACS Nano* **2015**, *9*, 5135-5142.
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- [95] Zhong, Q.; Diev, V. V.; Roberts, S. T.; Antunez, P.*; **Brutchev, R. L.**; **Bradforth, S. E.**; **Thompson, M. E.** Fused Porphyrin-Single Walled Carbon Nanotube Hybrids: Efficient Formation and Photophysical Characterization. *ACS Nano* **2013**, *7*, 3466-3475.
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- [101] Webber, D. H.*; **Brutchev, R. L.** Nanocrystal Ligand Exchange with 1,2,3,4-thiaziazole-5-thiolate and its Facile In-situ Conversion to Thiocyanate. *Dalton Transactions* **2012**, *41*, 7835-7838. (invited New

Talent: the Americas issue; picked by editors as a “hot article”; highlighted in *Materials Today*; cover article)

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(c) Peer Reviewed Journal Articles Prior to USC

- [123] **Brutchey, R. L.**; Morse, D. E. Silicatein and the Translation of its Molecular Mechanism of Biosilicification into Low Temperature Nanomaterial Synthesis. *Chemical Reviews* **2008**, *108*, 4915-4934.
- [124] Ruddy, D. A.; **Brutchey, R. L.**; Tilley, T. D. The Influence of Surface Modification on the Epoxidation Selectivity and Mechanism of TiSBA15 and TaSBA15 Catalysts with Aqueous Hydrogen Peroxide. *Topics in Catalysis* **2008**, *48*, 99-106.
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- [128] **Brutchey, R. L.**; Ruddy, D. A.; Andersen, L. K.; Tilley, T. D. Influence of Surface-Modification of Ti-SBA15 Catalysts on the Epoxidation Mechanism for Cyclohexene with Aqueous Hydrogen Peroxide. *Langmuir* **2005**, *21*, 9576-9583.
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- [133] **Brutchey, R. L.**; Goldberger, J. E.; Koffas, T. S.; Tilley, T. D. Nonaqueous, Molecular Precursor Route to Hybrid Inorganic/Organic Zirconia-Silica Materials Containing Covalently Linked Organic Bridges. *Chemistry of Materials* **2003**, *15*, 1040-1046.

(d) Editorials

- [1] Hayton, T. W.; Humphrey, S. M.; Cossairt, B. M.; **Brutchey, R. L.** We Need to Talk about New Materials Characterization. *Inorganic Chemistry* **2023**, *62*, 13165-13167. (most read article)
- [2] **Brutchey, R. L.**; Cossairt, B. M. (Nano)Materials Chemistry: What Belongs at *Inorganic Chemistry*? *Inorganic Chemistry* **2022**, *61*, 12915-12918. (most read article)
- [3] Skrabalak, S. E.; **Brutchey, R. L.** Going with the Flow: Continuous Flow Routes to Colloidal Nanoparticles. *Chemistry of Materials* **2016**, *28*, 1003-1005.

(e) Peer Reviewed Book Chapters

- [1] Lu, H.*; **Brutchey, R. L.** Hybrid Polymer:Nanocrystal Solar Cells. In World Scientific Handbook of Organic Optoelectronic Devices; So, F., Ed.; World Scientific: River Edge, NJ, 2018; Vol. 2.
- [2] Schaidle, J. A.; Habas, S. E.; Baddour, F. G.; Farberow, C.; Ruddy, D. A.; Hensley, J. E.; **Brutchey, R. L.**; Malmstadt, N.; Robota, H. Transitioning Rationally Designed Catalytic Materials to Real “Working” Catalysts Produced at Commercial Scale: Nanoparticle Materials. In *Catalysis*; Royal Society of Chemistry: Cambridge, 2017; Vol. 29, pp 213-281.
- [3] **Brutchey, R. L.**; Hens, Z.; Kovalenko, M. V. Surface Chemistry of Colloidal Semiconductor Nanocrystals: Organic, Inorganic and Hybrid. In *Chemistry of Organo-Hybrids: Synthesis and Characterization of Functional Nano-Objects*; Lacôte, E., Charleux, B., Copéret, C., Eds.; John Wiley & Sons: New York, 2015; Chapter 7.
- [4] Fajdala, K. L.; **Brutchey, R. L.**; Tilley, T. D. Tailored Oxide Materials Via Thermolytic Molecular Precursor (TMP) Methods. In *Topics in Organometallic Chemistry*; Copéret, C., Chaudret, B., Eds.; Springer-Verlag: New York, 2005; Vol. 16, pp 69-116.

(f) Patents

- [1] Webber, D. H.*; **Brutchey, R. L.** Solvent System for the Dissolution of Main Group Elements and for the Dissolution and/or Synthesis of Compound Metal Chalcogenide and Pnictide Materials. U.S. Provisional Appl. 61/808,915, April 5, 2013.
- [2] Webber, D. H.*; **Brutchey, R. L.** Colloidal Ligand Exchange of Semiconductor Nanocrystals with Small, Thermally Labile Thiols to Improve Conductivity in Deposited Films. U.S. Provisional Appl. 61/732,739, December 2, 2012.
- [3] **Brutchey, R.**; Malmstadt, N.; Lazarus, L.*; Yang, A. S.-J.; Riche, C.; Chu, S.; Marin, B. Continuous Flow Synthesis of Nanomaterials Using Ionic Liquids in Microfluidic Reactors. U.S. Patent 2013/0087020, April 11, 2013.
- [4] Franzman, M. A.*; Webber, D. H.*; **Brutchey, R. L.** Synthesis of Metal Chalcogenide Nanocrystals Using Organodichalcogenide Reagents. U.S. Patent 8,012,448, September 6, 2011.
- [5] Morse, D. E.; Schwenger, B.; Gomm, J. R.; Roth, K. M.; Heiken, B.; **Brutchey, R.** Biologically Inspired Synthesis of Thin Films and Materials without a Molecular Template and without Organic Contaminants. U.S. Patent 2007/0254141, November 1, 2007.

(g) Invited Presentations (since 2008)

- [1] University of Southern California; Los Angeles, CA; April 1, 2025.
- [2] National Meeting of the American Chemical Society; San Diego, CA; March 23, 2024.
- [3] University of Houston; Houston, TX; February 25, 2025.
- [4] National Meeting of the American Chemical Society; Denver, CO; August 18 and 21, 2024.
- [5] DOE-BES Materials Chemistry PI Meeting; Gaithersburg, MD; August 6, 2024.
- [6] Pennsylvania State University; State College, PA; March 26, 2024
- [7] National Meeting of the American Chemical Society; New Orleans, LA; March 18, 2024.
- [8] Atomically Precise Nanochemistry Gordon Conference; Galveston, TX; February 6, 2024.
- [9] University of Notre Dame; South Bend, IN; September 20, 2023.
- [10] Iowa State University; Ames, IA; September 1, 2023.
- [11] National Meeting of the American Chemical Society; San Francisco, CA; August 23, 2023.
- [12] UC San Diego; La Jolla, CA; March 3, 2023.
- [13] Cal State Northridge; Los Angeles, CA; October 19, 2022.
- [14] National Meeting of the American Chemical Society; Chicago, IL; August 21, 2022.

- [15] Weizmann Institute of Science; Rehovot, Israel, July 20, 2022.
- [16] Ben-Gurion University of the Negev; Beersheba, Israel; July 5, 2022.
- [17] Hebrew University of Jerusalem; Jerusalem, Israel; June 23, 2022.
- [18] UC Irvine; Irvine, CA; March 28, 2022.
- [19] National Meeting of the American Chemical Society; San Diego, CA; March 23, 2022.
- [20] Washington State University; Pullman, WA (virtual); November 15, 2021.
- [21] DOE-BES Materials Chemistry PI Meeting (virtual); July 21, 2021.
- [22] University of Manchester; Manchester, England (virtual); April 9, 2021.
- [23] National Meeting of the American Chemical Society (virtual); April 7&15, 2021.
- [24] National Meeting of the American Chemical Society; San Francisco, CA; August 18, 2020 (canceled because of COVID-19 pandemic).
- [25] Cal State Long Beach; Long Beach, CA; September 20, 2019.
- [26] National Meeting of the American Chemical Society; San Diego, CA; August 25, 2019.
- [27] Purdue University; West Lafayette, IN; April 30, 2019.
- [28] National Meeting of the American Chemical Society; Orlando, FL; April 1, 2019.
- [29] DOE-BES Materials Chemistry PI Meeting; Gaithersburg, MD; July 9, 2018.
- [30] National Meeting of the American Chemical Society; New Orleans, LA; March 18, 2018.
- [31] XXVI International Materials Research Congress; Cancún, Mexico; August 20, 2017.
- [32] University of Texas at Austin; Austin, TX; June 2, 2017.
- [33] UC Riverside; Riverside, CA; April 28, 2017.
- [34] Iowa State University; Ames, IA; April 7, 2017.
- [35] Michigan State University; East Lansing, MI; March 30, 2017.
- [36] University of Oregon; Eugene, OR; October 1, 2016.
- [37] Chemical Heritage Foundation Innovation Day; Philadelphia, PA; September 13, 2016.
- [38] Colloidal Semiconductor Nanocrystals Gordon Conference; West Dover, VT; August 3, 2016.
- [39] DOE-BES Materials Chemistry PI Meeting; Gaithersburg, MD; July 12, 2016.
- [40] University of Southern California; Los Angeles, CA; April 19, 2016.
- [41] University of Missouri; Columbia, MO; April 15, 2016.
- [42] National Meeting of the American Chemical Society; San Diego, CA; March 13, 2015.
- [43] QUIMICUBA 2015; Havana, Cuba; October 16, 2015.
- [44] University of Pennsylvania; Philadelphia, PA; October 2, 2015.
- [45] XXIV International Materials Research Congress; Cancún, Mexico; August 16, 2015.
- [46] University of Minnesota; Minneapolis, MN; April 9, 2015.
- [47] National Meeting of the American Chemical Society; Denver, CO; March 24, 2014.
- [48] Scialog Conference on Solar Energy Conversion; Tucson, AZ; October 14, 2014.
- [49] National Meeting of the American Chemical Society; San Francisco, CA; August 11, 2014.
- [50] DOE-BES Materials Chemistry PI Meeting; Gaithersburg, MD; July 13, 2014.
- [51] Inorganic Chemistry Gordon Conference; University of New England, ME; June 10, 2014.
- [52] Workshop on Quantum Solar Energy Conversion; Rauris, Austria; March 17, 2014.
- [53] ETH Zürich; Zürich, Switzerland; March 4, 2014.
- [54] National Meeting of the Materials Research Society; Boston, MA; December 1, 2013.
- [55] Colorado School of Mines; Golden, CO; November 15, 2013.
- [56] Scialog Conference on Solar Energy Conversion; Tucson, AZ; October 15, 2013.
- [57] University of Washington; Seattle, WA; April 30, 2013.
- [58] National Meeting of the American Chemical Society; New Orleans, LA; April 8, 2013.
- [59] Santa Clara University; Santa Clara, CA; March 8, 2013.
- [60] University of Southern California; Los Angeles, CA; November 6, 2012.
- [61] Solid State Chemistry Gordon Conference; Colby-Sawyer College, NH; July 22, 2012.

- [62] DOE-BES Materials Chemistry PI Meeting; Gaithersburg, MD; July 15, 2012.
- [63] National Renewable Energy Laboratory; Golden, CO; May 23, 2012.
- [64] Université de Picardie Jules Verne; Amiens, France; May 2, 2012.
- [65] ETH Zürich; Zürich, Switzerland; April 26, 2012.
- [66] National Meeting of the American Chemical Society; San Diego, CA; March 27, 2012.
- [67] California Institute of Technology; Pasadena, CA; March 19, 2012.
- [68] UC Berkeley; Berkeley, CA; February 10, 2012.
- [69] UC Santa Barbara; Santa Barbara, CA; November 16, 2011.
- [70] American Chemical Society WRM2011; Pasadena, CA; November 11, 2011.
- [71] The Ohio State University; Columbus, OH; October 28, 2011.
- [72] University of Wisconsin – Madison; Madison, WI; October 27, 2011.
- [73] UC San Diego; La Jolla, CA; October 14, 2011.
- [74] Cottrell Scholar Conference; Tucson, AZ; July 6, 2011.
- [75] UC Davis; Davis, CA; May 3, 2011.
- [76] University of Texas at Austin; Austin, TX; April 22, 2011.
- [77] Texas A&M University; College Station, TX; April 20, 2011.
- [78] University of Houston; Houston, TX; April 18, 2011.
- [79] UC Irvine; Irvine, CA; April 14, 2011.
- [80] UC Riverside; Riverside, CA; April 8, 2011.
- [81] National Meeting of the American Chemical Society; Anaheim, CA; March 27, 2011.
- [82] Precursor Energetics, Inc.; Santa Clara, CA; August 16, 2010.
- [83] Nanotechnology Symposium, DuPont Central Research; Wilmington, DE; May 26, 2010.
- [84] Cal State Los Angeles; Los Angeles, CA; May 18, 2010.
- [85] Iowa State University; Ames, IA; April 23, 2010.
- [86] Université de Montréal; Montréal, QC; April 1, 2010.
- [87] Université Laval; Québec City, QC; March 31, 2010.
- [88] National Meeting of the American Chemical Society; San Francisco, CA; March 21, 2010.
- [89] Cal State Long Beach; Long Beach, CA; March 17, 2010.
- [90] University of La Verne; La Verne, CA; December 9, 2009.
- [91] DOE-BES Catalysis PI Meeting; Annapolis, MD; June 1, 2009.
- [92] US-Japan Nano Hybrids Workshop; Himeji, Japan; May 15, 2009.
- [93] Air Force Research Laboratory Materials Science Directorate; WPAFB, OH; July 28, 2008.
- [94] National Meeting of the American Chemical Society; New Orleans, LA; April 15, 2008.

(h) Contributed Presentations (since 2008)

- [1] Pacsurf 2018; Waikoloa Beach, HI; December 3, 2018.
- [2] Pacifichem 2015; Honolulu, HI; December 15, 2015.
- [3] Inorganic Chemistry Gordon Conference; University of New England, ME; June 17, 2012.
- [4] Pacifichem 2010; Honolulu, HI; December 15, 2010.
- [5] Solid State Chemistry Gordon Conference; Colby-Sawyer College, NH; August 1, 2010.
- [6] Inorganic Chemistry Gordon Conference; University of New England, ME; June 20, 2010.
- [7] National Meeting of the American Chemical Society; Washington, D.C.; August 16, 2009.
- [8] Clusters, Nanocrystals & Nanostructures Gordon Conference; Mt. Holyoke, MA; July 19, 2009.
- [9] National Meeting of the Materials Research Society; San Francisco, CA; April 14, 2009.
- [10] Dalton Discussions #11; Berkeley, CA; June 23, 2008.

Current Funding

- [1] Title: From Defect Spectroscopy to Self Healing in Lead Halide Perovskite Nanocrystals
Agency: United States-Israel Binational Science Foundation
Total Amount: \$202,500 (Brutchey = \$101,250)
Period: 10/21-09/25
Role: co-PI (co-PI: Dan Oron, Weizmann Institute of Science, Israel)
Time: 5%
- [2] Title: Multidimensional Phase Maps for the Accelerated Synthesis and Study of Metastable Materials
Agency: DOE BES DE-SC0006812
Total Amount: \$534,696
Period: 09/23-08/26
Role: sole PI
Time: 10%
- [3] Title: New Directions in the Materials Chemistry of Thiol-Amine Precursor Inks
Agency: NSF DMR SSMC 2418013
Total Amount: \$548,709
Period: 09/24-08/27
Role: sole PI
Time: 10%
- [4] Title: Establishing Connections between In Situ Monitoring of Nanoparticles During Continuous Flow Synthesis and Catalytically Relevant Materials Properties
Agency: Alliance for Sustainable Energy, LLC SUB-2024-10509
Total Amount: \$75,000
Period: 09/24-08/25
Role: PI
Time: 1%
- [5] Title: Corrosion-Resistant High Entropy Alloy Nanocrystals for Thermocatalytic CO₂ Hydrogenation
Agency: ACS Petroleum Research Fund
Total Amount: \$125,000
Period: 01/25-12/26
Role: PI
Time: 1%

Prior Funding

- [1] Title: Engineering Microfluidic Mixing for Green Nanocrystal Manufacturing
Agency: NSF CMMI 0926969
Total Amount: \$270,000 (Brutchey = \$135,000)
Period: 09/09-08/11
Role: co-PI (PI: Noah Malmstadt, USC Department of Chemical Engineering & Materials Science)
Time: 10%
- [2] Title: New Low-Temperature Synthetic Routes to Functional Perovskite and Semiconductor Nanocrystals
Agency: NSF DMR 0906745
Amount: \$350,000
Period: 08/09-12/12
Role: sole PI
Time: 10%

- [3] Title: A Generalized Synthetic Route to Nontoxic Semiconductor Nanocrystals for Use in Inexpensive Solar Cells
Agency: Research Corporation for Science Advancement
Amount: \$75,000 direct costs
Period: 01/11-12/13
Role: sole PI
- [4] Title: Synthesis of Multifunctional Nanoparticles for Drug Delivery
Agency: L. K. Whittier Foundation
Total Amount: \$25,000 direct costs
Period: 01/12-12/13
Role: PI
Time: 5%
- [5] Title: Emerging Materials for Solar Energy Conversion and Solid State Lighting
Agency: DOE-EFRC DE-SC0001013
Total Amount: \$12,000,000 (Brutchev = \$800,000)
Period: 08/09-07/14
Role: co-PI (PI: P. Dan Dapkus, USC Department of Electrical Engineering)
Time: 10%
- [6] Title: Nanoparticle Properties and Alveolar Epithelial Barrier/Transport Functions
Agency: NIH
Total Amount: \$1,125,000 direct costs (Brutchev = \$24,000 direct costs)
Period: 07/09-06/14
Role: co-Investigator (PI: Edward Crandall, Keck School of Medicine)
Time: 5%
- [7] Title: Mitigating Breakdown in High Energy Density Perovskite Polymer Nanocomposite Capacitors
Agency: DOE BES DE-FG02-11ER46826
Amount: \$450,000
Period: 07/11-06/14
Role: sole PI
Time: 10%
- [8] Title: *tert*-Butyl Chalcogenides as Useful Synthetic Tools for the Synthesis and Surface Modification of Semiconductor Nanocrystals
Agency: NSF DMR 1205712
Total Amount: \$345,000
Period: 07/12-06/15
Role: sole PI
Time: 10%
- [9] Title: Scialog: Investigation into Interfacial States in Hybrid Polymer:Nanocrystal Solar Cells – Finding a Path to High Efficiencies
Agency: Research Corporation for Science Advancement
Total Amount: \$100,000 direct costs (Brutchev = \$33,000 direct costs)
Period: 01/14-12/16
Role: PI
Time: 5%
- [10] Title: Continuous Microfluidic Approach for Scalable Nanoparticle Catalyst Synthesis
Agency: Alliance for Sustainable Energy, LLC AFA-6-62006-01
Total Amount: \$21,400
Period: 01/16-05/16

- Role: PI
Time: 1%
- [11] Title: Sustainable Scale-up of Nanoparticle Manufacturing Using Microreactors
Agency: NSF CMMI 1436872
Total Amount: \$300,000 (Brutchev = \$150,000)
Period: 08/14-7/17
Role: co-PI (PI: Noah Malmstadt, USC Department of Chemical Engineering & Materials Science)
Time: 5%
- [12] Title: Low-Temperature Chemical Routes to Functional Complex Oxide Nanocrystals
Agency: DOE BES DE-SC0006812
Amount: \$450,000
Period: 09/14-08/17
Role: sole PI
Time: 10%
- [13] Title: Scialog: What's Inside a Perovskite Solar Cell?
Agency: Research Corporation for Science Advancement
Total Amount: \$100,000 direct costs (Brutchev = \$33,000 direct costs)
Period: 01/15-12/17
Role: PI
Time: 5%
- [14] Title: Catalytic Upgrading of Pyrolysis Products
Agency: Alliance for Sustainable Energy, LLC REJ-6-62198
Total Amount: \$60,000
Period: 11/16-09/17
Role: PI
Time: 1%
- [15] Title: High-Throughput Continuous Flow Synthesis of Tunable Metal and Mixed-Metal Carbide and Phosphide Nanoparticles for Biomass Conversion Processes
Agency: Alliance for Sustainable Energy, LLC REJ-6-62198
Total Amount: \$30,000
Period: 04/18-10/18
Role: PI
Time: 1%
- [16] Title: Solution Processing of Bulk Semiconductors with a Thiol-Amine Solvent Mixture
Agency: NSF DMR 1506189
Total Amount: \$390,000
Period: 08/15-07/19
Role: sole PI
Time: 10%
- [17] Title: Chemical Routes to Accessing Metastable Phases in Colloidal Nanocrystals
Agency: DOE BES DE-SC0006812
Amount: \$449,000
Period: 09/17-08/20
Role: sole PI
Time: 10%
- [18] Title: Flow Reactors for Rapid Screening of Reaction Parameters to Synthesize Metal and Metal Carbide Nanoparticles for Biomass Conversion Processes
Agency: Alliance for Sustainable Energy, LLC XAT-9-92219-01

Total Amount: \$40,000

Period: 08/19-12/20

Role: PI

Time: 5%

[19] Title: Highly Parallel Three-Dimensional Microfluidic Systems for Manufacturing Catalytic Nanoparticles

Agency: NSF CMMI 1728649

Amount: \$350,000 (Brutchey = \$175,000)

Period: 07/17-06/21

Role: co-PI (PI: Noah Malmstadt, USC Department of Chemical Engineering & Materials Science)

Time: 5%

[20] Title: Continuous Flow Synthesis of Non-Metal Nanoparticle Catalysts for Selective Conversion of C1 Intermediates

Agency: Alliance for Sustainable Energy, LLC DE-AC36-08GO28308

Total Amount: \$60,000

Period: 09/21-01/23

Role: PI (co-PI: Noah Malmstadt, USC Department of Chemical Engineering & Materials Science)

Time: 1%

[21] Title: Revealing the Mechanisms of Bulk Material Dissolution in Thiol-Amine Solvent Mixtures Toward the Solution Deposition of Chalcogenide Thin Films

Agency: NSF DMR 1904719

Amount: \$400,000

Period: 08/19-07/23

Role: sole PI

Time: 10%

[22] Title: Unravelling the Mechanisms of Phase Determination in Metastable Multinary Chalcogenides

Agency: DOE BES DE-SC0006812

Total Amount: \$450,000

Period: 09/20-08/23

Role: sole PI

Time: 10%

[23] Title: SEED: Optimization of Quantum Dot Nanofabrication Based on High-Throughput Continuous Flow Chemistry

Agency: Research Corporation for Science Advancement

Total Amount: \$50,000

Period: 10/20-09/23

Role: sole PI

Time: 5%

[24] Title: Accelerating the Development of Catalytic Materials Through Continuous Flow Synthesis Approaches Coupled with In Line Monitoring

Agency: Alliance for Sustainable Energy, LLC DE-AC36-08GO28308

Total Amount: \$60,000

Period: 9/23-05/24

Role: PI (co-PI: Noah Malmstadt, USC Department of Chemical Engineering & Materials Science)

Time: 1%

Instructional Activity**(a) Courses Taught**

Course	Title	Enrollment	Instructor Rating (Course Rating)*	% of Enrolled Students Responding
CHEM 203 (Fall 2007)	Chemistry in Life: AIDS Drug Discovery and Development	294	3.91 (3.91)	33
CHEM 203 (Fall 2008)	Chemistry in Life: AIDS Drug Discovery and Development	300	3.82 (3.92)	14
CHEM 203 (Fall 2009)	Chemistry in Life: AIDS Drug Discovery and Development	300	3.87 (3.76)	34
CHEM 455 (Fall 2013)	Chemical Nanotechnology	5	5.00 (5.00)	100
CHEM 455 (Fall 2014)	Chemical Nanotechnology	6	4.83 (4.67)	100
CHEM 455 (Fall 2015)	Chemical Nanotechnology	2	5.00 (4.50)	100
CHEM 455 (Fall 2016)	Chemical Nanotechnology	10	4.89 (4.22)	90
CHEM 455 (Spring 2019)	Chemical Nanotechnology	10	3.86 (3.62)	80
CHEM 455 (Spring 2022)	Chemical Nanotechnology	4	3.94 (4.00)	100
CHEM 455 (Spring 2023)	Chemical Nanotechnology	3	4.00 (4.00)	100
CHEM 455 (Spring 2024)	Chemical Nanotechnology	6	3.96 (3.97)	
CHEM 515 (Fall 2008)	Structure and Bonding in Inorganic and Organometallic Chemistry	20	4.25 (3.90)	100
CHEM 515 (Fall 2009)	Structure and Bonding in Inorganic and Organometallic Chemistry	21	4.06 (3.94)	86
CHEM 515 (Fall 2010)	Structure and Bonding in Inorganic and Organometallic Chemistry	21	4.26 (3.89)	100
CHEM 515 (Fall 2011)	Structure and Bonding in Inorganic and Organometallic Chemistry	22	4.55 (4.25)	91
CHEM 515 (Fall 2017)	Structure and Bonding in Inorganic and Organometallic Chemistry	19	3.75 (3.75)	63
CHEM 515 (Fall 2018)	Structure and Bonding in Inorganic and Organometallic Chemistry	10	3.65 (3.81)	90
CHEM 515 (Fall 2019)	Structure and Bonding in Inorganic and Organometallic Chemistry	21	3.70 (3.71)	67
CHEM 515 (Fall 2020)**	Structure and Bonding in Inorganic and Organometallic Chemistry	9	3.79 (3.89)	100

CHEM 515 (Fall 2021)**	Structure and Bonding in Inorganic and Organometallic Chemistry	13	3.70 (3.72)	38
CHEM 515 (Fall 2022)	Structure and Bonding in Inorganic and Organometallic Chemistry	12	3.74 (3.89)	50
CHEM 515 (Fall 2023)	Structure and Bonding in Inorganic and Organometallic Chemistry	14	3.33 (3.33)	43
CHEM 515 (Fall 2024)	Structure and Bonding in Inorganic and Organometallic Chemistry	12		
CHEM 516 (Spring 2009)	Synthesis, Reactivity and Mechanism in Inorganic and Organometallic Chemistry	14	3.83 (3.83)	86
CHEM 524 (Spring 2013)	Inorganic Materials Chemistry	8	4.83 (4.67)	75
CHEM 580 (Fall 2010)	Current Topics in Inorganic Chemistry and Nanoscience	6	5.00 (4.83)	100
CHEM 580 (Fall 2011)	Current Topics in Inorganic Chemistry and Nanoscience	9	4.50 (4.00)	89
CHEM 580 (Fall 2015)	Current Topics in Inorganic Chemistry and Nanoscience	8	4.63 (4.50)	100
CHEM 580 (Fall 2019)	Current Topics in Inorganic Chemistry and Nanoscience	11	3.55 (3.76)	64
CHEM 599 (Spring 2010)	Special Topics: Inorganic Materials Chemistry	7	4.29 (4.43)	100
CHEM 599 (Spring 2012)	Special Topics: Inorganic Materials Chemistry	8	4.88 (4.63)	100

*Beginning in Fall 2018 the rating is based on a Likert scale of 4; prior to Fall 2018 the rating is based on a Likert scale of 5.

**Course given online or partially online because of COVID-19 pandemic.

(b) Graduate Students Advised

Matthew Franzman (Ph.D. conferred), 2007-2010, Assistant Professor of Forensic Science at University of Baltimore

Laura Lazarus (Ph.D. conferred), 2008-2012, Professor of Chemistry at Fullerton College

Christopher Beier (Ph.D. conferred), 2008-2013, Technical Director, Spherix Mineral Products

Michelle Norako (Ph.D. conferred), 2008-2013, Winemaker at Four Lanterns Winery

Priscilla Antunez (NSF graduate research fellow; Ph.D. conferred), 2009-2014, Assistant Director for Strategic Partnerships at Brookhaven National Laboratory

Matthew Greaney (2015 ACS Division of Inorganic Chemistry Young Investigator Awardee, Ph.D. conferred), 2010-2015, Group Leader at Clariant International, Ltd.

Jannise Buckley (NSF graduate research fellow; Ph.D. conferred), 2010-2015, Chief Product Officer at Ciencia Labs

Sean Culver (NSF graduate research fellow; Ph.D. conferred), 2011-2016, Technology Transfer Group Leader at Solid Power, Inc.

Haipeng Lu (2019 ACS Division of Physical Chemistry Young Investigator Awardee, Ph.D. conferred), 2012-2017, Assistant Professor of Chemistry at Hong Kong University of Science and Technology

Carrie McCarthy (NSF graduate research fellow; Ph.D. conferred), 2013-2018
Gözde Barim (Ph.D. conferred), 2013-2018, Senior R&D Engineer at Cuberg
Emily Roberts (2018 ACS Kenneth G. Hancock Memorial Awardee; Ph.D. conferred), 2014-2019, Patent Prosecution Associate at Morrison Foerster
Sara Smock (NSF graduate research fellow; Ph.D. conferred), 2016-2021, Senior Materials and Process Engineer at GKN Aerospace
Bryce Tappan (Ph.D. conferred), 2016-2021, Senior Scientist at SES AI Corporation
Kristopher Koskela (Ph.D. conferred), 2017-2022, Senior Process Engineer at Applied Materials
Lanja Karadaghi (Ph.D. conferred), 2018-2023, Principal Engineer at Northrop Grumman
Emily Williamson (Ph.D. conferred), 2018-2023, AI Applications Engineer at SandBox Semiconductor
Kyle Crans, 2020-present
Marissa Strumolo, 2020-present
Allison Forsberg, 2021-present
Hyeyeon Lee (visiting student from Gyeongsang National University, South Korea), 2021-2022
Zhaohong Sun, 2022-present
Iris Berg (visiting student from Hebrew University of Jerusalem, Israel), 2023
Christopher Pakhanyan, 2023-present
Yizhen Chen, 2023-present

(c) Postdoctoral Fellows Advised

Dr. David Webber (Ph.D. University of Durham), 2008-2013, Chemical Hygiene Officer at University of Southern California
Dr. Federico Rabuffetti (Ph.D. Northwestern University), 2010-2014, Associate Professor of Chemistry at Wayne State University
Dr. Elsa Couderc (Ph.D. CEA Grenoble), 2012-2014, Open Science Officer, Sorbonne Université
Dr. Patrick Cottingham (Ph.D. Johns Hopkins University), 2015-2018, Technology Development Engineer, Intel Corporation
Dr. Lucía Mora (Ph.D. Universidad Nacional Autónoma de México), 2016-2018, Assistant Professor, School of Chemistry, UNAM
Dr. Brendan Ward-O'Brien (Ph.D. University of Manchester), 2024-present

(d) Undergraduate Students Advised

Marie Cuevas Heffern (NSF graduate research fellow), 2008-2009; Ph.D. in Chemistry, Northwestern, 2014; Associate Professor of Chemistry, University of California, Davis
Viridiana Pérez, 2008; Ph.D. in Chemistry, Université Laval (Québec City), 2016; CEO & Co-Founder of NANOSentinel
Ariane Beaupré, 2009; M.S. in Chemistry, Université Laval (Québec City); Director of Scientific Projects at Boite à Science
Amy DeVita-McBride, 2009-2010; M.S. in Materials Science & Engineering, USC
Brittany Daniels, 2009-2010; Project Engineer, Chevron Corporation
Maxwell Chang, 2010-2011
Hannah Hinton, 2011/2012; Manager, Supply Chain Engineering, SpaceX
Antonio Tinoco, 2013; Ph.D. in Chemistry, University of Rochester, 2020; Postdoctoral Fellow, Harvard University
James Munteanu, 2013; Undergraduate student at Cerritos College/Cal Poly Pomona
Joseph Morris, 2012-2013; Engineer, Schlumberger Limited

Jessica Rafson, 2012-2013; Ph.D. in Chemistry, Cornell University, 2021; Research Chemistry at Food and Drug Administration
 Jose Araujo, 2010-2014; Ph.D. in Chemistry, University of Washington, 2020; Electro Optical Engineer at Meta
 John Lee (NSF graduate research fellow), 2011-2014; Ph.D. in Chemistry, UC Berkeley, 2019; Scientist II at Nurix Therapeutics
 Marie Claire Trinidad, 2014; Tesla Energy
 Karla Abuyen, 2015; Ph.D. in Molecular Biology, USC, 2024
 Olivia Hull, 2015; Ph.D. in Chemistry, Kansas State University, 2023; Researcher II at NREL
 Emily Schueller, 2014-2016; Ph.D. in Materials, UCSB, 2020; Principal Materials and Processes Engineer, Northrop Grumman
 Rachel Gaspar, 2015; Ph.D. candidate in Atmospheric and Oceanic Science, University of Colorado
 Karla Macias, 2016; Analyst, Marvin Engineering Company
 Daniela Glaser, 2016-2017; J.D., UCLA, 2021; Associate at Fish & Richardson
 Solomon Kim, 2016-2018
 Michael Espejel, 2018; Undergraduate student at Cerritos College
 Eden Tzanetopoulos (NSF graduate research fellow), 2018; Ph.D. candidate in Chemistry, University of Washington
 Aaron Ghrist (NSF graduate research fellow), 2020-2021; Ph.D. candidate in Applied Physics, Stanford University
 Fernanda Romero, 2022; Undergraduate student at Cerritos College
 Ashley Kilmnick, 2023-present; Undergraduate student at USC
 Ariel Nehoray, 2023-present; Undergraduate student at USC
 Grace Solis, 2023; Undergraduate student at Cerritos College
 Nicole Ammari, 2023, 2024; Undergraduate student at UC Berkeley
 Karla Zamarripa, 2024; Undergraduate student at Cerritos College

Service Activities

Departmental Committee	Duration	Role
Alumni Relations Committee	2009	Member
Chemical Safety Committee	2014-2017	Chair
Executive Committee	2014-present	Member
Graduate Student Recruitment Committee	2008	Member
	2009-2014	co-Chair
	2015-present	Member
Inorganic Faculty Search Committee	2010, 2011, 2012	Member
Junior Faculty Mentoring Committees (B. Melot, S. Marinescu, M. Fieser, M. Inkpen)	2013-present	Member
Open Area Faculty Search Committees	2016	Member
	2017	Diversity Liaison
Strategic Mission & Planning Committee	2013-present	Member

Theory Faculty Search Committee	2015	Member
Undergraduate Affairs and Curriculum Committee	2008	Member
University Committee	Duration	Role
Graduate School Advisory Council	2015-2018	Member
Committee on Academic Policies and Procedures	2017-2020	Member
Advisory Committee for Core Center of Excellence in Nano Imaging (CNI)	2019-2022	Co-Director
	2022-present	Member
Hiring Committees for CNI Staff Microscopists	2021-2022	Co-Chair
Hiring Committee for CNI Staff X-ray Scientist	2024	Member

Additional Service Activities

- Organized inorganic section seminar series, 2008-2009, 2010-2011, 2011-2012, 2015-2016, 2019-2020 & 2025-2026
- Founded and supervised inorganic chemistry journal club, 2007-2012
- Served on *ad hoc* university committee for purchase of a TEM, 2011
- Served on *ad hoc* consultative committee for selection of new department chair, 2011 & 2017
- Served on *ad hoc* departmental NTT faculty merit review committee, 2011 & 2012
- Served on *ad hoc* Dornsife faculty merit review appeals committee, 2013
- Served on *ad hoc* departmental TT faculty merit review committee, 2014
- Served on *ad hoc* third- and fifth-year review committee for B. Melot, 2015 & 2017
- Served on *ad hoc* third-year review committee for S. Marinescu, 2017
- Served on *ad hoc* tenure promotion committee for B. Melot, 2017
- Chaired *ad hoc* tenure promotion committee for S. Marinescu, 2019
- Chaired *ad hoc* second-, third-, and fifth-year review committee for M. Fieser, 2019, 2023, 2024
- Served on *ad hoc* promotion committee for D. Tomkins (Writing Program), 2020
- Chaired *ad hoc* second-, third-, and fifth-year review committee for M. Inkpen, 2021, 2023, 2024
- Chaired *ad hoc* promotion committee for B. Melot, 2022
- Served on *ad hoc* second- and third-year review committee for K. White, 2022 & 2023
- Served on *ad hoc* second-year review committee for E. Picazo, 2023
- Chaired *ad hoc* consultative committee for selection of new department chair, 2024