

A'Lester C. Allen

IRACDA Postdoctoral Scholar

EDUCATION AND TRAINING

Ph.D., Chemistry Department, University of California Santa Cruz, 2022

Dissertation Title: "Highly Tunable Plasmonic Nanoparticles for Use as Surface Enhanced Raman Scattering Substrates for the Detection of Protein and Lipid Biomarkers in Solution."

M.S., Materials Engineering Department, San Jose State University, 2016.

Thesis Title: Preliminary investigation of commercially available pluronics as UV curable 3D printing inks for tissue engineering applications

B.S., Chemistry Department, Stanford University, 2012.

RESEARCH INTERESTS AND PROFESSIONAL EXPERIENCE

My research interests include designing, synthesizing, and characterizing new peptide probes to modulate protein targets. I aim to utilize plasmonics, non-invasive vibrational and time-resolved spectroscopy, along with the tools of synthetic medicinal chemistry, peptide chemistry, drug discovery, and chemical biology to solve interdisciplinary problems.

- Moore Lab, University of Illinois Chicago, NIH IRACDA Postdoctoral Scholar. 2022-present
Modified antimicrobial Apidaecin-137 to inhibit protein production in bacterial cells
- Zhang Lab, University of California Santa Cruz, Graduate Student Researcher. 2015-2022
Designed several novel plasmonic sensors for SERS based detection and catalysis
- National Center for Electron Microscopy, Berkeley Labs, Instrument User. 2017-Present.
- AMES Research Center, Mountain View, CA. Graduate Student Researcher. 2016-2021
- IBM Almaden Research Center, Research Intern. 2013-2015
Functionalized biocompatible PEO and PPO triblock copolymers with acrylate end groups to form UV curable gels for 3D printed scaffolds for tissue engineering.
- Louisiana State University, Undergraduate Researcher, Warner lab. Summer 2010
Explored the photothermal properties of an organic salt nanomaterial for use as hyperthermia therapeutic.
- Stanford University, Undergraduate Researcher, Zare lab. Summer 2007
Investigated the non-ideal behavior of carbon dioxide gas via expansion

AWARDS AND FELLOWSHIPS (10 awards)

NOBCCHE Analytical Division Graduate Poster Presentation Award 2021

STARS Re-Entry Scholarship 2021

President's Dissertation Year Fellowship 2020

New Generation Learning Fellow 2019

UC Chemical Symposium 1st Place in Poster Presentations 2019

MACES Center Grand Slam 2nd place 2018

University of California Santa Cruz Regents Fellowship 2015
SPE Foundation Louis Temesvary Memorial Scholarship 2015
California State University (CSU) Innovation Corps (I-Corps) Micro-Grant 2014
American Chemical Society Scholar 2007

PUBLICATIONS (4 first authored and a total of 19 co-authored)

Allen, A., Guarino-Hotz, M., Getahun, A., Ophus, C., Zhang, J. Z. "SERS Detection of SARS-CoV-2 Antibodies Using AgAu Multibranching Nanoshells Via Metal Affinity of Imidazole in His-tagged Antigens," *in progress*.

Guarino-Hotz, M., **A. Allen**, Wang, A., Zou, S. Zhang, J. Z., "Near-Infrared Light Absorbing Silver Coated Hollow Gold Nanostars for Surface Enhanced Raman Scattering Detection of Bovine Serum Albumin Using Capping Ligand Exchange," *J. Phys. Chem. C*, 2022

Allen, A., Efrem, M., Mahalingam, U., Guarino-Hotz, M., Foley, A. R., Raskatov, J., Song, C., Lindley, S. A., Li, J., Chen, B., Zhang, J. Z., "Hollow Gold Nanosphere Templated Synthesis of PEGylated Hollow Gold Nanostars and Use for SERS Detection of Amyloid Beta in Solution," *J. Phys. Chem. B*, 2021.

Allen, A., Amberchan, G., Golden, J., Singaram, B., Zhang, J.Z. "Real-time monitoring of organic reduction reactions using Raman spectroscopy," *ACS Sustain. Chem. Eng.* 2021.

Liu, L., Xu, K., **Allen, A.**, Li, X., Xia, H., Peng, L., Zhang, J. Z. "Enhancing the Photoluminescence and Stability of Methylammonium Lead Halide Perovskite Nanocrystals with Phenylalanine," *J. Phys. Chem. C*, 2021.

Xu, K., **Allen, A.**, Luo, B., Vickers, E. T., Wang, Q., Hollingsworth, W. R., Ayzner, A. L., Li, X., Zhang, J. Z. "Tuning from quantum dots to magic sized clusters of CsPbBr₃ using novel planar ligands based on trivalent nitrate coordination complex," *J. Phys. Chem. Lett.*, 2019.

Allen, A., Romero-Mangado, J., Adams, S., Flynn, M., Chen, B., Zhang, J. Z. "Detection of saturated fatty acids associated with a self-healing synthetic biological membrane using fiber-enhanced surface-enhanced Raman scattering," *J. Phys. Chem. B*, 2018.

Adams, S., Bonabi S., **Allen, A.**, Roseman G., Ramirez A. P., Millhauser G., Zhang J. Z. "The effect of polymer and gold functionalization on the magnetic properties of magnetite nanoparticles," *Biomed. Spectrosc. Imaging*, 2018.

Adams, S., Hauser, J., **Allen, A.**, Lindquist, K. P., Ramirez, A., Oliver, S., Zhang, J. Z. "Magnetic and plasmonic properties of gold nanoparticle decorated magnetite particles functionalized with silica and poly (vinyl pyrrolidone)," *ACS Appl. Nano Mater.*, 2018.

- Luo, B., Naghadeh, S. B., **Allen, A.**, Li, X., Zhang, J. Z. "Peptide passivated lead halide perovskite nanocrystals based on synergistic effect between amino and carboxylic functional groups," *Adv. Funct. Mater.*, 2017.
- Allen, A.** "Preliminary investigation of commercially available pluronics as UV curable 3D printing inks for tissue engineering applications," Master's thesis, San Jose State University, CA, 2016.
- Amberchan, G., Lopez, I., Ehike, B., Barnett, J., Bao, N., **Allen, A.**, Singaram, B., Oliver, S. "Aluminum Nanoparticles from a GaAl Composite for Water Splitting and Hydrogen Generation," *ACS Appl. Nano. Mater.*, 2022.
- Xu, K., Vickers, E. T., Luo, B., **Allen, A.**, Chen, E., Roseman, G., Wang, Q., Kliger, D. S., Millhauser, G. L., Yang, W., Li, X., Zhang, J. Z. "First synthesis of Mn-doped cesium lead bromide perovskite magic sized clusters at room temperature," *J. Phys. Chem. Lett.*, 2020.
- Liu, L., Xu, K., Vickers, E. T., **Allen, A.**, Li, X., Peng, L., Zhang, J. Z. "Varying the Concentration of Organic Acid and Amine Ligands Allows Tuning between Quantum Dots and Magic-Sized Clusters of CH₃NH₃PbBr₃ Perovskite," *ACS Appl. Nano. Mater.*, 2020.
- Mercado, R., Wahl, C., Lu, J. E., Zhang, T., Lu, B., Zhang, P., Lu, J. Q., **Allen, A.**, Zhang, J.Z., Chen, S. "Nitrogen-doped porous carbon cages for electrocatalytic reduction of oxygen: Enhanced performance with iron and cobalt dual metal centers," *ChemCatChem*, 2020.
- Bonabi, S. B., Sarang, S., Brewer, A., **Allen, A.**, Hsuan-Chiu, Y., Hsu, Y., Wu, J., Ghosh, S., Zhang, J. Z. "Size and temperature dependence of photoluminescence of hybrid perovskite nanocrystals," *J. Chem. Phys.*, 2019.
- Li, C., Lu, D., Wang, H., **Allen, A.**, Pengfei, F. "Enhanced photocatalytic activity of directly assembled Fe₂O₃/Gd₂O₃@TiO₂-based nanosheets," *J. Nanosci. Nanotechnol.*, 2019.
- Li, C., Du, S., Wang, H., Nagadeh, S. B., **Allen, A.**, Lin, X., Li, G., Liu, Y., He, C., Zhang, J. Z., Fang, P. "Enhanced visible-light-driven photocatalytic hydrogen generation using NiCo₂S₄/CdS nanocomposites," *Chem. Eng. J.*, 2019.
- Wang, H., Nagadeh, S. B., Li, C., Lu, Y., **Allen, A.**, Zhang, J. Z. "Enhanced photoelectrochemical and photocatalytic activities of CdS nanowires by surface modification with MoS₂ nanosheets," *Sci. China Mater.*, 2018.
- Xu, K., Vickers, E. T., Rao, L., Lindley, S. A., **Allen, A.**, Luo, B., Li, X., Zhang, J. Z. "Synergistic surface passivation of CH₃NH₃PbBr₃ perovskite quantum dots with phosphonic acid and (3 aminopropyl) triethoxysilane," *Sci. China Mater.*, (invited article), 2017.

PRESENTATIONS

Allen, A., "Incorporation of Alkyne Tags for Chemical Imaging to Develop a Post Translation Termination Inhibiting Antimicrobial Peptide into a Potent Class of Antibiotics," American Peptide Symposium 2023, Scottsdale, AZ.

Allen, A., "Increased detection of saturated fatty acids associated with a self-healing synthetic biological membrane using fiber-enhanced SERS," NOBCChE Conference 2021, UC Chemical Symposium, 2019.

Allen, A. Learning without community versus learning with community. New Gen Learning Graduate Student Researcher Flash Talk, May 2020

NASA AMES research intern poster session, 2017, 2018, 2019.

Allen, A. "What can Raman spectroscopy do for you, SERS?" UCSC Department Conference, 2019.

Five guest lectures (Thermodynamics, Statistical Mechanics, General Chemistry), 2017-2018.

Thomson, S., Allen, A., et al., "Raman life detection instrument development for icy worlds," NASA AMES, 2017.

Allen, A., Moore, K., Bencini, K. Hollow-fiber filtration as a cancer screening tool. CSUPERB Annual Meeting, Santa Clara, CA. March 2014.

Allen, A. Biocompatible triblock polymers as UV curable 3D printing inks for tissue engineering applications. Society of Plastics Engineers (SPE), Pleasant Hill, CA, November 2013.

Undergraduate Summer Research Symposia at LSU, ABRCAMS, 2010.

TEACHING EXPERIENCE

Instructor of Record

Organic Chemistry (Chem 1M), UC Santa Cruz, 2021

Lecture

Cellular and Molecular Biology (Bio 121), Malcolm X College, Fall 2022

Organic Chemistry (Chem 8B), UC Santa Cruz, Spring 2021

General Chemistry (Chem 1B, 1C), UC Santa Cruz, 2017-2018

Thermodynamics (Chem 163B), UC Santa Cruz, Winter 2018

Statistical Mechanics (Chem 163C), UC Santa Cruz, Spring 2018

Laboratory

General Chemistry Lab (1M), UC Santa Cruz, 2019-2020

Organic Chemistry Lab (Chem 8L), UC Santa Cruz, 2015-2021

Introduction to Materials Engineering (MatE 25), San Jose State University, 2014-2015

INVITED TALKS

International Lecture Series Mother Teresa Women's University, February 21, 2022

SERVICE, MENTORSHIP, AND OUTREACH

National Organization for the Professional Advancement of Black Chemists and Chemical Engineers Professional Development Committee Subcommittee Chair 2022, Committee Co-Chair 2023

For the 2022 national conference, we organized 6 events (workshops, seminars, and panels) focusing on helping early and mid-career professionals (undergrads through postdocs and <10 years in industry) navigate transitioning from undergrad to grad school and grad school to industry/academia. The topics of focus included financial responsibility, teaching pedagogy, scientific storytelling, navigating conflict, and personal branding on social media.

Organized Informational Panel on the NIH Funded IRACDA Program

Organized and moderated a 90-minute informational panel with program directors and postdoc fellows from five IRACDA affiliated academic institutions with 55 registered faculty, postdoc, and graduate students from the U.S., Japan, and Ghana.

Justice Equity Diversity and Inclusion Committee

Served for one quarter the Chemistry and Biochemistry DEI committee which collaborates with faculty, staff, graduate students, undergraduate students to invite speakers, organize symposia, and instill equitable work and hiring practices within the department.

Mentorship with Underrepresented Groups in STEM

Mentored three undergraduates in the Zhang lab leading to many successes

1. Awarded MARC scholarship and presented at the 2018 ABRCMS conference
2. Awarded 2020 ACS Undergraduate Award in Physical Chemistry
3. Awarded NSF REU scholarship summer 2020

Teach Me Tutoring, San Jose, CA. 2021 - 2022

K-12 Tutor

East O'Keefe Family Center, East Palo Alto, CA. 2012-2015, 2019

Tutor, Science Demonstration Volunteer, and Teen Mentor

Community Outreach

University of Illinois Chicago, Career Enhancement and Education Outreach,
June 24, 2022

WEST transfer day graduate student poster presenter. 2019

Judge for SPE undergraduate poster presentation. 2019