ALANA G. GONZALES

alanagonzales@arizona.edu | linkedin.com/in/alana-gabrielle-gonzales/ | alanagonzales.net

EDUCATION

- **PhD Candidate in Optical Sciences**, The University of Arizona, GPA: 3.85/4.0 August 2023 – Present
- Master of Science in Optical Sciences, The University of Arizona, GPA: 3.85/4.0 May 2026
- Master of Science in Biomedical Engineering, Duke University, GPA: 3.97/4.0 May 2022
  - Graduate Certificate in Global Health
- Bachelor of Science in Biomedical Engineering, The University of Arizona, GPA: 3.69/4.0 May 2020
- Bachelor of Arts in 3-2 Engineering, Scripps College, GPA: 10.67/12 May 2020

RESEARCH AND RELEVANT WORK EXPERIENCE

Graduate Research Associate, Wyant College of Optical Sciences August 2023 – Present
Faculty Advisor: Jennifer Barton, PhD, Departments of Optical Sciences and Biomedical Engineering
University of Arizona, Tucson, AZ

- Project: Developing a handheld clinical imaging system for early detection of inflammatory breast cancer using optical coherence tomography (OCT) and optical coherence elastography (OCE)
- Designing and constructing optical and mechanical system, including lens, custom fiber interferometer, and piezoelectric scanning mechanism

Research & Development Intern, Zygo Corporation, Middlefield, CT June 2026 – August 2026

- Investigated the performance, utility, and practicality of a novel optical profiling technology
- Designed, built, and tested a microscope-like system and compared its performance to gold-standard interferometry using OpticStudio, SolidWorks, MATLAB, and Mx software

Associate Research Scientist, SiPhox, Inc., Burlington, MA June 2022 – August 2023

- Developed point-of-care and at-home diagnostic assays with robust photonic chip technology
- Planned and carried out experiments, analyzed results, and made decisions to progress research

Graduate Research Assistant, Center for Global Women's Health Technologies July 2020 – May 2022
Faculty Advisor: Nirmala (Nimmi) Ramanujam, PhD, Department of Biomedical Engineering
Duke University, Durham, NC

- Project 1: Measured the image quality of a point-of-care colposcope for cervical cancer screening
- Project 2: Tested the ability of a low-cost, image-guided ablative therapy for breast and cervical cancer to induce tumor necrosis and long-lasting immune responses in preclinical murine models

Research Trainee, Maximizing Access to Research Careers (MARC) Program May 2018 – May 2020
Faculty Mentor: Jeong-Yeol Yoon, PhD, Department of Biomedical Engineering
The University of Arizona, Tucson, AZ

- Project: Developed a novel optical biosensor using a paper-based lateral flow immunoassay and a smartphone-based fluorescence microscope for: 1) quantifying cancer cells in the blood at the point of care, 2) measuring plant genome sizes in the field, and 3) detecting norovirus in water samples
- Designed and built an imaging apparatus to improve the device ease-of-use and quality of smartphone fluorescence images using SolidWorks and 3D printing
- Created two graphical user interfaces for simple, automated processing of fluorescence images in MATLAB and Python, respectively

Research Trainee, Massachusetts Institute of Technology Summer Research Program (MSRP) Summer 2019
Faculty Mentor: Roger Kamm, PhD, Departments of Biological and Mechanical Engineering
Massachusetts Institute of Technology, Cambridge, MA

- Project: Developed an *in vitro* cell culture model of T cell trafficking and migration to tumors
- Designed two experimental setups to model T cell adhesion and migration relative to human endothelial cells using a Transwell migration assay, 2D cell culture and fluorescence microscopy
- Wrote scripts in ImageJ and RStudio to analyze microscopy data

Research Trainee, Howard Hughes Medical Institute (HHMI) Summer 2017
Exceptional Research Opportunities Program (EXROP)
Faculty Mentor: Muhammad Zaman, PhD, Department of Biomedical Engineering
Boston University, Boston, MA

- Project: Optimized a fluorescence assay for field-based quantification of antimalarial medicines
- Performed fluorescence measurements using spectrophotometry and a portable microfluidic device
- Improved the accuracy and precision of measurements by troubleshooting pharmaceutical sample preparation and signal acquisition parameters

Research Trainee, Danish Institute for Study Abroad (DIS) Science Research Practicum Spring 2017
Faculty Mentor: Abigail Mackey, PhD, Institute of Sports Medicine
Bispebjerg Hospital, Copenhagen, Denmark

- Project: Studied the effects of exercise-related injury on skeletal muscle and muscle fiber regeneration
- Quantified amounts of different fiber types in injured skeletal muscle tissue using fluorescence microscopy

Research Trainee, Medical Scientist Training Program Summer 2016
Summer Undergraduate Research Fellowship (MSTP-SURF)
Faculty Mentor: Karen Christman, PhD, Department of Bioengineering
University of California, San Diego, CA

- Project: Tested the efficacy of an extracellular matrix (ECM)-based hydrogel derived from porcine tissue as a delivery method for therapeutic microRNAs
- Fabricated the ECM-based hydrogel by decellularizing porcine tissue with appropriate reagents
- Measured the rate of release of microRNAs from the hydrogel using spectrophotometry
- Quantified degradation of microRNAs using PCR and gel electrophoresis

Research Assistant, Interdisciplinary Consortium on Advanced Motion Performance Summer 2015
Faculty Mentors: David Armstrong, PhD, DPM and Bijan Najafi, PhD, Department of Surgery
University of Arizona, Tucson, AZ

- Project: Conducted a Gait and Balance Assessment and Training Program in patients with or at risk for peripheral neuropathy using wearable sensor technology and virtual reality
- Collected exercise data using MATLAB and wearable motion sensors
- Obtained patient demographics and health history using IRB-approved surveys

Math Tutor, Math Spot Tutor Center, Scripps College January 2015 – December 2016

- Led group and individual tutoring session for students in Scripps College math courses: Calculus I, II, and III and Differential Equations

PUBLICATIONS AND CONFERENCE PROCEEDINGS

- **Gonzales, Alana G.**, Caitlin Ruhland, Graham Spicer, Stephen Mead, Massimiliano Di Pietro, Ashraf Sanduka, Photini F. S. Rice, Ryan H. W. Mitstifer, Sarah E. Bohndiek, Travis W. Sawyer, and Jennifer K. Barton (2026). "Optical coherence tomography and elastography for ex vivo visualization of early gastric cancer," *Journal of Biomedical Optics*, vol. 31(2), 026501.

- Galvez, Dominique, Andrew Daniel Rocha, **Alana G. Gonzales**, Dilara J. Long, Photini Faith Rice, Makayla R. Johnson, Ethan Tovar, Bo Lwin, Helen Varghese, Kongit Amaha, David Fishman, John M. Heusinkveld, Jennifer Kehlet Barton (2026). "Improved endoscope for imaging and cell collection in the fallopian tubes," *Biophotonics Discovery*, vol. 3(2), 025001.

- Ruhland, Caitlin, **Alana Gonzales**, Photini Rice, Ghassan Mouneimne, Jennifer K. Barton (2026). "Optical coherence tomography and elastography for tissue imaging and stiffness differences in soft- and stiff-conditioned breast tumors," *Proc. SPIE 13853*, Optical Elastography and Tissue Biomechanics XIII, 138530B.

- Rocha, Andrew D., Dominique Galvez, **Alana Gonzales**, Eduardo Gonzalez, Matthias Schlich, David Vega, and Jennifer K. Barton (2025). "Lens design strategies for miniature scanning fiber endoscopes," *Optical Engineering*, vol. 64(9), 090801.

- **Gonzales, Alana**, Ruyuan Dong, Ryan Walton Mitstifer, Caitlin Ruhland, Travis Sawyer, Ghassan Mouneimne, and Jennifer K. Barton (2025). "Optical coherence tomography and elastography for the visualization of architecture and stiffness differences in soft- and stiff-conditioned murine mammary tumors," *Proc. SPIE 13306*, Advanced Biomedical and Clinical Diagnostic and Surgical Guidance Systems XXIII, 133060E.

- Rocha, Andrew D., Matthias Schlich, David Vega, Jennifer K. Barton, **Alana Gonzales**, Eduardo Gonzalez, and Dominique Galvez (2025). "Finite element and optical analysis of a miniature forward-scanning fiber endoscope", *Proc. SPIE PC13334*, Endoscopic Microscopy XX, PC1333403.

- Preston, Kyle, Guojun Chen, Cole Chapman, Sarat Gundavarapu, Ebrahim Aljohani, Armando Paredes Arroyo, Chi-Chen Lin, Alexander Vinitsky, **Alana Gonzales**, Ze Yin, Michael Dubrovsky, and Diedrik Vermeulen (2024). "Silicon Photonics-Powered Biosensing for Rapid Quantification of Blood Biomarkers," *Frontiers in Optics + Laser Science 2024 (FiO, LS),* Technical Digest Series (Optica Publishing Group, 2024), paper FTu1D.1.

- Højfeldt, Grith, Trent Sorenson, **Alana Gonzales**, Michael Kjaer, Jesper L Andersen, and Abigail L Mackey (2023). "Fusion of myofibre branches is a physiological feature of healthy human skeletal muscle regeneration," *Skeletal Muscle*, vol. 13, 13.

- Aljohani, Ebrahim, Sarat Gundavarapu, Cole A. Chapman, Armando Paredes Arroyo, Guojun Chen, Chi-Chen Lin, Andrea Romig, Kyle Preston, Alexander Vinitsky, **Alana Gonzales**, Eric Hsu, Jordan Cobb, Yulia Rybakova, Michael Dubrovsky, and Diedrik Vermeulen (2023). "Silicon Photonics System for Low-Cost Rapid Quantification of Biomarkers in Blood," *2023 IEEE Silicon Photonics Conference (SiPhotonics)*, 1-2.

- Nief, Corrine, **Alana Gonzales**, Erika Chelales, Júlia Sroda Agudogo, Brian T. Crouch, Smita Nair, and Nirmala Ramanujam (2022). "Targeting tumor acidosis and regulatory T cells unmasks anti-metastatic potential of local tumor ablation in triple-negative breast cancer," *International Journal of Molecular Sciences*, vol. 23, 8479.

- Agudogo, Júlia, Corrine Nief, **Alana Gonzales**, Erika Chelales, Rebecca Previs, Jenna Mueller, Brian Crouch, and Nimmi Ramanujam (2022). "A novel point-of-care ethyl cellulose ethanol ablative therapy for the enhancement of paclitaxel in local recurrent cervical cancer treatment (308.5)," *Gynecologic Oncology*, vol. 166, supplement 1, S162.

- Nief, Corrine A., Júlia Sroda Agudogo, **Alana Gonzales**, Rebecca A. Previs, Smita K Nair, and Nimmi Ramanujam (2021). "Resetting the tumor microenvironment to favor anti-tumor immunity after local ablation," *Journal of Clinical Oncology*, vol. 39, issue 15_suppl, 2561.

- Agudogo, Júlia Sroda, Corrine Nief, Erika Chelales, **Alana Gonzales**, Jenna Mueller, Brian Crouch, Rebecca A. Previs, and Nimmi Ramanujam (2021). "A novel treatment for recurrent localized cervical cancer using point-of-care ethyl cellulose ethanol ablation with concurrent cytotoxic therapy," *Journal of Clinical Oncology*, vol. 39, issue 15_suppl, e17507.

- Chung, Soo, Lane E. Breshears, **Alana Gonzales**, Christian M. Jennings, Christina M. Morrison, Walter Q. Betancourt, Kelly A. Reynolds, and Jeong-Yeol Yoon (2021). "Norovirus detection in water samples at the level of single virus copies per microliter using a smartphone-based fluorescence microscope," *Nature Protocols*, vol. 16, 1452-1475.

- Ulep, Tiffany-Heather, Ryan Zenhausern, **Alana Gonzales**, David S. Knoff, Paula A. Lengerke Diaz, Januario E. Castro, and Jeong-Yeol Yoon (2020). "Smartphone based on-chip fluorescence imaging and capillary flow velocity measurement for detecting ROR1+ cancer cells from buffy coat blood samples on dual-layer paper microfluidic chip," *Biosensors and Bioelectronics*, vol. 153, 112042.

CONFERENCE PRESENTATIONS

- *Leveraging Advanced Optical Imaging Modalities for Stomach Cancer Detection*, Poster presentation at the Achievement Rewards for College Scientists (ARCS) Annual Scholarship Awards Ceremony, Phoenix, AZ, April 2026.

- *Optical Coherence Elastography for Ex Vivo Detection of Human Gastric Cancer and Dysplasia*, Poster presentation at the International Society for Optics and Photonics (SPIE) Photonics West, San Francisco, CA, January 2026. **Best Poster Award** earned for high presentation score.

- *Optical Coherence Tomography and Elastography for Ex Vivo Detection of Human Gastric Cancer and Dysplasia*, Oral Presentation at Arizona Photonics Days, Tucson, AZ, January 2026.

- *Optical Coherence Tomography and Elastography for the Visualization of Architecture and Stiffness Differences in Gastric Cancer and Dysplasia*, Poster presented at the SPIE Biophotonics Summer School, Hven, Sweden, June 2025.

- *Optical Coherence Tomography and Elastography for the Visualization of Architecture and Stiffness Differences in Soft- and Stiff-Conditioned Breast Tumors*, Oral presentation at the International Society for Optics and Photonics (SPIE) Photonics West, San Francisco, CA, January 2025.

- *Optical Coherence Tomography and Elastography for the Visualization of Architecture and Stiffness Differences in Gastric Cancer and Dysplasia*, Poster presented at the American Society of Clinical Oncology (ASCO) Gastrointestinal Cancers Symposium, San Francisco, CA, January 2025.

- *Optical Coherence Tomography and Elastography for the Visualization of Architecture and Stiffness Differences in Soft- and Stiff-Conditioned Breast Tumors*, Poster presented at the IEEE-EMBS International Conference on Healthcare Innovations in Point of Care Technologies (HI-POCT), Tucson, AZ, September 2024.

- *Modeling T Cell and Vascular Interactions In Vitro*, Poster presented at the Annual Biomedical Research Conference for Minority Students (ABRCMS), Anaheim, CA, November 2019.

- *Modeling T Cell and Vascular Interactions In Vitro*, Poster presented at the Biomedical Engineering Society (BMES) Annual Meeting, Philadelphia, PA, October 2019.

- *Modeling T Cell and Vascular Interactions In Vitro*, Poster presented at the Massachusetts Institute of Technology Summer Research Program Poster Session, Cambridge, Massachusetts, August 2019.

- *Paper-based Vertical Assay for Detection of Metastatic Breast Circulating Tumor Cells*, Poster presented at the Annual Biomedical Research Conference for Minority Students (ABRCMS), Indianapolis, IN, November 2018. **ABRCMS Presentation Award** earned for high presentation score.

- *Paper-based Vertical Assay for Detection of Metastatic Breast Circulating Tumor Cells*, Poster presented at the Undergraduate Research Opportunities Consortium (UROC)'s Research Conference, The University of Arizona, Tucson, AZ, August 2018.

- *Optimizing a Dihydroartemisinin Assay for the Detection of Substandard Medicines*, Poster presented at the Howard Hughes Medical Institute Annual EXROP Meeting, Chevy Chase, Maryland, May 2018.

- *Optimizing a Dihydroartemisinin Assay for the Detection of Substandard Medicines*, Poster presented at the Biomedical Engineering Society (BMES) Annual Meeting, Phoenix, AZ, October 2017.

- *Optimizing a Dihydroartemisinin Assay for the Detection of Substandard Medicines*, Poster presented at the Arizona Bioindustry Association (AZBio) Awards, Phoenix, Arizona, October 2017.

- *Efficacy of an Extracellular Matrix-Based Hydrogel as a Delivery Method for MicroRNAs*, Oral presentation at the University of California, San Diego's Summer Research Conference, San Diego, California, August 2016.

SCHOLARSHIPS, FELLOWSHIPS, HONORS, AND AWARDS

University of Arizona Cancer Center CONVERGE T32 Training Grant 2026-2027
The University of Arizona | Tuition, stipend, and $15,000 support for research activities

SPIE (The International Society of Optics and Photonics) Women in Optics Scholarship 2026-2027
$10,000 to support tuition and fees, course-related expenses, and equipment

Achievement Rewards for College Scientists (ARCS) Scholarship | $10,500 discretionary award 2026-2027

Jennifer Turner-Valle Advancing Women in Optics Graduate Student Scholarship 2026-2027
The University of Arizona Wyant College of Optical Sciences | $2,750 discretionary award

SPIE Photonics West Best Poster Award (1st Place, $500) | San Francisco, CA January 2026

Kenneth E. and Michele L. Moore Endowed Scholarship in Optical Sciences 2024-2025 and 2025-2026
The University of Arizona Wyant College of Optical Sciences | $2,750 discretionary award

SPIE Student Conference Support | $700 award to attend Photonics West 2025, San Francisco, CA 2025

DeMund Foundation Graduate Student Endowed Scholarship in Optical and Medical Sciences 2023-2024
The University of Arizona Wyant College of Optical Sciences | Tuition and stipend for first-year studies

National Science Foundation Graduate Research Fellowship | Awarded but unable to accept 2022

BME Second Year Fellowship | Duke University | Tuition and stipend for second-year studies 2021-2022

Fitzpatrick Institute for Photonics (FIP) John T. Chambers Fellowship | Duke University 2020-2021
$10,000 discretionary award and $1,000 professional travel funds

Raytheon Award for Best Overall Design ($5,000) | The University of Arizona May 2020
College of Engineering Craig M. Berge Design Day

Rincon Research Award for Best Presentation ($1,500) | The University of Arizona May 2020
College of Engineering Craig M. Berge Design Day

Global Health Competition Innovation Award | The University of Arizona October 2019

Academic Year Academic Distinction | The University of Arizona 2018-2019

Annual Biomedical Research Conference for Minority Students Presentation Award November 2018

Dean's List | The University of Arizona | 3.8 GPA for more than 14 units Fall 2018, Spring 2019 and Fall 2019

Dean's List Honorable Mention | The University of Arizona | 4.0 GPA for 12-14 units Spring 2018 and 2020

Dean's List | Scripps College | At least 3.67 GPA for 16+ credits Fall 2015 and Fall 2016

Rebecca Barber Adams '61 Non-Profit Internship Grant | Scripps College February 2015

Donna Darnell '56 Scholarship | Scripps College | Awarded for academic achievement December 2014

COMMUNITY ACTIVITIES

Tutor, Practical Optics Workshop (POW) August 2025 – Present
University of Arizona, Tucson, AZ
- Planning and leading lessons on lens design software (Ansys Zemax OpticStudio and Synopsys CODE V) for students of all levels in the Wyant College of Optical Sciences

Committee Member, Graduate Recruitment Team (GeRT) August 2024 – Present
University of Arizona, Tucson, AZ
- Organizing and facilitating PhD Graduate Recruitment Weekend for the Wyant College of Optical Sciences and engaging with prospective PhD students to aid them in their application and decision process

President, Optics for All (OFA) August 2025 – August 2026
University of Arizona, Tucson, AZ
- Leading the executive board of OFA, a student-run club in the Wyant College of Optical Sciences which hosts social and cultural events, academic and professional development workshops, outreach events, and initiatives which promote diversity, equity, and inclusion in the field of optics

Volunteer Coordinator Optics Valley International Day of Light Planning Committee March 2026 – May 2026
Tucson, AZ
- Working with members of the optics community to organize the 2026 International Day of Light Celebration in Tucson, presented by Optics Valley

Social Chair, Optics for All (OFA) May 2024 – August 2025
University of Arizona, Tucson, AZ
- Organized social events and initiatives to serve the optical sciences community, specifically providing a forum for students from underserved, underrepresented, and underinvested backgrounds

Student Mentor, Keep Engaging Youth in Science (KEYS) Research Internship June 2024 – August 2024
University of Arizona, Tucson, AZ
- Mentored a high school student through a summer research project, teaching them how to use MATLAB programming to perform data analysis and providing guidance on scientific writing and presentation

Pratt Liaison, Out in Science, Technology, Engineering, and Mathematics (oSTEM) March 2021 – May 2022
Duke University, Durham, NC
- Worked as a contact point between oSTEM and the Duke Pratt School of Engineering to enhance the experience of the LGBTQ+ community in STEM graduate departments at Duke

Mentor, Duke F1RSTS-Duke L1FE Mentoring Program September 2020 – May 2022
Duke University, Durham, NC
- As a first-generation graduate student, I mentored first-generation undergraduate students at Duke interested in pursuing graduate studies in biomedical engineering

First Year Representative, Duke Optical Students Chapter (DOSC) September 2020 – May 2021
Duke University, Durham, NC
- Engaged current and incoming Duke students interested in optics with the Fitzpatrick Institute for Photonics and the Duke Optical Students Chapter through social media and outreach events

Volunteer, Molecular and Cellular Biology STEM Outreach and Recruitment January 2020 – May 2020
University of Arizona, Tucson, AZ
- Educated youth in the Tucson community about topics in molecular and cellular biology through various events, lessons and demonstrations such as DNA extraction from human cheek cells, engaging in virtual outreach through the development of educational videos following the COVID-19 shutdown of schools

Project Team Member, Medical Device Club August 2019 – May 2020
University of Arizona, Tucson, AZ
- Partnered with DialysFlex, Inc. to design and build a revolutionary flexible hemodialysis catheter to eliminate pain and complications caused to hemodialysis patients by traditional rigid steel access needles

The Advance Undergraduate Institute (AUI) March 14-16, 2019
Stanford University, Stanford, CA
- Participated in a three-day intensive experience at Stanford University in which students are selected to participate based on their potential and interest in pursuing a PhD in the Biosciences

Scribe, Theta Tau Professional Engineering Fraternity, Chi Chapter November 2018 – December 2019
University of Arizona, Tucson, AZ
- Maintained written records for the chapter, including minutes of all chapter and Executive Council meetings
- Corresponded with regional and national officers

Head of Philanthropy Committee, Theta Tau Professional Engineering Fraternity August 2018 – May 2019
University of Arizona, Tucson, AZ
- Organized and led philanthropy events for the fraternity throughout the year to give back to the community

Student Teacher, Science Bus August 2016 – December 2016
The Claremont Colleges, Claremont, CA
- Taught local fourth and fifth grade students hands-on lessons on topics in science

REFERENCES

Jennifer Barton, PhD
Interim Vice Provost for Health Programs, Professor of Biomedical Engineering and Optical Sciences
University of Arizona, Tucson, AZ
Email: barton@arizona.edu
Phone: (520) 626-0314

Diedrik Vermeulen, PhD
Chief Executive Officer and Co-Founder
SiPhox Health, Inc., Burlington, MA
Email: diedrik.vermeulen@siphox.com

Nimmi Ramanujam, PhD
Robert W. Carr, Jr., Distinguished Professor of Biomedical Engineering
Duke University, Durham, NC
Email: nimmi.ramanujam@duke.edu
Phone: (919) 660-5307

Jeong-Yeol Yoon, PhD
Associate Department Head for Biomedical Engineering Graduate Affairs, Professor of Biomedical Engineering
The University of Arizona, Tucson, AZ
Email: jyyoon@email.arizona.edu
Phone: (520) 621-3587

Roger Kamm, PhD
Cecil and Ida Green Distinguished Professor of Biological and Mechanical Engineering
Massachusetts Institute of Technology, Cambridge, MA
Email: rdkamm@mit.edu
Phone: (617) 253-5330

Muhammad Zaman, PhD
Professor of Biomedical Engineering
Boston University, Boston, MA
Email: zaman@bu.edu
Phone: (617) 358-5881

Abigail Mackey, PhD
Associate Professor of Biomedical Sciences and Clinical Researcher
University of Copenhagen and Bispebjerg Hospital Institute of Sports Medicine, Copenhagen, Denmark
Email: abigailmac@sund.ku.dk
Phone: +45 (0) 3531 6090

Karen Christman, PhD
Associate Dean and Professor of Bioengineering
University of California, San Diego, CA
Email: kchristman@ucsd.edu
Phone: (858) 822-7863

David Armstrong, PhD/DPM
Professor of Clinical Surgery and Podiatric Surgeon
University of Southern California, Los Angeles, CA
Email: dgarmstr@usc.edu
Phone: (323) 442-1100

Bijan Najafi, PhD
Professor of Surgery and Director of Clinical Research
Baylor College of Medicine, Houston, TX
Email: bijan.najafi@bcm.edu
Phone: (713) 798-7536