

BENJAMIN J. LEAR

Current as of January 25, 2022

EDUCATION

Ph.D.	Chemistry	2007
	<i>University of California, San Diego</i>	
	Advisor: Clifford P. Kubiak	
M.S.	Chemistry	2004
	<i>University of California, San Diego</i>	
	Advisor: Clifford P. Kubiak	
B.S.	Biochemistry	2002
	<i>University of California, Davis</i>	
	Advisor: Andrew J. Fisher	

PROFESSIONAL EXPERIENCE

CTO and co-Founder	2016–now
<i>Actinic, LLC</i>	
Associate Professor of Chemistry	2015–now
<i>The Pennsylvania State University</i>	
Assistant Professor of Chemistry	2010–2016
<i>The Pennsylvania State University</i>	
Postdoctoral Researcher	2007–2010
<i>The Ohio State University</i>	
Advisor: Malcolm H. Chisholm	
Undergraduate Research Scholar	1998–2022
<i>Lawrence Livermore National Laboratory</i>	
Advisor: James D. Tucker	

AWARDS

Fulbright US Scholar	2019
Priestley Prize for Outstanding Undergraduate Teaching in Chemistry	2014
3M Non-Tenured Faculty Award	2011

PUBLICATIONS

40 published · 740 citations · *h*-index = 17 · † indicates papers as corresponding author

- 43[†] *Dipolar versus through-bond control of surface potential in colloidal nanoparticles*. Lillian M. Mawby and Benjamin J. **Lear**
ACS Nano, **In revision**,
- 42[†] *Surface chemical control of electron properties of silver nanoparticles: Connecting the plasmon with experimentally probed electronic structure*. Santana Cruz and Benjamin J. **Lear**
Journal of Physical Chemistry C, **In revision**,
- 41[†] *Surface chemistry controls the density of states in metallic nanoparticles*. Nicholas P. Litak, Lillian M. Mawby, and Benjamin J. **Lear**
ACS Nano, **In revision**,
- 40[†] *Asymmetries in the electronic properties of spheroidal metallic nanoparticles, revealed by conduction electron spin resonance and surface plasmon resonance*. Santana Cruz, Vadim Tanygin, and Benjamin J. **Lear** 2021
ACS Nano, **15**, 4490–4503, (2021).
- 39[†] *Preparation and oxygen sensitivity of a range of noble metal nanoparticle cores (Ir, Pt, and Au) protected by a series of chalcogen-dodecane ligands (S, Se, and Te)*. Vadim Tanygin and Benjamin J. **Lear**
Chemistry of Materials, **33**, 63–72, (2021).
- 38[†] *Dependence of core electronics of gold nanoparticles on ligand, solvent, and sample preparation*. Jonathan W. Fagan and Benjamin J. **Lear** 2020
Journal of Physical Chemistry C, **124**, 24435–24440, (2020).
- 37[†] *Nanoscale heat for organic transformations: A photothermally driven retro Diels–Alder reaction*. Andrea L. Widstrom and Benjamin J. **Lear**
Applied Nanoscience, **10**, 819–825, (2020).
- 36[†] *Structural and solvent control over activation parameters for a pair of retro Diels–Alder reactions*. Andrea L. Widstrom and Benjamin J. **Lear** 2019
Scientific Reports, **9**, 18267, (2019).
- 35[†] *Photothermal control over the mechanical and physical properties of polydimethylsiloxane*. R. Joseph Fortenbaugh, Sabrina N. Carrozzi, and Benjamin J. **Lear**
Macromolecules, **52**, 3839–3844, (2019).
- 34[†] *Controlled rapid formation of polyurethane at 700 K: Thermodynamic and kinetic consequences of extreme photothermal heating*. Emma N. Van Burns and Benjamin J. **Lear**
Journal of Physical Chemistry C, **123**, 14774–14780, (2019).

- 33[†] *Photothermal effectiveness of magnetite nanoparticles: Dependence upon particle size probed by experiment and simulation.* Robert J. G. Johnson, Jonathan D. Schultz, and Benjamin J. **Lear** *Molecules*, **23**, 1234, (2018). 2018
- 32[†] *On-demand curing of polydimethylsiloxane (PDMS) using the photothermal effect of gold nanoparticles.* R. Joseph Fortenbaugh and Benjamin J. **Lear** *Nanoscale*, **9**, 8555–8559, (2017). 2017
- 31[†] *Chain length and solvent control over the electronic properties of alkanethiolate-protected gold nanoparticles at the molecule-to-metal transition.* Anthony Cirri, Alexey Silakov, Lasse Jensen, and Benjamin J. **Lear** *Journal of the American Chemical Society*, **138**, 8459–8467, (2016). 2016
- 30[†] *Probing ligand-induced modulation of metallic states in small gold nanoparticles using conduction electron spin.* Anthony Cirri, Alexey Silakov, Lasse Jensen, and Benjamin J. **Lear** *Physical Chemistry Chemical Physics*, **18**, 25443–25451, (2016).
- 29[†] *Steady-state spectroscopic analysis of proton-dependent electron transfer on pyrazine-appended metal dithiolenes $[Ni(pdt)_2]$, $[Pd(pdt)_2]$, and $[Pt(pdt)_2]$ ($pdt = 2,3$ -pyrazinedithiol).* Steven R. Kennedy, Morgan N. Kozar, Hemant P. Yennawar, and Benjamin J. **Lear** *Inorganic Chemistry*, **55**, 8459–8467, (2016).
- 28[†] *Effect of protonation upon electronic coupling in the mixed valence and mixed protonated complex, $[Ni(2,3$ -pyrazinedithiol) $_2]$.* Steven R. Kennedy, Philip Weiss, Morgan N. Kozar, Hemant P. Yennawar, Puja Goyal, Lasse Jensen, Sharon Hammes-Schiffer, and Benjamin J. **Lear** *Inorganic Chemistry*, **55**, 1433–1445, (2016).
- 27[†] *Synthesis and characterization of the gold dithiolene monoanion, $(Bu_4N)[Au(pdt = 2,3$ -pyrazinedithiol) $_2]$.* Steven R. Kennedy, Morgan N. Kozar, Heman P. Yennawar, and Benjamin J. **Lear** *Polyhedron*, **103**, 100–104, (2015). 2015
- 26[†] *Isolation and chemical transformations involving a reactive intermediate of MOF-5.* Juyeong Kim, Michelle R. Dolgos, and Benjamin J. **Lear** *Crystal Growth and Design*, **15**, 4781–4786, (2015).
- 25[†] *Ligand control over electronic properties within the metallic core of gold nanoparticles.* Anthony Cirri, Alexey Silakov, and Benjamin J. **Lear** *Angewandte Chemie*, **54**, 11750–11753, (2015).

- 24[†] *Billion-fold rate enhancement of urethane polymerization via the photothermal effect of plasmonic gold nanoparticles.* Kaitlin M. Haas and Benjamin J. **Lear**, *Chemical Science*, **6**, 6462–6467, (2015).
- 23[†] *Structural, electronic, and magnetic characterization of a dinuclear zinc complex containing TCNQ and a μ [TCNQ–TCNQ]₂ ligand.* Juyeong Kim, Alexey Silakov, Hemant P. Yennawar, and Benjamin J. Lear *Inorganic Chemistry*, **54**, 6072–6074, (2015).
- 22[†] *Comparing the energetic and dynamic contributions of solvent to very low barrier isomerization using dynamic steady-state vibrational spectroscopy.* Andrea N. Giordano and Benjamin J. Lear *Journal of Physical Chemistry A*, **119**, 5345–3555, (2015).
- 21[†] *Fe₃O₄ nanoparticles as robust photothermal agents for driving high barrier reactions under ambient conditions.* Robert J.G. Johnson, Kaitlin M. Haas, Benjamin J. **Lear** *Chemical Communications*, **51**, 417–420, (2015).
- 20 *Electron-transfer reactions of electronically excited zinc tetraphenylporphyrin with multinuclear ruthenium complexes.* Jane Henderson, Starla D. Glover, Benjamin J. **Lear**, Don Walker, Jay R. Winkler, Harry B. Gray, and Clifford P. Kubiak *Journal of Physical Chemistry B*, **119**, 7473–7679, (2015).
- 19[†] *Concentration-dependent dynamics of hydrogen bonding between acetonitrile and methanol as determined by 1D vibrational spectroscopy.* Brian G. Alberding and Benjamin J. **Lear** 2014 *Journal of Physical Chemistry A*, **118**, 4363–4371, (2014).
- 18[†] *Quantitative assessment of the connection between steric hindrance and electronic coupling in 2,5-bis(alkoxy)benzene-based mixed-valence dimers.* Angela M. Bischof, Shaopeng Zhang, Tara Y. Meyer, Benjamin J. **Lear** *Journal of Physical Chemistry C*, **118**, 12693–12699, (2014).
- 17[†] *Solvent versus temperature control over the infrared bandshape and position in Fe(CO₃(η -ligand) complexes.* Andrea N. Giordano and Benjamin J. **Lear** 2013 *Journal of Physical Chemistry A*, **117**, 12313–12319, (2013).
- 16 *Silica nanoparticles for enhanced carrier transport in polymer-based short channel transistors.* Ali Veysel Tunc, Andrea N. Giordano, Bernard Ecker, Enrico Da Como, Benjamin J. **Lear**, Elizabeth von Hauff *Journal of Physical Chemistry C*, **117**, 22613–22618, (2013).

- 15[†] *Synthesis of ruthenium polypyridal complexes with hydroxypyridine derivatives: Effect of protonation and ethylation at the pyridyl nitrogen.* Juyeong Kim, Hemant P. Yennawar, and Benjamin J. **Lear**
Dalton Transactions, **42**, 15656–15662, (2013).
- 14[†] *Degradation of polypropylene carbonate through plasmonic heating.* Kaitlin M. Haas and Benjamin J. **Lear**
Nanoscale, **5**, 5247–5251, (2013).
- 13[†] *Direct test of the equivalency of dynamic IR and dynamic Raman spectroscopies as techniques for observing ultrafast molecular dynamics.* Andrea N. Giordano, Seth M. Morton, Lasse Jensen, and Benjamin J. **Lear**
Journal of Physical Chemistry A, **117**, 2067–2074, (2013).
- 12[†] *Synthesis and characterization of trans- $M_2(T^iPB)_2(O_2C-CH=CH-C_4H_3S)_2$ ($M = Mo$ or W) and comments on the metal-to-ligand charge transfer bands in MM quadruply bonded complexes of the type trans- $M_2(T^iPB)_2$, where $T^iPB=2,4,6$ -triisopropylbenzoate and $L = \pi$ -accepting carboxylate ligand.* Brian G. Alberding, Malcolm H. Chisholm, Benjamin J. **Lear**, Vesal Nasser, and Carly R. Reed
Dalton Transactions, **40**, 10658–10663, (2011). 2011
- 11 *M_2 to ligand-conjugation: Testbeds for current theories of mixed valence in ground and photoexcited state of molecular systems.* Malcolm H. Chisholm and Benjamin J. **Lear**
Chemical Society Reviews, **40**, 5254–5265, (2011).
- 10 *Extent of $M_2 \delta$ to ligand-conjugation in neutral mixed valence state of bis(4-isonicotinate)-bis(2,4,6-triisopropylbenzoate) dimetal complexes (MM), Where $M = Mo$ or W , and their adducts with tris(pentafluorophenyl)boron.* Philip Bunting, Malcolm H. Chisholm, Judith C. Gallucci, and Benjamin J. **Lear**
The Journal of the American Chemical Society, **133**, 5873–5881, (2011).
- 9 *Electroabsorption of dimers containing MM ($M = Mo, W$) quadruply bonding units: Insights into the electronic structure of neutral coupled redox centers and their relationship with mixed valence ions.* Malcolm H. Chisholm, Benjamin J. **Lear**, Alberto Moscatelli, and Linda A. Peteanu
Inorganic Chemistry, **49**, 2706–3713, (2010). 2010
- 8 *Inter- or intramolecular electron transfer between triruthenium clusters: We'll cross that bridge when we come to it.* Starla D. Glover, John C. Goeltz, Benjamin J. **Lear**, and Clifford P. Kubiak
Coordination Chemistry Reviews, **254**, 331–345, (2010).

- 7 *Oxalate bridged MM (MM = Mo₂, MoW, and W₂) quadruply bonded complexes as test beds for current mixed valence theory: Looking beyond the intervalence charge transfer transition.* Benjamin J. **Lear** and Malcolm H. Chisholm
Inorganic Chemistry , **48**, 10954–10971, (2009). 2009
- 6 *Solvent dynamical control of ultrafast ground state electron transfer: Implications for Class II-III mixed valency.* Benjamin J. **Lear**, Starla D Glover, J. Catherine Salsman, Casey H. Londergan, and Clifford P. Kubiak
The Journal of the American Chemical Society, **129**, 12772–12779, (2009).
- 5 *Mixed valency at the nearly delocalized limit: Fundamentals and forecast.* Starla D. Glover, John C. Goeltz, Benjamin J. **Lear**, and Clifford P. Kubiak
European Journal of Inorganic Chemistry, **5**, 585–594, (2009).
- 4 *Electron transfer at the Class II/III borderline of mixed valency: Dependence of rates of solvent dynamics and observation of a localized-to-delocalized transition in freezing solvents.* Starla D. Glover, Benjamin J. **Lear**, J. Catherine Salsman, Casey H. Londergan, and Clifford P. Kubiak
Philosophic Transactions of the Royal Society. A, **336**, 177–185, (2008). 2008
- 3 *Origins of cooperative noncovalent host-guest chemistry in mixed valence complexes.* Benjamin J. **Lear** and Clifford P. Kubiak
Journal of Physical Chemistry B, **111**, 6766–6771, (2007). 2007
- 2 *Charge gating and electronic delocalization over a denderimeric assembly of trinuclear ruthenium clusters.* Benjamin J. Lear and Clifford P. Kubiak
Inorganic Chemistry , **45**, 7041–7043, (2006). 2006
- 1 *Observation and dynamics of ‘mixed-valence isomers’ and a thermodynamics estimate of electronic coupling parameters .* Casey H. Londergan, J. Catherine Salsman, Benjamin J. Lear, and Clifford P. Kubiak
Chemical Physics , **324**, 57–62, (2006).

PRESENTATIONS

0 invited · 29 contributed · † indicates invited talk

- 29[†] The interplay between nanoparticles and their chemical environments 2019
University of Tampere, Department of Physics
Tampere, FI, 2019
- 28[†] The interplay between nanoparticles and their chemical environments 2019
University of Tampere, Department of Chemistry
Tampere, FI, 2019

27 [†]	Ligand control over electronic properties of metal nanoparticles National ACS Meeting, San Diego San Diego, CA, 2019	2019
26 [†]	Towards additive manufacturing of two-part thermoset polymers Hershey Medical Center, Surgical Innovations Group Hershey, PA, 2019	2019
25 [†]	Using the photothermal effect of nanoparticles to drive chemical transformations 3M, None St. Paul, MN, 2018	2018
24 [†]	Bringing inorganic insight to ligand design for metallic nanoparticles National ACS Meeting, New Orleans New Orleans, LA, 2018	2018
23 [†]	The interplay between surface chemistry and electronic properties of nanoscale metals Messiah College, Department of Chemistry Mechanicsburg, PA, 2017	2017
22 [†]	Photothermal applications of nanomaterials University of New Mexico, Department of Chemistry Albuquerque, NM, 2016	2016
21 [†]	The interplay between surface chemistry and electronic properties of nanoscale metals University of Texas at Austin, Department of Chemistry Austin, TX, 2016	2016
20 [†]	The interplay between surface chemistry and electronic properties of nanoscale metals Columbia University, Department of Chemistry New York, NY, 2016	2016
19 [†]	Charge Mobility in Molecules and Materials University of Pittsburgh, Department of Chemistry Pittsburgh, PA, 2015	2015
18 [†]	Charge Mobility in Molecules and Materials The Ohio State University, Department of Chemistry Columbus, OH, 2015	2015

- 17[†] Charge Mobility in Molecules and Materials 2015
Haverford College, Department of Chemistry
Haverford, PA, 2015
- 16[†] Charge Mobility in Molecules and Materials 2015
University of Delaware, Department of Chemistry
Newark, DE, 2015
- 15[†] Charge Mobility in Molecules and Materials 2015
Stony Brook University, Department of Chemistry
Stony Brook, NY, 2015
- 14[†] Charge Mobility in Molecules and Materials 2015
North Carolina State University, Department of Chemistry
Raleigh, NC, 2015
- 13[†] Charge Mobility in Molecules and Materials 2015
University of North Carolina, Department of Chemistry
Chapel Hill, NC, 2015
- 12[†] Charge Mobility in Molecules and Materials 2015
University of Washington, Department of Chemistry
Seattle, WA, 2015
- 11[†] Charge Mobility in Molecules and Materials 2015
Oregon State University, Department of Chemistry
Corvallis, OR, 2015
- 10[†] Charge Mobility in Molecules and Materials 2015
The University of Oregon, Department of Chemistry
Eugene, OR, 2015
- 9[†] Control over the surface states of gold nanoparticles via the electronic 2014
properties of the ligand set
National ACS Meeting, San Francisco
San Francisco, CA, 2014
- 8[†] Nanoscale Heat as a Tool for Chemistry 2013
The College at Brockport, Department of Chemistry
Brockport, NY, 2013
- 7[†] Dynamic Raman as a Tool for Studying Dynamics at Interfaces 2012
National ACS Meeting, San Diego
San Diego, CA, 2012

6 [†]	Understanding the ‘Chemical Availability’ of Plasmonic Heat in Gold Nanostructures 3M, None St. Paul, MN, 2012	2012
5 [†]	Observing Single Electron Transfer Events Bucknell University, Department of Chemistry Lewisburg, PA, 2011	2011
4 [†]	Understanding the ‘Chemical Availability’ of Plasmonic Heat in Gold Nanostructures 3M, None St. Paul, MN, 2011	2011
3	Rapid on-demand curing of thermally cured thermosets using photothermal heating PacificChem, Virtual Congress None, 2021	2021
2	Rapid on-demand curing of thermally cured thermosets using photothermal heating PacificChem, Virtual Congress None, 2021	2021
1 [†]	Molecular Scale Heat for Molecular Scale Transformations University of Binghamton, Department of Chemistry Binghamton, NY, 2022	2022

FUNDING

\$1,198,863 in pending funding · \$443,576 in current funding · \$2,635,355 in past funding

Pending Funding

- 4 **Title:** Collaborative Research: Engineering surface chemistry to gate electron transfer at the nanoscale
 Agency: National Science Foundation
 Amount: \$329,734
 Roll: co-PI
 Duration: Pending
 Goals: Design and build mixed valence complexes using atomically precise gold clusters to demonstrate ligand control of electron transfer through the clusters.
- 3 **Title:** MCA: Towards a rational framework for manufacturing molecule/matrix interfaces with desired thermal transport properties
 Agency: National Science Foundation
 Amount: \$316,399
 Roll: PI
 Duration: Pending
 Goals: Simulation and measurement of nanoscale thermal transport subsequent to photothermal heating of nanoparticles.
- 2 **Title:** Rapid deposition of marine-grade protective coatings, enabled by photothermal curing
 Agency: Office of Naval Research
 Amount: \$225,000
 Roll: PI
 Duration: Pending
 Goals: Demonstrate the ability to photothermally cure polymers as films on substrates.
- 1 **Title:** Demonstrating the feasibility of on-demand arbitrary direct micron scale patterning of thermally cured thermosets
 Agency: National Science Foundation
 Amount: \$327,726
 Roll: PI
 Duration: Pending
 Goals: Demonstrate the ability to photothermally cure thermally cured thermosets on demand in a way that is compatible with coil coating manufacturing and also in a way that can realize sub-micron patterns in the thermosets.

Current Funding

1 **Title:** Ligand control over electronic structure in metallic nanoparticles and model clusters
 Agency: National Science Foundation
 Amount: \$443,576
 Roll: PI
 Duration: 06/01/2020–06/01/2020
 Goals: Investigate the ability of surface chemistry to control the Fermi energy, density of states, and g-factor of metallic nanoscale systems.

Past Funding

17 **Title:** Development of 3D Printer using Laser Assisted Tunable Curing of Thermosets
 Agency: Actuated Medical Inc
 Amount: \$50,000
 Roll: co-PI
 Duration: 02/10/2021–02/10/2021
 Goals: Demonstrate a viable 3D printer of two component thermally cured thermosets.

16 **Title:** Investigation of chemical processes relating to the surface treatment of metallic powders to support the development of an aluminum-water undersea propulsion system”
 Agency: Office of Naval Research
 Amount: \$225,000
 Roll: PI
 Duration: 08/01/2018–08/01/2018
 Goals: Use surface chemistry of micron sized aluminum particles to control their physical properties.

15 **Title:** Transnational Access programme
 Agency: HPC Europa 3
 Amount: \$3,500
 Roll: PI
 Duration: 03/01/2021–03/01/2021
 Goals: Learn to perform DFT calculations on small metal clusters under the guidance of Prof. Krewald at U. Darmstadt

- 14 **Title:** Using conduction spin electron spectroscopy as a sensitive and selective probe for understanding the surface chemical control over the electronic behavior of metallic nanoparticles
- Agency:** National Science Foundation
- Amount:** \$376,800
- Roll:** PI
- Duration:** 09/01/2016–09/01/2016
- Goals:** Investigate the control that the chemical environment of metal nanoparticles (surfactants, solvents, etc.) exerts over the electronic properties of the metal core.
-
- 13 **Title:** Demonstrating additive manufacturing of commercially relevant two-part thermoset polymers
- Agency:** PennState
- Amount:** \$75,000
- Roll:** PI
- Duration:** 08/01/2018–08/01/2018
- Goals:** Construction of a practical photothermally based 3D polymer printer.
-
- 12 **Title:** Laser-Based 3D printer for thermally cured polymer devices with micron resolution
- Agency:** Army Research Office
- Amount:** \$180,136
- Roll:** PI
- Duration:** 06/15/2018–06/15/2018
- Goals:** Construct a 3D printer capable of printing thermally cured thermosets using photothermal approaches.
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- 11 **Title:** On Demand, Rapid, and Tunable Curing of Thermoset Polymers using the Photothermal Effect of Nanoparticles
- Agency:** Army Research Office
- Amount:** \$205,000
- Roll:** PI
- Duration:** 11/15/2014–11/15/2014
- Goals:** Determine the generality of the photothermal effect for cleanly and efficiently driving the curing of thermally cured thermoset polymers.

- 10 **Title:** Additive Manufacturing of PEEK and Fiber-Reinforced PEEK for NASA Applications and Custom Medical Devices
 Agency: NASA
 Amount: \$37,000
 Roll: co-PI
 Duration: 06/15/2018–06/15/2018
 Goals: Construct a 3D printer that can produce parts built using high fiber content PEEK.
- 9 **Title:** Collaborative Research: Gaining a molecular level understanding of the sorption of model organic molecules to engineered soils”
 National Science Foundation
 Agency: National Science Foundation
 Amount: \$250,000
 Roll: PI
 Duration: 11/15/2014–11/15/2014
 Goals: Use NMR to study the interaction between organic molecules and soil surrogates in order to better understand how passive remediation works.
- 8 **Title:** Determining the feasibility and mechanisms of chemical reactions as a basis for heat transfer media
 Agency: Air Force Office of Scientific Research
 Amount: \$379,617
 Roll: PI
 Duration: 10/15/2015–10/15/2015
 Goals: Determine the extent to which the latent heat of chemical bonds can be used to control the effective thermal conductivity of liquid media.
- 7 **Title:** 3D printing of thermoset polymers for industrial and commercial applications
 Agency: Army Research Office
 Amount: \$70,000
 Roll: PI
 Duration: 09/30/2017–09/30/2017
 Goals: Assess the commercial viability and market prospects for photo-thermal curing of thermally cured thermoset polymers.

- 6 **Title:** Cross-linking of polymer films, triggered by the photothermal effect of gold nanoparticles
Agency: PPG Industries
Amount: \$50,000
Roll: PI
Duration: 10/01/2016–10/01/2016
Goals: Determine the ability of the photothermal effect of nanoparticles to drive the radical polymerization of acrylates.
- 5 **Title:** Collaborative Research: Quantifying the Reactive Surface Area of Environmental Solids
Agency: National Science Foundation
Amount: \$610,000
Roll: PI
Duration: 09/15/2012–09/15/2012
Goals: Work with artificial soil surrogates in order to understand the surface area they present in the environment.
- 4 **Title:** Towards large area photothermal curing of urethane films using non-golf photothermal converters
Agency: PPG Industries
Amount: \$50,000
Roll: PI
Duration: 06/01/2015–06/01/2015
Goals: Determine size of films that could be cured using photothermal heating by non-metallic particles.
- 3 **Title:** Scialog Collaboration Innovation Award
Agency: Research Corporation for Science Advancement
Amount: \$25,000
Roll: PI
Duration: 01/01/2014–01/01/2014
Goals: Evaluate the potential of doped metal oxide nanoparticles to provide low-quality heat for desalinization applications.
- 2 **Title:** Accelerating the cross-linking of thermally cured polymers via the photothermal effect of gold nanoparticles
Agency: PPG Industries
Amount: \$26,744
Roll: PI
Duration: 08/01/2014–08/01/2014
Goals: Examine the extent to which the photothermal effect of gold nanoparticles can enhance the rate of polyurethane curing.

- 1 **Title:** Cross-linking of polymer films, triggered by the photothermal effect of gold nanoparticles
Agency: PPG Industries
Amount: \$21,558
Roll: PI
Duration: 12/01/2013–12/01/2013
Goals: Determine the ability of the photothermal effect of nanoparticles to cross-link polyurethanes.

GRADUATE MENTORING

0 postdoc · 14 Ph.D. · 2 M.S. · 6 current

Graduate Alumni

	Name	Placement upon graduation	Grad.
Ph.D.	Lilian Mawby	TBD, TBD	2021
Ph.D.	Santina Cruz	TBD, Colgate	2021
M.S.	Becky DiMarco	TBD, TBD	2021
Ph.D.	Emma Van Burns	Journal Manager, AIP Publishing	2019
Ph.D.	Joseph Fortenbaugh	Actinic, LLC, co-Founder	2019
Ph.D.	Andrea Widstrom	TBD, TBD	2019
Ph.D.	Jonathan Fagan	Postdoc, SUNY, Stony Brook, Chemistry	2019
Ph.D.	Brittney Grisewood	TBD, Church & Dwight Co	2018
Ph.D.	Robert Johnson	Postdoc, Drexler University, Physics	2016
Ph.D.	Angela Bischof	Teaching Professor, Penn State, Chemistry	2015
Ph.D.	Anthony Cirri	Postdoc, SUNY Stony Brook, Chemistry	2015
Ph.D.	Steven Kennedy	Adjunct Professor, Roanoke College, Chemistry	2015
Ph.D.	Kaitlin Haas	Senior Scientist, 3M, Coatings	2015
Ph.D.	Juyeong Kim	Postdoc, UIUC, Materials Science	2014
Ph.D.	Andrea Giordano	Assistant Professor, St. John Fischer, Chemistry	2014
M.S.	Joshua Wruble	Safety Coordinator, Bettis Atomic Power Laboratory	2013
postdoc	Brian Alberding	Research Chemist, NIST	2013

Current Graduate Students

	Name	Previous Institution	Joined
Ph.D.	Ben Kaercher	None	2021
Ph.D.	Sarah Phillips	Texas A&M	2020
Ph.D.	Nate Ginder	Case Western Reserve	2018
Ph.D.	Zachary Rhodan	Bloomsburg University	2016
Ph.D.	Vivian Tanygin	University of Chicago	2015
Ph.D.	Anthony Katona	Susquehanna University	2015

UNDERGRADUATE MENTORING

10 Alumni · 8 REU · 3 Current

Undergraduate Alumni

	Name	Position upon Graduation	Grad.
B.S.	Cecelia Flores	University of California, Los Angeles, Chemical Engineering Graduate Program	2021
B.S.	Danny Glickman	Hershey Medical School	2021
B.S.	Nick Litak	Harvard, Betley Group	2021
B.S.	Madeline Anderson	None	2019
B.S.	Madison Atkerson	None	2019
B.S.	Sabrina Carrozzi	None	2019
B.S.	Julie Lester	Xellia Pharmaceuticals	2016
B.S.	Morgan Kozar	Unilever	2016
B.S.	Eric Piechota	University of North Carolina, G. Meyer group	2014
B.S.	Brandon Killduff	University of Wisconsin, Fredrickson Group	2013

REU Students

	Name	Undergraduate Institution	Year
B.S.	Aaron Vilchez	University of California, Los Angeles	2021
B.S.	Nate Ginder	Case Western Reserve University	2017
B.S.	Dickson Ortiz	University of Puerto Rico	2016
B.S.	Tyler Logue	The Pennsylvania State University	2016
B.S.	Jon Schultz	University of Minnesota	2015
B.S.	Alyssa Rosas	Texas A&M University	2014
B.S.	John Lin	The City College of New York	2013
B.S.	Brandon Plaisance	University of Louisiana Lafayette	2012

Current Undergraduate Students

	Name	Major	Joined
B.S.	Mitchelle Stry	Chemistry	2021
B.S.	Hannah Priller	Chemistry and Mechanical Engineering	2020
B.S.	Timothy Lou	Chemistry	2019

TEACHING

3 undergraduate courses taught · 1 graduate course taught

Course Number	Name/Description	Sem.
SC 103N	<i>When Data Meets Design</i> General education course, counting for both General Science and General Arts credits. Students learn the history behind data visualizations, design rules for creating their own data visualizations, and how to interpret and critique data visualizations. This course was designed by me.	S2019 F2020 F2021

CHEM 110	<i>Chemical Principles I</i> First semester general chemistry. Students are taught quantum theory of the atom and bonding, molecular shapes, hybridization, ideal gas behavior, solutions, reaction chemistry, and thermochemistry.	F2011 F2012 F2013 F2014 F2015 F2016
CHEM 110H	<i>Chemical Principles I, Honors</i> First semester general chemistry. Students are taught quantum theory of the atom and bonding, molecular shapes, hybridization, ideal gas behavior, solutions, reaction chemistry, and thermochemistry.	F2017 F2018 F2020 F2021
CHEM 518	<i>Physical Methods in Inorganic Chemistry</i> Students are introduced to group theory and its applications. The course begins with definition of symmetry operations and groups, as well as their matrix representations. These concepts are applied to the electronic structure of isolated molecules (orbitals) and solid state materials (bands). Then, group theory is applied to spectroscopies, including rotational, vibrational (IR and Raman), electronic, EPR, NMR, XPS, and Mossbauer.	F2010 F2011 F2012 F2013 F2014 F2016 F2017 F2019

SERVICE

2 current committees· 6 past committees

EXTERNAL

Role	Name/Responsibilities	Years
Reviewer	<i>NSF GRFP</i> Review applications for the National Science Foundation's Graduate Fellowship Research Program	2020
Organizer	<i>National ACS meeting</i> Organized a symposium on ligand effects in metallic nanoparticles	2019
Reviewer	<i>Fulbright Finland</i> Reviewed applications for the Fulbright Finland Program	2019 2020 2021
Panel Reviewer	<i>NSF GRFP</i> Reviewed applications for the NSF GRFP.	2019

Reviewer	<i>DOE BES</i> Reviewed proposals submitted to the DOE BES program	2019
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Host	<i>PacificChem Congress</i> Running a session of the symposium, Metal-based Nanostructures: From Synthesis to Functionalization, Characterization, and Applications	2021
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DEPARTMENTAL

Role	Name/Responsibilities	Years
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Reviewer	<i>Priestly Prize Committee</i> Review nominations for the Department of Chemistry's outstanding teaching award	2021
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Reviewer	<i>Eberly College of Science Sabbatical Review</i> Review applications for sabbatical by members of the college	2020
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Chair	<i>Continuing Teaching Assistant Award</i> Organized a call for and evaluation of proposals from TAs for course improvements	2020 2021
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Associate Head	<i>Facilities</i> Maintain a list of facilities available to department members. Strategic planing of expansions to shared facilities.	2018 2019 2020 2021
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Member	<i>Faculty Search</i> Evaluate applicants and select candidates for on campus interviews.	2016 2017 2018
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Chair	<i>Faculty Search</i> Lead a committee that evaluates applicants and selects candidates for campus interviews	2020
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Chair	<i>Seminar Committee</i> Organize the selection and invitation of speakers for the academic year. The committee is composed of one representative from each research interest group within the department.	2016 2017 2018
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Member	<i>Continuing Teaching Assistant Award</i>	2016
	Evaluate proposals by teaching assistants for improvements to courses. Select students for cash awards based upon merits of their proposals.	2017 2018
Member	<i>Seminar Committee</i>	2014
	Aid in the selection of speakers for the departmental seminar series. Organized the efforts for the inorganic and materials research interest groups	2015 2016
Member	<i>Graduate Admissions</i>	2010
	Evaluate applicants and select the incoming class of graduate students	2011 2012 2013
Member	<i>RUE Selection</i>	2015
	Evaluate applicants for Penn State's REU program and select candidates for admission	2016
Member	<i>Graduate Student Counseling and Awards</i>	2011
	Plan and implement the academic plan for the graduate program in chemistry	2012 2021
Advisor	<i>Undergraduate advising</i>	2014
	Advise chemistry majors in creating their academic plans and finding research opportunities.	2016
Member	<i>Department head advisory committee</i>	2013
	Advise the head of the chemistry department on potential changes to the department	
Judge	<i>Undergraduate poster session</i>	2010
	Judge final posters of students from their laboratory courses	2011 2012 2013
Evaluator	<i>Teaching</i>	2017
	Evaluate the teaching of colleagues	2018 2019 2020 2021
Member	<i>Facilities Coordinator Hiring</i>	2021

Select a candidate to coordinate the department of chemistry's facilities—including maintenance, renovations, safety, and other such tasks.

Mentor	<i>Faculty Peer Mentor</i> Advise faculty mentee on issues related to teaching, research, and service	2021
Host	<i>Alumni visits</i> Giving tours of the department and campus to illustrious alumni of the department.	2021
Member	<i>Graduate Curriculum Committee</i> Review existing graduate curriculum for the chemistry department, and suggest a process for proposing new courses.	2022

UNIVERSITY

Role	Name/Responsibilities	Years
Advisor	<i>Undergraduate Honors program</i> Advise students from the honors college on course of study and professional preparation.	2020 2021
Advisor	<i>Undergraduate Research</i> Design and implement a program aimed to encourage freshman and sophomore college of science undergraduates to participate in on-campus research	2018 2019
Member	<i>Graduate Student Committees</i> Participate in graduate examinations and defenses. Read and comment on theses. Students, Department, Preceptors, and years are as follows:	None
Evaluator	<i>Shreyers Honors College Admissions</i> Evaluate applications of incoming first year undergraduate students for admission to Penn State's Honors College.	2020

	Student	Department	Preceptor	Years
Ph.D.	Alexander Castonguay	Chemistry	Lauren Zarzar	2017–now
Ph.D.	Charles Rafalko	Chemistry	Mike Hickner	2020–now
Ph.D.	Charles Wood	Chemistry	Ray Schaack	2021–now
Ph.D.	Connor McCormick	Chemistry	Ray Schaack	2018–now

Ph.D.	Daniel Knappenberger	Chemistry	Beth Elacqua & Mike Hickner	2021–now
Ph.D.	Gaurav Dey	Chemistry	Ray Schaack	2021–now
Ph.D.	Hailey Young	Chemistry	Ray Schaack & Enrique Gomez	2020–now
Ph.D.	Imra Chaudhry	Chemistry	Lasse Jensen	2021–now
Ph.D.	Jiaqi Song	Chemistry	Ayusmen Sen	2020–now
Ph.D.	John Swartzfager	Chemistry	John Asbury	2016–now
Ph.D.	Jordan Wallaace	Chemistry	Ken Knappenberger	2020–now
Ph.D.	Joseph Veglak	Chemistry	Ray Schaack	2021–now
Ph.D.	Katelyn Baumler	Chemistry	Ray Schaack	2020–now
Ph.D.	Kelsey Schlegel	Chemistry	John Asbury	2016–now
Ph.D.	Kenneth Judd	Chemistry	Paul Cremer	2016–now
Ph.D.	Krista Hirsch	Chemistry	Lauren Zarzar	2021–now
Ph.D.	Kyle Munson	Chemistry	John Asbury	2016–now
Ph.D.	Margaret Lakomy	Chemistry	Ramesh Giri	2020–now
Ph.D.	Mica Pitcher	Chemistry	Amir Sheikhi	2020–now
Ph.D.	Momoka Nagamine	Chemistry	Ibrahim Ozbolot	2021–now
Ph.D.	Nate Smith	Chemistry	Ken Knappenberger	2021–now
Ph.D.	Rachel Guest	Chemistry	Christian Pester	2021–now
Ph.D.	Ran Chen	Chemistry	Lasse Jensen	2018–now
Ph.D.	Sarah O’Boyle	Chemistry	Ray Schaack	2020–now
Ph.D.	Sarah Sheffield	Chemistry	Mike Hickner & Enrique Gomez	2017–now
Ph.D.	Supuni Inaththappulige	Chemistry	Ramesh Giri	2021–now
Ph.D.	Tylene Hilaire	Chemistry	Rob Hickey	2018–now
Ph.D.	William Jeffries	Chemistry	Ken Knappenberger	2017–now
Ph.D.	Yujia Zhai	Chemistry	John Asbury	2020–now
Ph.D.	Zixian Pan	Chemistry	John Asbury	2021–now
Ph.D.	Zixuan Guo	Chemistry	Enrique Gomez	2017–now
Ph.D.	H. Song	Chemistry	???	2012–None
Ph.D.	H. Zhu	Chemistry	???	2012–None
Ph.D.	Steven Arro	Chemistry	John Badding	2012–None
Ph.D.	Y Liu	Chemistry	???	2011–None
Ph.D.	Z. Tuan	Chemistry	???	2010–None
Ph.D.	Abigail Fagan	Chemistry	Ray Shaack	2017–2021
Ph.D.	Briana Laubacker	Chemistry	John Badding & Miriam Freedman	2014–2021
Ph.D.	Kathryn Penrod	Chemistry	Adri vanDuin	2017–2021
M.S.	Kristin DiMonte	Chemistry	Miriam Freedman	2019–2021
Ph.D.	Robert Lord	Chemistry	Ray Schaack	2017–2021
M.S.	Susanna Ogazaly	Chemistry	Rob Rioux	2019–2021
Ph.D.	Connor Stultz	Chemistry	Frank Dorman	2015–2020
M.S.	Gabriella Di Dimizio	Chemistry	Ray Shaack	2019–2020
Ph.D.	Suprita Jharimune	Chemistry	Rob Rioux	2015–2020
Ph.D.	C. Yan	Chemistry	John Badding	2015–2018
Ph.D.	Hiu Yan Cheng	Chemistry	John Badding	2012–2018
Ph.D.	Bellamarie Ludwig	Materials Science	Jim Adair	2016–2017

Ph.D.	Jennifer Dysart-Russell	Chemistry	Tom Mallouk	2010–2017
Ph.D.	Chris Harmon	Chemistry	Will Castleman	2009–2016
Ph.D.	D. Sun	Chemistry	Mary Beth Williams	2011–2016
Ph.D.	James Hodges	Chemistry	Ray Shaack	2012–2016
Ph.D.	Nick McCool	Chemistry	Tom Mallouk	2011–2016
Ph.D.	Sarah Sihvonen	Chemistry	Miriam Freedman	2011–2016
Ph.D.	Eric Popczun	Chemistry	Ray Shaack	2010–2015
Ph.D.	Josh McEnaney	Chemistry	Ray Shaack	2011–2015
Ph.D.	Justin Moore	Chemistry	Lasse Jensen	2010–2015
Ph.D.	Megan Strayer	Chemistry	Tom Mallouk	2010–2015
Ph.D.	Nella Vargas-Barbosa	Chemistry	Tom Mallouk	2010–2015
Ph.D.	Nikki Lafemina	Chemistry	Karl Muller	2010–2015
Ph.D.	Sha Sun	Chemistry	Mary Beth Williams	2010–2015
Ph.D.	Thomas Modzelewski	Chemistry	Harry Allcock	2010–2015
Ph.D.	M Zhang	Chemistry	???	2010–2014
M.S.	Philip Weiss	Chemistry	Lasse Jensen	2011–2014
Ph.D.	Chris Averill	Chemistry	John Asbury	2011–2013
Ph.D.	Nichole Morozowich	Chemistry	Harry Allcock	2008–2013
Ph.D.	Ryan Pavlick	Chemistry	Ayusman Sen	2010–2013
M.S.	Yu Zhao	Chemistry	Mary Beth Williams	2010–2013
Ph.D.	Jacob Beveridge	Chemistry	Mary Beth Williams	2007–2012
M.S.	Seth Ostheimer	Chemistry	Mary Beth Williams	2009–2011
Ph.D.	Z Schaefer	Chemistry	???	2007–2011

OUTREACH ACTIVITIES

Organization	Activity/Responsibilities	Years
Penn State	<i>Upward Bound/SEECoS</i>	2013
	Design and lead a summer course for high school students from disadvantaged areas in PA. Includes laboratory experience	2014
		2017
		2018
		2019
Department of Chemistry	<i>REU</i>	2011
	Provide hands-on research experience for undergraduate students. Students are selected in a nationwide competition.	2012
		2013
		2014
		2015
		2016
		2017
		2018
2021		

Penn State		<i>Carbon earth</i>	2013
		NSF-funded outreach program to K-12 schools in the Centre County PA rural area. Included visits to area schools and visits of area students to our laboratories.	2014 2015
Valley Schools	Christian	<i>Advising</i>	2011
		Help to develop a cutting-edge research experience for high school students.	

PROFESSIONAL AFFILIATIONS _____

Role	Organization	Years
Member	American Chemical Society	2000–now
Member	Royal Chemical Society	2010–now

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