SOFIA SHUBERT-ZULETA

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EDUCATION

University of Texas at Austin Expected Graduation Spring 2024
Ph.D. Candidate, Physical Chemistry

University of Texas at Austin Spring 2019
Bachelor of Science, Chemistry
Elements of Computer Programming Certificate

RESEARCH EXPERIENCE

Milliron Research Group Fall 2019 - present
Dr. Delia Milliron, University of Texas

- Improving optoelectronic performance of dispersed metal oxide nanocrystals by performing colloidal atomic layer deposition to eliminate the negative impacts of surface depletion layers.
- Investigated factors that lead to discrepancy in nanocrystal electron quantification by comparing plasmon Drude fitting and oxidative titration of Sn-doped In_2O_3 nanocrystals with varying extent of reduction, size, and doping level. Established guidelines for most accurate electron quantification techniques given specific synthetic parameters.
- Studied how surface depletion layers govern dynamic plasmonic response by chemically reducing Sn-doped In_2O_3 nanocrystals at varying size and doping level. Determined the optimal synthetic conditions for maximizing optical modulation and charge storage capacity, resulted in publication.

Rose Research Group Feb. 2017- May 2019
Dr. Michael Rose, University of Texas

- Synthesized a library of antimony-based ligands used to tune the NIR emission of Cu cuboid clusters.
- Used Density Functionalization Theory to model the electronic structure and understand properties of luminescent Cu clusters and magnetic Ni complexes.

Department of Energy, Science Undergraduate Research Internship Summer 2018
Dr. Ashley Gaulding, National Renewable Energy Laboratory

- Department of Energy, Science Undergraduate Laboratory Internship Program
- Fabricated and characterized composite quantum dot-perovskite thin films. Studied the effect of perovskite composition on optical and charge transport properties.

PUBLICATIONS

7. Shubert-Zuleta, S.A.; Tandon, B.; Roman, B. R.; Gan, X. Y.; How to Quantify Electrons in Plasmonic Colloidal Metal Oxide Nanocrystals. *Chem. Mater.* **2023,** *Accepted.*
6. Roman, B.; Shubert-Zuleta, S.A.; Shim, G.; Kyveryga, V.; Faris, M.; Milliron, D. J., Facet-Enhanced Dielectric Sensitivity in Plasmonic Metal Oxide Nanocubes. *J. Phys. Chem. C* **2023**, *127*, 5, 2456–2463
5. Lu, H.-C.; Zydlewski, B. Z.; Tandon, B.; Shubert-Zuleta, S. A.; Milliron, D. J. Understanding the Role of Charge Storage Mechanisms in the Electrochromic Switching Kinetics of Metal Oxide Nanocrystals. *Chem. Mater.* **2022**, *34*, 5621–5633.
4. Tandon, B. †; Shubert-Zuleta, S. A. †; Milliron, D. J. Investigating the Role of Surface Depletion in Governing Electron-Transfer Events in Colloidal Plasmonic Nanocrystals. *Chem. Mater.* **2022**, *34*, 777–788.
3. Jhong, H. R.; Nwabara, U. O.; Shubert-Zuleta, S.A.; Grundish, N. S.; Tandon, B.; Reimnitz, L. C.; Staller, C. M.; Ong, G. K.; Saez Cabezas, C. A.; Goodenough, J. B.; Kenis, P. J. A.; Milliron, D. J. Efficient

Aqueous Electroreduction of CO_2 to Formate at Low Overpotential on Indium Tin Oxide Nanocrystals. *Chem. Mater.* **2021**, *33*, 7675–7685.

2. Taylor, W. V.; Cammack, C. X.; Shubert, S. A.; Rose, M. J. Thermoluminescent Antimony-Supported Copper-Iodo Cuboids: Approaching NIR Emission via High Crystallographic Symmetry. *Inorg. Chem.* **2019**, *58*, 16330–16345.
1. Taylor, W. V.; Xie, Z.-L.; Cool, N. I.; Shubert, S. A.; Rose, M. J. Syntheses, Structures, and Characterization of Nickel(II) Stibines: Steric and Electronic Rationale for Metal Deposition. *Inorg. Chem.* **2018**, *57*, 10364–10374.

INDUSTRY EXPERIENCE

Dispersol Technologies Summer 2019

Supervisor: Dr.Daniel Ellenberger

- Responsible for lab technician duties including day to day upkeep of analytical labs
- Compiled patent data and market research for potential new drug development projects

AWARDS

- National Science Foundation (NSF) Graduate Research Fellow 2020-2023
- Chemistry Department Research Fellowship 2019
- American Chemical Society Scholars Fellow 2018-2019
- Undergraduate Research Distinction award from UT College of Natural Sciences 2019
- Outstanding Senior award from Central Texas ACS chapter 2019

LEADERSHIP AND TEACHING

- NSF MRSEC – student leadership council, social chair 2021-2022
- American Chemical Society UT Student Affiliates, President 2017-2019
- American Chemical Society UT Student Affiliates, Outreach Officer 2016-2017
- Teaching assistant, Physical Chemistry I laboratory 2019-2020
- Teaching assistant, Physical Chemistry I lecture Spring 2019

SELECTED PRESENTATIONS

- Semiconductor Nanocrystal Gordan Research Conference, poster presentation July 2022
- NSF MRSEC Industry Day, poster presentations February 2022
- Poster presentation in American Chemical Society national conference Spring 2018

SKILLS

- Milliron Lab safety officer – managed chemical database, worked with university EH&S, organized lab cleanup days, handled waste disposal, advocated for safe practices in and out of the lab
- Coordinated and led the move of the Milliron research lab to a new building over the course of 1.5 years
- Proficient in organometallics and nanocrystal synthesis methods, including air-free chemistry techniques such as Schlenk line and glovebox usage
- Experienced with materials characterization techniques such as Fourier transform infrared spectroscopy, UV-vis spectroscopy, air-free *in situ* extinction spectroscopy, scanning transmission electron microscopy, powder X-ray diffraction, inductively-coupled plasma optical emission spectrometry, dynamic light scattering, nuclear magnetic resonance spectroscopy
- Data analysis and coding experience in Igor Pro, Matlab, Python, SQL
- Skilled in analyzing and plotting large datasets with Igor Pro
- Proficient in common chemistry software with purposes including chemical illustration (Chemdraw, Inkscape), NMR analysis (MestReNova) and literature searching software (Scifinder, Mendeley)