Susan K. Kozawa, Ph.D.
26 E Henrietta St, Baltimore, MD 21230 | 443.216.9178 | susan.kozawa.phd@gmail.com

Education

Postdoctoral Fellow, Oak Ridge Institute for Science and Education 2023 — present
DEVCOM Chemical Biological Center | Aberdeen Proving Ground, MD
Protective Materials Development Branch, Protection Division, Research and Operations
Project: Scalable Nanofiber Production for Incorporating Detection Moieties

University of Tennessee Health Science Center | Memphis, TN 2020 — 2022
Pre-clinical curriculum completed

Ph.D., Macromolecular Science and Engineering, Case Western Reserve University | Cleveland, OH 2020
Dissertation: Understanding Polyelectrolytes to Mimic Biological Structures

M.S., Macromolecular Science and Engineering, Case Western Reserve University | Cleveland, OH 2017
Project: Poly(acrylic acid) Fiber Fabrication Through Electrospinning, Coaxial Electrospinning, and Casting Techniques

B.S.E., Polymer Science and Engineering, Case Western Reserve University | Cleveland, OH 2016
Minors: Biomedical Engineering, Chemistry, Dance

Research and Professional Experience

Post Doctoral Fellow, ORISE| Protective Materials Development Branch, DEVCOM Chemical Biological Center | Aberdeen Proving Grounds, MD 2023 — present
Advisor: Dr. Kristian Van de Voorde

- Integrate chemical and biological sensing capabilities into nonwoven fibrous materials using commodity materials and scalable fabrication methods.
- Design and conduct studies to investigate transport through polymers and networks at Å – mm scales.
- Advanced manufacturing techniques, such as 3D printing (DLP, DIW) and solution blow spinning.

Post Doctoral Researcher, UTHSC | Memphis, TN 2021 — 2022
Advisor: Dr. Karen Hasty and Dr. Hongsik Cho

- A targeting antibody directed against damaged Type II collagen was conjugated to a polymer delivery vehicle for the purpose of delivering mesenchymal stem cells into the joint.
- Investigation of targeting capabilities in the mouse knee joint confirmed successful coupling without harming the MSCs.

Graduate Researcher, UTHSC | Memphis, TN 2021
Advisor: Dr. Feng Liu Smith

- Performed experiments on skin cancer cell lines to assess their toxicity levels towards specific potential therapeutics.
- Engaged in Western Blot analysis, maintenance and proliferation of cell lines, and drug dosing experiments.

Graduate Researcher, Case Western Reserve University | Cleveland, OH 2016 — 2020
Advisor: Dr. Gary Wnek and Dr. Horst von Recum

- Investigated the fundamental properties of polyelectrolyte gels through exposure to monovalent and divalent salt species.
- Synthesized and characterized hydrogels employing neutron, thermal, and mechanical techniques.
- Investigated cell spheroid formation on polymer substrates, including PVA and hydrogel formulations, for tissue infusion.
- Produced encapsulated particles and fiber hydrogels utilizing coaxial electrospinning.
- Investigated the application of actuators and sensors for soft robots.
- Fabrication of particles employing an electrospraying technique in conjunction with cyclodextrin polymers.
- Oversaw the operation of the Zwick Roell tensile tester, as well as confocal and optical microscopes, and developed training protocols for new users.
- Personally supervised twenty undergraduate students in laboratory research, of whom eight have graduated, culminating in five students enrolling in a PhD program.

Co-Director, Polymer Initiative of Northeast Ohio 2017

- Organized an industry-focused conference attended by 200 participants, including a poster session, industry recruitment activities, and a seminar on professional development.
- Oversaw an $8,000 budget and led a team of 15 organizers, forming specialized teams for advertising, industry representation, and logistics, including the planning and execution of meetings.

Undergraduate Researcher, Case Western Reserve University | Cleveland, OH 2015 — 2016
Advisor: Dr. Gary Wnek

- Produced uniaxially aligned electrospun fibers and assessed optimal experimental parameters as well as testing methodologies.
- Developed a method for microgel formation via core-shell electrospinning.

Undergraduate Researcher, Case Western Reserve University | Cleveland, OH 2013 — 2015
Advisor: Dr. Hatsuo Ishida | Project: Keratin incorporation into Benzoxazines

- Synthesized various benzoxazines to characterize their properties utilizing thermal analysis and spectroscopy techniques, focusing on protein incorporation and cell viability.

Undergraduate Researcher, Kyoto University | Kyoto, Japan 2015
Advisor: Dr. Mitsuo Sawamoto and Dr. Takaya Terashima | Project: Self-folding rings in aqueous solutions

- Synthesized various block co-polymers utilizing air-free techniques and evaluated their folding mechanisms and dimensions based on differing polymer block ratios.

Undergraduate Researcher, Case Western Reserve University | Cleveland, OH 2013 — 2015
Advisor: Dr. Alan Riga | Project: Thermal evaluation of biomedical polymers

- Performed thermal characterization of biomaterials intended for commodity use.

Instrumentation: light scattering (SLS, DLS, UV-vis), neutron scattering (SANS, NSE), thermal analysis (TGA, DSC), mechanical analysis (DMA, tensile), microscopy (Confocal, Fluorescence, Optical, SEM, TEM), cell studies (assays, maintaining and propagating cells), air free chemistry, X-ray diffraction (XRD), chemical identification (NOESY, COSY, NMR, FTIR), rheology

Professional Societies: American Chemical Society, American Physical Society, American Association for the Advancement of Science, Biomedical Engineering Society

Funding Awarded

- Solution blow spinning: increasing capabilities $30,000, Quick Empowerment leads to Successful Tomorrows, US Army DEVCOM Chemical Biological Center | 2024
- Synthetic bioprinted ocular and dermal model for toxicological characterization >$700,000 over 3 years, Co-PI, US Army DEVCOM Chemical Biological Center | 2024- 2026
- Biosensing incorporation into personal protective equipment $50,000, Co-PI, US Army DEVCOM Chemical Biological Center | 2023
- Change in mesh size due to chain rearrangement: counterion decondensation Beam Time, NIST Center for Neutron Research (NCNR), NG-7 SANS | 2019
- Toward an artificial neuron: excitable polyelectrolyte fiber networks equipment purchase <$1000, Sigma Xi Grant in Aid | 2018
- Coaxial electospinning of polystyrene and polyacrylic acid for potential use as synthetic neuron equipment purchase <$500, SOURCE, Office of Undergraduate Research, CWRU | 2016

Awards and Honors

Medical Student Research Fellowship Program Funding Awardee	Summer 2021
Claudio Selletti ’90 Prize, Case Alumni Association	2020
Excellence in Graduate Polymer Research – Oral Session, American Chemical Society	April 2020
PIRE International Travel Funding Award	February 2019
NSF Graduate Research Fellowship Program (GRFP) Honorable Mention	April 2018
Glenn Nichols Character of Distinction Award	Spring 2016
Macromolecular Science and Engineering Summer Research Abroad Funding Grant	Summer 2015
Christina Camardo Greek Leadership Award	Spring 2015
Sages Capstone Research Funding Grant	Summer 2015
University Scholarship with Funding	Fall 2012 — Spring 2016

Publications

- Kolan, D., **Kozawa, S.**, Weitzer, D., Wnek, G. E. Mussel M. Propagation of a Chemo-Mechanical Phase Boundary in Polyacrylate Gels. *Polymer*, 2025, 319, 128039. https://doi.org/10.1016/j.polymer.2025.128039
- Van de Voorde, K. M., **Kozawa, S. K.**, Mack, J., Thompson, C. B. Influence of Crosslinker Functionality and Photoinitiator Loading on Network Connectivity and Actuation in 3D Printed Model Thermosets. ACS Appl. Polym. Mater. 2024, 6, 3918-3929. https://doi.org/10.1021/acsapm.3c03217

- Wnek, G.E., Costa, A.C.S., **Kozawa, S. K.** Bio-Mimicking, Electrical Excitability Phenomena Associated with Synthetic Macromolecular Systems: A Brief Review with Connections to the Cytoskeleton. Front. Mol. Neurosci. 2022, 15, https://doi.org/10.3389/fnmol.2022.830892
- Scrivner, O. F., Newell-Rogers, K., Dao, L., Shahandeh, B., Meyskens, F. L., Liu-Smith, F., **Kozawa, S. K.**, Plascencia-Villa, G., José-Yacamán, M., Jiash, S., Chan, J., Chang, C.J., Farmer, P.J. The ionophore thiomaltol induces rapid lysosomal accumulation of copper and apoptosis in melanoma. Metallomics. 2022, 14, 1. https://doi.org/10.1093/mtomcs/mfab074
- Wilcox, K., **Kozawa, S. K.**, Morozova, S. Fundamentals and Mechanics of Polyelectrolyte Gels: thermodynamics, swelling, scattering, and elasticity. Chem. Phys. Rev. 2021, 2, 041309. https://doi.org/10.1063/5.0048152
- Young, K., Lord, A.E., Burkhart, G.E., **Kozawa, S. K.**, Mu, N., von Recum, H.A. Simple degradable cyclodextrin polyester with chelator-based crosslinker for stent-based drug delivery. bioRxiv 2021, 04 (29), 442054. https://doi.org/10.1101/2021.04.29.442054
- **Kozawa, S. K.**, Lord, A., Walker, A., Wnek, G. Micro-Capillary Reactors via Co-Axial Electrospinning: Fabrication of Small Poly(acrylic acid) Gel Beads and Thin Threads of Biological Cell Dimensions. Gels. 2021,7,37. https://doi.org/10.3390/gels7020037
- **Kozawa, S. K.**, Wnek, G.E.; Macromolecules of the Cell: A Macromolecular Science Point of View. Polym. Int. 2020, 885-888. https://doi.org/10.1002/pi.6148
- **Kozawa, S. K.**, Matsumoto, K., Suzuki, A., Sawamoto, M., Terashima, T.; Self-assembly of amphiphilic ABA random triblock copolymers in water. J. Polym. Sci., Part A: Polym. Chem. 2019, 57, 313-321. https://doi.org/10.1002/pola.29178
- Walker, A., Vratsanos, M., **Kozawa, S.**, Askew, T., Hemmendinger, K., McGrail, B., Bedford, N., Wnek, G.; Enhanced elasticity in poly(acrylic acid) gels via synthesis in the presence of high concentration of select salts. Soft Matter, 2019, 15, 7596-7604. https://doi.org/10.1039/c9sm01101c
- Brannum, D.J., Price, E.J., Villamil, D., **Kozawa, S.**, Brannum, M., Berry, C., Semco, R., Wnek, G.E.; Flame-Retardant Polyurethane Foams: One-Pot, Bioinspired Silica Nanoparticle Coating. ACS Appl. Polym. Mater. 2019, 1, 8, 2015-2022. https://doi.org/10.1021/acsapm.9b00283

Patents and Applications

- Provisional Patent Application: Klein, N., Peterson, G., **Kozawa, S. K.**, Darko, A. Materials and processes for sensing of toxic chemicals using Rh(II) complexes embedded in polymeric fibers. 2024.
- Provisional Application: Lee, J. A., **Kozawa, S. K.**, Biondo, J. R., Van de Voorde, K. M., Walker, A. Y., Lux, M. W., Lee, M. S. Functionalization of polymer fibers and particles via incorporation of cell-free expression. Application #: 63/595,852. 2023

Presentations

1. Kozawa, S. K., Mundy, L., Garibay, S., Van de Voorde, K. M., Peterson, G. Fiber/MOF composites: Processing-dependent performance in chemical protection. Presented at the American Chemical Society Meeting and Exposition, Washington, DC. August 19, 2025.
2. Kozawa, S. K., Lee, J. A., Blum, S., Biondo, J., Van de Voorde, K. M., Lux, M., Lee, M. S. Cell-free protein synthesis in polymer fibers: Expanding applications for fieldable biosensing. Presented at the American Chemical Society Meeting and Exposition, Washington, DC. August 19, 2025.
3. Kozawa, S.K., Mundy, L., Peterson, G. Understanding the effects of processing on fiber/MOF composites. Poster. Protection Open House, Aberdeen Proving Ground, MD. May 29, 2025.
4. Kozawa, S. K., Mundy, L., Garibay, S., Peterson, G. Evaluating the Impact of Processing Techniques on Fiber/MOF Composites. Invited Speaker. Intended to present at Materials Research Society, Spring, 2025.
5. Kozawa, S.K., Lee, P., Sarles, S.E. Utilization of bioprinting to fabricate tunable tissues: A polymeric perspective. Poster. CBDST at Fort Lauderdale, FL. December 4, 2024.
6. Kozawa, S.K., Mundy, L., Peterson, G. Understanding the effects of processing on fiber/MOF composites. Poster. CBDST at Fort Lauderdale, FL. December 4, 2024.
7. Kozawa, S.K. Understanding Polyelectrolytes to Mimic Biological Structures. Invited seminar. Polymer Physics Gordon Research Symposium at Mount Holyoke, MA. July 20, 2024.
8. Kozawa, S.K. Understanding Polyelectrolytes to Mimic Biological Structures. Poster. Polymer Physics Gordon Research Conference at Mount Holyoke, MA. July 22-26, 2024.
9. Kozawa, S.K. Understanding Polyelectrolytes to Mimic Biological Structures. Poster. Polymer Physics Gordon Research Symposium at Mount Holyoke, MA. July 20-21, 2024.
10. Kozawa, S. K., Lee, P., Sarles, S. E. Utilization of bioprinting to fabricate tunable tissues: A polymeric perspective. Poster. CwC Aberdeen Proving Ground, MD. May 23, 2024.
11. Kozawa, S. K., Mundy, L., Peterson, G. Understanding the effects of processing on fiber/MOF composites. Poster. CWC Aberdeen Proving Ground, MD. May 23, 2024.

12. Kozawa, S. K., Biondo, J., Lee, M. S., Lee, J. A. Stabilizing CFPS materials using solution blow spun polymer nanofiber mats: Influence of polymer properties and processing on activity and water transport. Presented at the American Chemical Society Meeting and Exposition, New Orleans, LA. March 17, 2024.
13. Kozawa, S.K. Understanding Polyelectrolytes to Mimic Biological Structures. Invited seminar. Science Seminar Series at DEVCOM Chemical Biological Center. October 19, 2023.
14. Kozawa, S. Van de Voorde, K., Walker, A. Y. Solution Blow Spinning: Nanofiber Fabrication. Poster. CWC Aberdeen Proving Ground, MD. May 23, 2023.
15. Kozawa, S.K., Hasty, K. A., Cho, H. J. Synthesis of Antibody Targeted Biosynspheres Encapsulating Mesenchymal Stem Cells for Intra-articular Injection into Osteoarthritic Joints. Presented at the 42nd Annual MSRF Program Presentations. Memphis, TN. July 30, 2021.
16. Kozawa, S.K. Understanding Polyelectrolytes to Mimic Biological Structures. Invited seminar. University of Memphis and University of Tennessee Health Science Center Joint Graduate Program In Biomedical Engineering. October 16, 2020.
17. Kozawa, S.K., Walker, A., Scott-McKean, J., Garr, J., Flask, C., Hore, M., Costa, A., Wnek, G. Unusual hyperpolarization observations in polyacrylate gels with monovalent salts. Presented virtually at the American Chemical Society Meeting and Exposition, Philadelphia, PA. April 1, 2020, in the Excellence in Graduate Polymer Research Oral Session.
18. Kozawa, S.K., Walker, A., Scott-McKean, J., Garr, J., Flask, C., Hore, M., Costa, A., Wnek, G. Anomalous Hyperpolarization observed in polyacrylate gels and their implications on polyelectrolyte theory, and intended to present (COVID-19) at the American Physical Society, Denver, CO. March 3, 2020.
19. Kozawa, S. Biomimicry using polyelectrolytes: Experimental implications for current theory. Polymer Initiative of Northeast Ohio, Cleveland, OH. June 14, 2019.
20. Kozawa, S., Kreider, L., Venkatswamy, A., Tierney, G., Walker, A., Wnek, G. Biomimetic neurons using polyelectrolytes: Experimental implications on current models. Presented at the 256th American Chemical Society Meeting and Exposition, Orlando, FL. March 22nd, 2019.
21. Kozawa, S., Kreider, L., Venkatswamy, A., Tierney, G., Walker, A., Wnek, G. Directional Motion of Sodium Polyacrylate Gels Initiated by Ca^{2+}-Induced Contraction is coupled to an NaCl Gradient. Presented at the American Physical Society, Boston, MA. March 6, 2019.
22. Kozawa, S., Rudolf, S., Wang, Y., Wnek, G. Poly(acrylic acid) fibers and gel threads for the formation of a biomimetic actin fiber system. Polymer Initiative of Northeast Ohio, Cleveland, OH. July 2017
23. Kozawa, S. Selecting Polymer Candidates for Surgically Implanted Materials by Advanced Derivative Analysis of DSC. North American Thermal Analysis Society, Bowling Green, KY. August 4, 2013.
24. Kozawa, S. Selection of Medical Plastics by Thermogravimetric Analysis (TGA) and Enhanced Derivative Analysis. North American Thermal Analysis Society, Bowling Green, KY. August 4, 2013.

Teaching

Teaching Assistant, Case Western Reserve University | Cleveland, OH 2014 — 2020

Introduction to Polymer Science (2014-2016), Introduction to Biomaterials (2015), Polymer Engineering (2019-2020)

- Taught 150+ undergraduate students the fundamentals of biomedical and macromolecular engineering
- Conducted review and 1-1 sessions, with a focus on identifying and teaching to the learning styles of individual students

Introduction to Research EMAC 125 (year 1), Research EMAC 325 (year 2+), Senior Capstone EMAC 398 (year 4+) 2017 — 2020

- Designed and supervised experiments for undergraduate students research.
- Reviewed effective strategies for reading journal articles and conducting literature reviews.
- Completed a midterm and final paper reflecting students' work, findings, and conclusions.
- Numerous students continued working on their projects across multiple semesters.

Service and Outreach

Paper Reviewer 2025 — present

- Polymer, Elsevier

Industrial Council Member, Center for Hybrid, Active and Responsive Materials at the University of Delaware 2025 — present

Women in Medicine and Science, UTHSC 2020 — 2022

- Outreach Chair 2021 — 2022

COVID Shot Administrator, UTHSC 2021

Honor Council Elected Member, UTHSC 2020 — 2022

Diekhoff Graduate Teaching and Mentoring Awards Committee Member, CWRU 2019 — 2020

Alpha Chi Omega Ritual Specialist, AXO National 2019 — 2021

Case School of Engineering Graduate Student Government, CWRU 2018 — 2020

- President and Founder 2018 — 2019

Science and Human Rights Coalition, CWRU 2017 — 2020
- Director of Outreach 2018 — 2019

Volunteer, Outreach Demonstrations, Department of Macromolecular Science and Engineering, CWRU 2017 — 2020
Housing Director, Greek Life Office, CWRU 2017 — 2020
Macromolecular Student Organization, CWRU 2017 — 2020
- President 2018 — 2019
- Treasurer 2017 — 2018

Alpha Chi Omega Leadership Academy Ritual breakout leader, AXO National 2018
Phi Kappa Psi Membership Education Advisor, CWRU Chapter 2017 — 2020
Alpha Chi Omega Leadership Development Specialist, AXO National 2017 — 2019
Emerging Leaders Program Mentor, CWRU 2017 — 2019
Graduate Leadership Intern, Student Activities and Leadership, CWRU 2016 — 2017
Leadership Intern, Office of Greek Life, CWRU 2015 — 2016

Students Supervised

Case Western Reserve University 2017 — 2020

- Sara Rudolph - Contraction and Chelation of Electrospun Poly(acrylic acid) (PAA) Nanofibers, EMAC 398, 2017
- Loren Kreider - Dynamic PAA Movement Optimization Summer REU, 2017
- Michaela Wright - Thermal Degradation and Rehydration of PAA Hydrogels, EMAC 325, 2017
- Michel'le Wright - Thermal Characterization of PAA hydrogels, EMAC 325, 2017
- Adi Alkalay - Electrospraying core-shell PAA particles, EMAC 125, 2018
- Melissa Nakazawa - Image Analysis of Dynamic PAA Hydrogels using MATLAB, EMAC 125 & 325, 2017-2018
- Gillian Tierney - Poly(vinyl alcohol) (PVA) induced spheroid formation EMAC 325 & 398, 2017-2019
- Anita Venkataswamy - Dynamic PAA Characterization under Electrical Stimulus EMAC 325 & 398, 2017-2019
- Yifei He - Single Nanofiber Optimization, Expansion Microscopy: Enhanced Capabilities EMAC 325 & 398, 2017 - 2020
- Alex Vander Stow - Effect of Ion concentration and pH of PAA via rheology, EMAC 398, 2018-2019
- Emma Hetson - Voltage and size differences in PAA hydrogels: the effects of ion concentration and pH, Summer REU, 2018
- Jessica Zhou - Optimizing PAA Mechanical Characterization EMAC 325 & 398, 2018-2020
- John Perszyk - Electrical Stimulation and Characterization of PAA Nanofibers, EMAC 325, 2018-2020
- Mickey Yu - Varying Adhesion via pH in PAA hydrogels, Summer REU, 2019
- Mansi Peesapati- Dynamic Light Scattering of PAA chains in varying ions, Summer REU, 2019
- Audrey (Lord) Van Heest- Collection Methods for Core-Shell Fibers, EMAC 325, 2019-2020
- Malavika Rajeev - Static Light Scattering of PAA hydrogels in varying conditions, EMAC 325, 2019-2020
- Nicole Lu - Ion Quantification in PAA Hydrogels using Flame Atomic Absorption Spectroscopy, EMAC 325, 2019-2020
- Grace Kemerer - Effects of PAA under Anesthetics, EMAC 325, 2019-2020
- Rachel Le Blanc - Swelling Parameters and Characterization of PAA Hydrogels, EMAC 325, 2019-2020

DEVCOM Chemical Biological Center 2023 — present

Department of Defense Historically Black Colleges & Universities and Minority Serving Institutions Program

- Tahiyah Brinkley - Establishing PEO Crosslinking in Solution Blow Spinning, Summer 2023, New Jersey Institute of Technology, BSE 2024
- Barbara Hayes - Fluorescence Analysis for CFPS reporters, Summer 2023, San Diego State University, MS 2025
- Aryanna Jones – Investigating Conductivity and Continuous Yarn Spinning of Piezoelectric Fibers through Solution Blow Spinning, Summer 2025, Delaware State University MS 2025

Continuing Education

Postdoc to Faculty Workshop, American Chemical Society July 2025
Neutron Scattering for Soft Matter, Dr. Yun Liu at the NCNR at NIST Fall 2024
Aerosols and Particle Measurement Short Course, TSI and the University of Minnesota August 2023
CHRNS Summer School on Neutron Scattering, NCNR at NIST July 2018
Future Faculty Workshop for Soft Materials, Princeton University Fall 2019