

Sasha Elena Alden

Phone: +1(425)-647-0814 | Email: sealden@tamu.edu

Texas A&M University, Department of Chemistry, 580 Ross St, College Station, TX 77843

EXECUTIVE SUMMARY

Analytical chemist with 6+ years of research experience in instrumentation development, electrochemistry, materials chemistry, measurement science, and microfabrication. Extensive hands-on experience with nanofabrication in Oakridge National Laboratory CNMS and AggieFab facilities. Aspiring to build upon microfabrication and research skills in semiconductor industry.

EDUCATION

Ph.D. Analytical Chemistry , Texas A&M University College Station, TX	*Jan. 2022 – Present
Ph.D. Candidate Chemistry , Indiana University Bloomington, IN Advisor Professor Lane A. Baker	Aug. 2018 – Dec. 2021
*Moved with PI from Indiana University in Dec. 2021 to TAMU	
B.S. Chemistry , Western Washington University, WA Advisor: Professor David A. Rider	Sep. 2014 – June 2018

PROFESSIONAL EXPERIENCE

Graduate Research Assistant, Department of Chemistry, Texas A&M University & Indiana University Bloomington

Advisor: Prof. Lane A. Baker Aug. 2018 – Present

Designed and constructed the Array Microcell Method (AMCM), an electrochemical scanning probe technique for serial electroanalysis at micro and nanoelectrode arrays.

- Conceptual, physical, and software design of instrumentation including automated XYZ positioning of probe and stages, potentiostat/headstages, and optical camera systems. Software design in collaboration with other Baker group members facilitating automated probe scanning, positioning, electrochemical measurements, and data transfer via FPGA driven instrumentation. *Associated Skills:* Low noise current measurement, and lead collaboration with machine and electronic shop technicians. Software: LabVIEW, Python, SolidWorks
- Microfabrication of application specific microelectrode arrays and microfluidic devices. Integration with electrochemical scanning probe technology including multi-scale design ensuring correlative characterization at macro- (optical imaging), micro- (scanning electrochemistry) and nano- (scanning electron microscopy, atomic force microscopy). *Associated Skills:* Photolithography, soft lithography/PDMS processing, carbon materials, deposition (LPCVD, PECVD, E-beam PVD, electrodeposition), dry (RIE) and wet Si etching, and mask design. Characterization via profilometry (stylus and AFM), SEM, optical microscopy, and 4-point probe measurements. Software: Klayout, Layout Editor, AutoCAD

High-throughput electrochemistry of particle catalysis, electrodeposition, single-entity particle collisions, and protein films.

- Experimental design and troubleshooting for micro and nanoscale electrochemistry at single electrodes within a microfabricated electrode array. Including complex array design and characterization by AFM and SEM.
- Electrodeposition and electrocatalysis at shaped platinum particles within arrays.

- Developed microfluidic system incorporated with electrode array for red blood cell isolation and glucose sensing.
- High-throughput single-entity particle collisions with AMCM. Simulations of electrochemistry and convection in the AMCM geometry via finite element modeling and data analysis of thousands of current traces with U-net deep learning model written in PyTorch.
- Investigation of directed evolution synthesized [NiRd] catalytic enzymes for hydrogen evolution reaction at carbon microelectrodes.
- *Associated skills:* critical thinking, experimental design, data analysis (Origin and python), chemical safety, presenting research results to diverse audiences, prepared manuscripts, peer-reviewed articles, and edited grant proposals. Software: Office Suit, Origin Pro, python, COMSOL Multiphysics.

Leadership Experience

- Mentorship and training of junior graduate students and undergraduates.
- Moved delicate instrumentation and lab equipment from IU to TAMU in a safe and organized manner. Helped coordinate purchasing lab equipment and supplies and directed building facilities staff during absence of PI.
- Secretary for IU electrochemical society (ECS) student chapter (2019-2020). Coordinating visiting speakers, handling of funds, and writing progress reports.
- Associate instructor to laboratory classes to both upperclassmen (C414 Analytical Instrumentation, C343 organic lab) and freshman (C127 gen chem lab). Communicated goals and important scientific principles effectively and efficiently to ensure smooth learning environment for students.

Undergraduate Researcher, Western Washington University, WA

Advisor: Prof. David A. Rider

Jan. 2016 – June 2018

- Developed titania stabilized cuprous oxide photocatalysis for the electrochemical reduction of hydrogen and carbon dioxide. Full characterization of materials was carried out by electrochemistry, SEM, XRD, and ICP-MS as an undergraduate researcher.
- Wrote multiple internal research grants, prepared manuscripts, and presented research at international conferences.

PUBLICATIONS

1. **Alden, S.E.**; Shafaat, H.S.; Baker, L.A. Electrochemistry of Nickel-Substituted Rubredoxin at the Microscale. *Manuscript in preparation*.
2. **Alden, S.E.**; Zhang, L.; Wang, Y.; Lavrik, N.V.; Thorgaard, S.; Baker, L.A. High-throughput Nanoparticle Collisions Measured via Micropipette and Electrode Arrays. *Manuscript in preparation*.
3. Alanis, K.; **Alden, S.E.**; Baker, L.A.; Satheesan, A.E.; Jetmore, H.D.; Shen, M.) Chapter 17: Micro and Nanopipettes for Electrochemical Imaging and Measurement. *Scanning Electrochemical Microscopy* (3rd ed.); Bard, A.J.; Mirkin, M.V.; Eds.; CRC Press. Boca Raton, 2022; pp 419-479.
4. Siepser, N.P.; Choi, M.; **Alden, S.E.**; Baker, L.A. Single-Entity Electrocatalysis at Electrode Ensembles Prepared by Template Synthesis **2021** *J. Electrochem. Soc.*, 168, 126526.
5. **Alden, S.E.**; Siepser, N.P.; Patterson, J.A.; Jagdale, G.S.; Choi, M.; Baker, L.A. Array Microcell Method (AMCM) for Serial Electroanalysis *ChemElectroChem*, **2020**, 7, 1084

- Butler, T.; **Alden, S.E.**; Taylor, M.; Deese, S.; Rider, D. A.; Laskoski, M. Oligomeric Phthalonitriles and Tetrakis(Phenylethynyl)Benzene Blend with Improved Processing and Thermal Properties. *J. Polym. Sci., Part A: Polym. Chem.* **2018**, 56, 2630-2640.
- Curtis, T.; Taylor, A. K.; **Alden, S.E.**; Swanson, C.; Lo, J.; Knight, L.; Gates, B. D.; Emory, S. R.; and Rider, D. A. Synthesis and Characterization of Tunable, pH-Responsive Nanoparticle-Microgel Composites for Surface-Enhanced Raman Scattering Detection. *ACS Omega.* **2018**, 3, 10572-10588.

AWARDS & FELLOWSHIPS HONORS

- 2023 Joseph W. Richard Summer Fellowship from the Electrochemical Society (ECS)
- 2020 Society of Electroanalytical Chemists (SEAC) Travel Award
- 2017 Outstanding Poster Award WWU Scholars Week Symposium
- 2017 Verna Alexander Price Scholarship for Academic Merit and Continuation in Chemistry
- 2017 WWU Research for Undergraduates Experience Summer Internal Student (NSF-REU)
- 2017 WWU RSP Creative Opportunities Research Grant
- 2016 WWU RSP Creative Opportunities Research Grant

SELECTED PRESENTATIONS (TOTAL 4 ORAL, 10 POSTERS)

Oral (*Invited):

- *“High-Throughput Nanoelectrochemistry: Individual Nanoelectrodes Investigated via the Array Microcell Method (AMCM)” **Alden, S.E.**; Zhang, L.; Lavrik, N.V.; Wang, Y.; Baker, L.A. Society for Electroanalytical Chemists (SEAC) Student Session, Pittcon Conference, Online. 2022.
- “Array Microcell Method Coupled with Microfluidic Cell Traps for Single-Cell Quantification”. **Alden, S.E.**; Lavrik, N.V.; Baker, L.A. Pittcon Conference, Online. 2021.

Posters:

- Practical Considerations for Scanning Micropipette Techniques: Instrumentation Advancements for the Array Microcell Method (AMCM) at Nano and Microelectrode Arrays. **Alden, S.E.**; Thorgaard, S.N.; Zhang, L.; Lavrik, N.V.; Wang, Y.; Baker, L.A. Electrochemistry Gordon Research Conference, Ventura, CA. 2022.
- High-Throughput Nanoelectrochemistry: Individual Nanoelectrodes Investigated via the Array Microcell Method (AMCM). **Alden, S.E.**; Zhang, L.; Lavrik, N.V.; Wang, Y.; Baker, L.A. Faraday Discussion: Nanoelectrochemistry, Online. 2021.
- Micropipettes for Serial Electrochemical Array Analysis **Alden, S.E.**; Siepser, N.P; Patterson, J.A.; Jagdale, G.S.; Choi, M.; Baker, L.A. Pittcon Conference, Chicago, IL. 2020.

PROFESSIONAL ACTIVITIES

2021 – Present	Committee Member – SEAC Student Group
2020 – Present	Member – International Society of Electrochemistry
2018 – Present	Member – Electrochemical Society
2021 – 2022	Secretary – IU Student Chapter of the Electrochemical Society
2016 – 2019	Member – American Chemical Society

TEACHING EXPERIENCE

Fall 2019	Head Associate Instructor: C414 Analytical Chemistry Lab
2019 Spring	Associate instructor: C127 General Chemistry Lab
2018 Fall & 2020 Spring	Associate instructor: C343 Organic Chemistry Lab