

## Stacy M. Copp

University of California, Irvine  
Interdisciplinary Science and Engineering Bldg.  
Irvine, CA 92697

Email: stacy.copp@uci.edu  
Phone: (949)824-8181  
Website: copplab.eng.uci.edu

---

### PROFESSIONAL APPOINTMENTS

#### **University of California, Irvine**

Assistant Professor of Materials Science and Engineering	2019-present
Assistant Professor of Physics and Astronomy, <i>by courtesy</i>	2019-present
Assistant Professor of Chemical and Biomolecular Engineering, <i>by courtesy</i>	2021-present

#### **Los Alamos National Laboratory (LANL)**

Hoffman Distinguished Postdoctoral Fellow	2018-2019
UC President's Postdoctoral Fellow, LANL and UC Davis	2017-2019
Director's Postdoctoral Fellow, LANL	2017-2018

### EDUCATION

#### **University of California, Santa Barbara (UCSB)**

Ph.D. Physics	2016
Advisor: Elisabeth Gwinn	
Thesis: Optical Materials with a Genome: Nanophotonics with DNA-Stabilized Silver Clusters	

M.A. Physics	2013
--------------	------

#### **University of Arizona**

B.S. Physics with Honors and Mathematics, <i>summa cum laude</i>	2011
--	------

### RESEARCH

My research program focuses on fundamental chemistry and design of DNA- and polymer-architected nanomaterials for biophotonics, nanoelectronics and energy technologies. I study how nucleic acids can organize metal ions and template metallic nanoclusters, with a current major focus on DNA-stabilized silver nanoclusters as near-infrared fluorophores for deep tissue bioimaging. My lab also investigates DNA and peptide-based “wires” for bioelectronics, as well as block polymer-directed nanoparticle assembly. We develop machine learning tools to guide our experimental studies and provide new insights into materials chemistry.

### PUBLICATIONS

**Peer-reviewed journal articles.** († Corresponding author. UCI Copp lab members **bold**)

- J27. B. P. Carpenter, B. Rose, E. M. Olivas, M. X. Navarro, A. R. Talosig, P. J. Hurst, G. Di Palma, L. Xing, **R. Guha**, **S. M. Copp**, J. P. Patterson. The role of protein folding in pre-nucleation clusters on the activity of enzyme@metal-organic frameworks, *J. Mater. Chem. A.*, In press, (2024).
- J26. **R. Guha**, **A. González-Rosell**, **Malak Rafik**, **N. R. Arevalos**, B. B. Katz, **S. M. Copp**<sup>†</sup>. Electron count and ligand composition influence the optical and chiroptical signatures of NIR-emissive DNA-stabilized silver nanoclusters. *Chem. Sci.* **14**, 11340 (2023). \*Featured on Inside Front Cover.
- J25. **P. Mastracco** and **S. M. Copp**<sup>†</sup>. Beyond Nature's base pairs: machine learning-enabled design of DNA-stabilized silver nanoclusters. *Chem. Commun.* **59**, 10360 (2023).

- J24. **R. Guha, Malak Rafik, A. González-Rosell, S. M. Copp**<sup>†</sup>. Salt, acid, heat: synthesis strategies to favor formation of near-infrared DNA-stabilized silver nanoclusters. *Chem. Commun.* **59**, 10488 (2023). \*Featured on Front Cover.
- J23. **A. González-Rosell**, S. Malola, **R. Guha, N. R. Arevalos**, M. F. Matus, M. E. Goulet, E. Haapaniemi, B. B. Katz, T. Vosch, J. Kondo, H. Häkkinen, **S. M. Copp**<sup>†</sup>. Chloride ligands on DNA-stabilized silver nanoclusters. *J. Am. Chem. Soc.*, **145**, 10721 (2023).
- J22. **P. Mastracco, A. González-Rosell, J. Evans**, P. Bogdanov, **S. M. Copp**<sup>†</sup>. Chemistry-informed machine learning enhances predictive design of fluorescent DNA-stabilized silver clusters. *ACS Nano* **16**, 16322 (2022).
- J21. **A. González-Rosell, R. Guha**, V. Rück, C. Cerretani, M. B. Liisberg, B. B. Katz, T. Vosch, **S. M. Copp**<sup>†</sup>. DNA stabilizes eight-electron superatom silver nanoclusters with broadband downconversion and microsecond-lived luminescence. *J. Phys. Chem. Lett.* **13**, 8305 (2022).
- J20. **S. M. Copp**<sup>†</sup>, R. L. Hamblin, K. Swingle, D. Rai, V. Urban, S. A. Ivanov, G. A. Montaño<sup>†</sup>. Investigation of the pH-dependent interaction of weak polyelectrolyte block copolymer micelles with molecular fluorophores. *Langmuir* **38**, 2038 (2022).
- J19. **S. M. Copp**<sup>†</sup>, **A. González-Rosell**. Large-scale investigation of the effects of nucleobase sequence on fluorescence excitation and Stokes shifts of DNA-stabilized silver clusters. *Nanoscale* **13**, 4602 (2021) \*Nanoscale Emerging Investigators Themed Collection
- J18. **A. González-Rosell**, C. Cerretani, **P. Mastracco**, T. Vosch, **S. M. Copp**<sup>†</sup>, Structure and luminescence of DNA-templated silver clusters. *Nanoscale Advances* **3**, 1230 (2021) \*Inside back cover
- J17. M. B. Liisberg, Z. S. Kardar, **S. M. Copp**, C. Cerretani, T. Vosch. Single-molecule detection of DNA-stabilized silver nanoclusters emitting at the NIR I/II border. *J. Phys. Chem. Lett.* **12**, 1150 (2021).
- J16. V. A. Neacșu, C. Cerretani, M. B. Liisberg, S. M. Swasey, E. G. Gwinn, **S. M. Copp**, T. Vosch. Unusually large fluorescence quantum yield for a near-infrared emitting DNA-stabilized silver nanocluster. *Chem. Commun.* **56**, 6384 (2020).
- J15. **S. M. Copp**<sup>†</sup>, S. M. Swasey, A. Gorovits, P. Bogdanov, E. G. Gwinn. General approach for machine learning-aided design of DNA-stabilized silver clusters. *Chem. Mater.*, **32**, 430 (2020).
- J14. T. Elkin, **S. M. Copp**, R. L. Hamblin, J. S. Martinez, G. A. Montano, R. C. Rocha. Synthesis of Terpyridine-Terminated Amphiphilic Block Copolymers and Their Self-Assembly into Metallo-Polymer Nanovesicles. *Materials*, **12**, 601 (2019).
- J13. S. M. Swasey, F. Rosu, **S. M. Copp**, V. Gabelica, E. G. Gwinn. Parallel G-duplex and C-duplex DNA with Uninterrupted Spines of Ag<sup>I</sup>-Mediated Base Pairs. *J. Phys. Chem. Lett.*, **9**, 6605 (2018).
- J12. S. M. Swasey, **S. M. Copp**, H. C. Nicholson, P. Bogdanov, A. Govorits, E. G. Gwinn. High throughput near infrared screening discovers DNA-templated silver clusters with peak fluorescence beyond 950 nm. *Nanoscale*, **10**, 19701 (2018).
- J11. S. M. Swasey, H. C. Nicholson, **S. M. Copp**, P. Bogdanov, A. Govorits, E. G. Gwinn. Adaptation of a visible wavelength fluorescence microplate reader for discovery of near-infrared fluorescent probes. *Rev. Sci. Instrum.*, **89**, 095111 (2018).
- J10. **S. M. Copp**<sup>†</sup>, A. Gorovits, S. M. Swasey, S. Godibandi, P. Bogdanov, E. G. Gwinn. Fluorescence color by data-driven design of genomic silver clusters. *ACS Nano*, **12**, 8240-8247 (2018).
- J9. S. Bogh, M. Carro-Temboury, C. Cerretani, S. Swasey, **S. M. Copp**, E. G. Gwinn, T. Vosch. Unusually large Stokes Shift for a Near-Infrared Emitting DNA-Stabilized Silver Nanocluster. *Methods Appl. Fluoresc.*, **16**, 024004 (2018).

- J8. **S. M. Copp**, D. Schultz, A. Faris, S. Swasey, E. Gwinn. Cluster Plasmonics: Dielectric and Shape Effects on DNA-Stabilized Silver Clusters. *Nano Lett.*, **16**, 3594-3599 (2016).
- J7. **S. M. Copp**, A. Faris, S. Swasey, E. Gwinn. Heterogeneous Solvatochromism of Fluorescent DNA-Stabilized Silver Clusters Precludes Use of Simple Onsager-Based Stokes Shift Models. *J. Phys. Chem. Lett.*, **7**, 698-703 (2016).
- J6. E. Gwinn, D. Schultz, **S. M. Copp**, S. Swasey. DNA-Protected Silver Clusters for Nanophotonics. *Nanotechnology*, **5**, 180-207 (2015).
- J5. **S. M. Copp**, D. Schultz, S. Swasey, E. Gwinn. Atomically Precise Arrays of Fluorescent Silver Clusters: a Modular Approach for Photonics on DNA Nanostructures. *ACS Nano*, **9**, 2303-2310 (2015). \*ACS Nano featured article
- J4. **S. M. Copp**, P. Bogdanov, M. Debord, A. Singh, E. Gwinn. Base Motif Recognition and Design of DNA Templates for Fluorescent Silver Clusters by Machine Learning. *Adv. Mater.* **26**, 5839-5845 (2014).
- J3. **S. M. Copp**, D. Schultz, S. M. Swasey, J. Pavlovich, M. Debord, A. Chiu, K. Olsson, E. Gwinn. Magic Numbers in DNA-Stabilized Fluorescent Silver Clusters Lead to Magic Colors. *J. Phys. Chem. Lett.* **5**, 959-963 (2014).
- J2. D. Schultz, **S. M. Copp**, N. Markešević, K. Gardner, S.S.R. Oemrawsingh, D. Bouwmeester, E. Gwinn. Dual-Color Nanoscale Assemblies of Structurally Stable, Few-Atom Silver Clusters, as Reported by Fluorescence Resonance Energy Transfer. *ACS Nano* **7**, 9798-9807 (2013).
- J1. **S. Shiffler\***, P. Polynkin, J. Moloney. Self-focusing of femtosecond diffraction-resistant vortex beams in water. *Opt. Lett.* **36**, 3834-3836 (2011). (\*maiden name)

#### Peer-reviewed conference proceedings.

- C1. F. Moomtaheen, M. Killeen, J. Oswald, **A. González-Rosell**, **P. Mastracco**, A. Gorovits, **S. M. Copp**, P. Bogdanov. DNA-Stabilized Silver Nanocluster Design via Regularized Variational Autoencoders. In *Proceedings of the 28th ACM SIGKDD Conference on Knowledge Discovery and Data Mining (KDD '22)*. Association for Computing Machinery, 3593–3602 (2022).

#### Book chapters.

- B1. **R. Guha** and **S. M. Copp**<sup>†</sup>. Nucleic acid-templated metal nanoclusters. In *Modern Avenues in Metal-Nucleic Acid Chemistry* 1st ed. CRC Press, 2023, pp 291-342.

#### Publications in review and preparation.

- P1. **E. Bethur**, **R. Guha**, Z. Zhao, P. D. Ashby, H. Zeng, **S. M. Copp**<sup>†</sup>. Formation and nanomechanical properties of silver-mediated guanine duplexes in aqueous solution. *In revision, ACS Nano*.
- P2. **P. Mastracco**, E. Sadeghi, M. Solomon, **A. González-Rosell**, P. Bogdanov, **S. M. Copp**<sup>†</sup>. Multiobjective design of DNA-stabilized silver nanocluster color and emission intensity with regularized variational autoencoders. *In preparation for Advanced Materials*.
- P3. **P. Mastracco**, K. Yu, X. Wang, J. Schoenung, E. Lavernia<sup>†</sup>, **S. M. Copp**<sup>†</sup>. Machine learning-guided discovery of factors governing twinning in MgY alloys. *In preparation for Digital Discovery*.
- P4. **P. Mastracco**, L.N. Mohanam, Y. Oh, Q. Cui, S. Sharifzadeh<sup>†</sup>, **S. M. Copp**<sup>†</sup>. Influence of Structural Distortions on Electronic Structure of De Novo Peptide Bundles. *In preparation*.

#### SELECTED HONORS & AWARDS

Fellow for Scialog: Automating Chemical Laboratories

2024

US Frontiers of Engineering Symposium Selected Participant	2023
Hellman Faculty Fellowship	2023
UC Irvine School of Engineering Early Career Excellence in Research Award	2023
2nd Place Winner of the 2022 Spectroscopy Application Challenge (International competition by StellarNet, Inc., \$1,500 award)	2022
Kathy Alberti Faculty Award for grad student advocacy and promotion (UCI)	2021
AFOSR Young Investigator Program (YIP) Award	2020
Samueli Faculty Development Chair	2019
Outstanding Reviewer for Molecular Systems Design and Engineering, RSC	2018
L'Oreal USA for Women in Science Fellowship, L'Oreal USA & AAAS	2018
Hoffman Distinguished Postdoctoral Fellowship, LANL	2018
UC President's Postdoctoral Fellowship, University of California	2017
Director's Postdoctoral Fellowship, LANL	2017
Materials Research Society (MRS) Graduate Student Silver Award	2015
Arthur Nowick Graduate Student Award, MRS	2015
Selected participant, 65 <sup>th</sup> Lindau Nobel Laureate Meeting	2015
Fiona Goodchild Award for excellence in undergrad. research mentorship, UCSB	2015
NSF Graduate Research Fellowship	2011
Chancellor's Fellowship, UCSB	2011
Yzurdiaga Fellowship, UCSB Physics Dept.	2011
Goldwater Scholar	2010

### INVITED TALKS

09/2024	Center for Molecular Design and Biomimetics, Arizona State University Seminar
06/2024	Noble Metal Nanoparticles Gordon Research Conference, Mt. Holyoke, MA
03/2024	Argonne National Laboratory Seminar
03/2024	University of California, San Diego NanoEngineering Seminar
02/2024	Pennsylvania State University Chemistry Seminar
01/2024	North Carolina State University Materials Science and Engineering Seminar
01/2024	University of California, Riverside Materials Science and Engineering Colloquium
10/2023	Nanoscience Days 2023 <u>Plenary Speaker</u> , University of Jyväskylä, Finland
02/2023	Brigham Young University Chemistry and Biochemistry Dept. Seminar
10/2022	Atomically Precise Nanochemistry Gordon Research Conference, Ventura, CA
09/2022	41st Annual Symposium on Applied Surface Analysis, Pacific Northwest Nat. Lab.
08/2022	UC Santa Barbara Center for Polymers and Organic Solids Seminar
04/2022	George Mason University Chemistry Seminar
08/2021	Beckman Laser Institute Program Seminar Series
05/2021	Sonoma State University Physics and Astronomy Public Lecture Series
02/2021	UC Riverside Bioengineering Seminar
01/2021	UC Irvine Biological Chemistry Seminar
10/2020	Intl. Symposium on Small Particles & Inorganic Clusters (canceled, COVID19)
09/2020	Center for Integrated Nanotechnologies Annual Meeting, LANL & Sandia Nat. Lab.
08/2020	UC Irvine Photonics Seminar
01/2020	UC San Diego Mechanical and Aerospace Engineering Seminar
11/2019	University of Arizona Physics Department Colloquium
10/2019	UC Irvine Materials Science and Engineering Seminar

10/2019	APS Four Corners Meeting
07/2019	Center of Integrated Nanotechnologies, Sandia National Labs
01/2019	UC Santa Barbara ABC...z Physics Seminar
12/2018	UC Irvine Materials Science and Engineering
12/2018	UC Irvine Physics, Condensed Matter Seminar
11/2018	UC Santa Cruz Electrical and Computer Engineering Seminar
10/2018	APS Four Corners Meeting
04/2018	UC Irvine Physics and Chemistry Seminar
03/2018	UC Merced Chemistry and Chemical Biology Seminar
02/2018	Center of Integrated Nanotechnologies, Sandia National Labs
11/2017	Northern Arizona University Physics and Astronomy Colloquium
07/2017	Gordon Research Conference on Clusters and Nanostructures, Mount Holyoke MA
06/2017	LANL Materials Physics and Applications Council
12/2016	UC Santa Cruz Genomics Institute Seminar
06/2016	Wyss Institute, Boston MA
08/2015	Wyss Institute, Boston MA
05/2015	ITST Condensed Matter Seminar Series, UC Santa Barbara
03/2015	APS March Meeting, San Antonio TX
06/2014	Collaborative Conference on Materials Research, Incheon/Seoul, South Korea

## CONTRACTS, GRANTS, AND SPONSORED RESEARCH

### **Current Funding**

- NSF Biophotonics, “Collaborative Research: New class of near-infrared fluorophores derived from DNA-templated silver clusters for deep tissue imaging.” **Lead PI**, \$361,636, 9/20 – 8/23
- AFOSR Young Investigator Program, “Expanding the toolbox of DNA nanotechnology: silver-mediated DNA base pairing.” **Sole PI**, \$450,000, 7/21 – 7/24
- ACS Petroleum Research Fund Doctoral New Investigator, “Hierarchical order driven by solution-phase block copolymer self-assembly.” **Sole PI**, \$110,000, 1/23 – 8/25
- Hellman Faculty Fellowship, “Engineering functional biolabels for non-invasive deep tissue imaging.” **Sole PI**, \$50,000, 7/23 – 6/24
- University of California Multicampus Research Programs and Initiatives (MRPI), “UC Collaborative for AI-enabled Materials Exploration and Optimization (UC-CAMEO)” **Co-PI**, \$53,204 to UCI, 1/23 – 12/24
- NSF Division of Materials Research, “UCI MRSEC: Materials Discovery Through Atomic Level Structural Design and Charge Control.” Senior personnel, \$18m (to Copp lab: support for PhD student and small supplies budget), 9/20 – 8/25
- NSF DMREF Supplement. “Uncovering hidden correlations between HCP metal alloy microstructural parameters and twinning behavior by unsupervised machine learning.” Senior personnel, \$69,882 to Copp lab, 09/20 – 09/23

### **Past Funding**

- AFOSR DURIP, “DURIP: A circular dichroism spectrometer for analysis of self-assembling bioinspired nanomaterials.” **Lead PI**, \$112,543, 04/22 – 04/23

L'Oreal USA for Women in Science Fellowship (managed by AAAS), "Soft matter photonics: a data-driven approach to light-matter interactions." **PI**, \$60,000, 07/19 – 10/20

## TEACHING AND MENTORSHIP

### **Research supervision and mentorship, UCI**

- **Ph.D. students:** Peter Mastracco (2019-present), Anna González-Rosell (2019-present), Eshana Bethur (2021-present), Alexander Vasquez (2022-present), Anthea Segger (2023-present), I Hsin "Vivian" Lin (2023-present), Jayme Chow (2024-present)
- **M.S. students:** Malak Rafik (Pathway to PhD Fellow, 2021-2022) Daniel Snow (2019-2020, now R&D Chemist at Sherwin Williams)
- **Undergraduate students:** Wendy Lee (2019-20), Jiewen He (2020), Nery Arevalos (2020-2022), Diego Espino (SURF 2021), Hannah Martin (REU 2021), John Bateman (2022), Tasneem Khokhar (2022), Vianna Xiao (2022), Shan "Vicky" Yu (2022), Michael Friend (REU 2022), I Hsin Lin (UCInspire 2022), Kaicheng Jiang (2022-present), Crystal Murillo (2023-present), Carlos Melchor (2023-present), Jessica Lee (2023-present), Vareesha Uddin (2023-present), Jose Lopez-Gallego (2023-present), Christopher Muller (2023 REU)
- **Chaffey Community College students:** Joshua Evans (2020-21), Miriam Contreras (2021)
- **Postdoctoral researchers:** Rweetuparna Guha (2021-present)

**Research supervision at UCSB and LANL:** 14 undergraduates, including 5 women, 5 minoritized students, and 7 community college transfer students. 6 are my coauthors on publications. 8 pursued graduate degrees in STEM.

**Changing the Face of STEM:** my lab's effort to increase inclusion of underrepresented groups in STEM. Research opportunities for community college and transfer students at UCI and Chaffey Community College. Development of educational resources to "spotlight" underrepresented materials scientists in college curricula, available on my website (*in progress*).

### **Courses taught, University of California, Irvine**

- MSE 205: Materials Physics. (2020-2024) Core course of MSE PhD and MS programs. Solid state physics related to electronic and optical properties of crystalline materials. Adapted course to remote format in Spring 2020, incorporated significant amounts of new curricular material, and integrated bi-weekly student surveys to optimize student learning.
- MSE 151: Polymeric Materials (2020, 2022-2023) Core MSE undergrad course on science and engineering of polymeric materials. Developed new course, integrated core material with topics on societal and environmental impacts and art in science, integrated "scientist spotlights" from Changing the Face of STEM effort (above), and applied student survey strategies from MSE 205.
- MSE 141/241: Nanomaterials (2023-2024) Elective MSE undergraduate and graduate course on fundamental science and emerging new directions in nanomaterials.

## SERVICE AND LEADERSHIP

### **Professional societies**

- Member of American Physical Society, Materials Research Society, American Chemical Society
- Co-chair, Gordon Research Conference on Atomically Precise Nanochemistry 2026
- Co-vice chair and discussion leader, Gordon Research Conference on Atomically Precise Nanochemistry 2024

- Lead Symposium Organizer, Materials Research Society Fall 2024
- Panelist, Gordon Research Seminar, Atomically Precise Nanochemistry, Oct. 2022
- Discussion Leader, Gordon Research Conference, Noble Metal Nanoparticles, Jun. 2022 (canceled due to COVID illness)
- Session Presider, ACS Spring Meeting 2021
- Panelist and Session Chair, APS Conference for Undergraduate Women in Physics, 2019-20
- Session Chair, APS Four Corners Annual Meeting, UT 2018 and AZ 2019

**Peer reviewer:**

- Scientific journals: *Nature Communications*, *ACS Nano*, *Chemical Science*, *PLOS One*, *Molecular Systems Design & Engineering*, *Journal of Physical Chemistry Letters*, *ChemPhysChem*, *Nanoscale Advances*, *Matter*, *ACS Omega*, *ACS Applied Biological Materials*, *Advanced Materials*, *Angewandte Chemie*, *Nature Nanotechnology*
- Agencies: NSF Biophotonics CAREER and unsolicited proposal panels, and NSF GRFP panel, AFOSR, ARO, Universities Canada Global Excellence Initiative

**University and department service**

- UCI What Matters to Me and Why Planning Committee (2023-present)
- UCI MSE Department Seminar Coordinator (2023-24)
- UCI Center for Complex and Active Materials (CCAM) MRSEC co-lead of Innovation & Collaboration Committee (2022-present)
- UCI Parenting Students Work Group (2021-2023)
- Faculty search committees at UCI, MSE (2021-22) and IDMI (2020)
- MSE Department Strategic Planning Committee (2021-22)
- MSE Graduate Student Association faculty mentor (2019-21): Liason on issues of student wellness and service, support of Science of Cooking K-12 outreach program.
- MSE graduate curriculum task force/committee (2019-21)
- MSE anti-racism working group (2020-21): department town halls, website development.

**Recent community service (UCI)**

- K-12 and community college science outreach through virtual and hands-on demos, through UCI MRSEC and MSE Graduate Student Association partnerships (2020-present)
- LANL Summer Physics Camp for Young Women: hands-on demos led by my lab, Zoom @ UCI (2017-22)
- UCI Alumni Association events guest speaker: Bringing it Back to UCI (April 2021), UCI Alumni Annual Meeting (June 2022)
- Guest Speaker, Chaffey Community College Women in STEM Event (Feb. 2022)
- Co-host and organizer for Bridging the Gap Forums on Graduate Student Wellness. Three forums for UCI grad students in SSoE and ICS (2021) Planning events with Physical Sciences in 2022-23.
- Guest speaker, MatSci undergraduate club (2020)
- Faculty Women in Engineering Panel, Engineering Undergraduate Student Affairs (2020, 2021)
- Parenting Workshop Panel, Physical Sciences (2019)