

Ana E Gomez Martinez
ana_gomez@berkeley.edu

EDUCATION

PhD Candidate

August 2018- Present

UC Berkeley-UCSF Graduate Program in Bioengineering

Amy Herr Lab

NSF Graduate Research Fellow

GEM Consortium Fellow

Frank Schwabacher Graduate Fellow

Bachelor of Science in Bioengineering

June 2018

Minor: Global Health

University of Washington, Seattle

Cum Laude

Bioengineering Departmental Honors

RESEARCH INTERESTS

Multi-mode single-cell analysis: proteoform analysis in combination with DNA damage, proteoform analysis in combination with DNA and mRNA analysis.

Microfluidics with applications in diagnostic, including point-of-care diagnostics.

RESEARCH EXPERIENCE

Graduate Student Researcher

March 2019 - Present

Amy Herr, Ph.D, Lab

UC Berkeley Bioengineering Department

Multimodal measurements of BRCA2 gene variants and BRCA2 proteoforms.

Breast Cancer Type 2 Susceptibility Protein (BRCA2) is mutated in 30% inherited breast cancers. This tumor suppressor is a nuclear protein that repairs dsDNA breaks as part of the homologous recombination DNA repair mechanism. There are variants of uncertain significance (VUS) that make it challenging for health care providers to assess breast cancer risk and make it challenging for researchers to assess if the mutation may be a target for cancer therapies. Multimodal single-cell sequencing DNA and measuring proteoform expression will allow for unambiguous links between BRCA2 DNA variants and proteoforms expression (BRCA2 proteoform and protein response to DNA damage).

Detecting Cell Death By Electrophoretic Cytometry

We introduce a multi-modal, single-cell electrophoresis assay that integrates the canonical, single-cell DNA damage assay (Comet) with protein blotting from each individual cell, for a population of hundreds of cells. We assess mammalian breast cancer cells, SKBR3 cells, for viability and total β -tubulin expression. Using one multimodal endpoint readout, the assay simultaneously reports single-cell viability and 'proteo-type' profile in a combined fluorescence micrograph.

Lydia Sohn's, Ph.D, Lab January - February 2018
UC Berkeley Bioengineering Department

The resistive-pulse sensing tumor-derived exosome detection device enables non-invasive, cost-effective lung cancer screening. I work toward improving data analysis improving outlier removal methods and particle diameter identification. Determine colloid/exosome aggregation effects in the node-pore sensing device.

Aaron Streets', Ph.D, Lab September - November 2018
UC Berkeley Bioengineering Department

Setting up a single cell droplet-based sequencing system, inDrop, and investigating droplet generation and bead isolation. Fabricated droplet generating devices using soft lithography and analyzed the generated droplets.

Graduate Student Intern June - August 2018
Draper, Synthetic Biology Boston, MA

Supervisor: Kirsty McFarland, Ph.D

The overall project goal was to create a toolset to identify genetically modified organisms. I worked towards optimizing conditions for DNA microarray fabrication. Investigated DNA microarray optical detection approaches.

Research Assistant January 2015 - Present
MEMS Lab at the University of Washington, EE/BioE Department

PI: Karl F. Böhringer's, Ph.D

Mentor: Hal Holmes, Ph.D

I characterized the Anisotropic Ratchet Conveyors (ARCs) platform, a microfluidic system, for point-of-care diagnostics. I worked on developing an isothermal timber DNA amplification method (the loop-mediated isothermal amplification method (LAMP)) for a DNA barcode device for identification of timber species using the ARCs platform. I investigated timber lysate inhibitory effects on qPCR.

Molecular Engineering Internship July - September 2017
Conservation X Labs, Molecular Innovations Division- City of Seattle

Supervisor: David Baisch

Conservation X Labs supports technologies and solutions for conservation biology. I performed salmon DNA extraction and designed LAMP primers for fish and wildlife species.

Research Assistant July - August 2014
Seattle Biomedical Research Institute/Center for Infectious Disease Research

PI: Peter Myler, Ph.D

Mentor: Loren Baugh, Ph.D

I investigated the sequence elements required for the insertion of base J into Leishmania DNA. This involved creating plasmid constructs and performing PCR and In-Fusion Cloning.

PUBLICATIONS

A. E. Gomez Martinez & A. E. Herr. "Programmed Cell Death Mechanism Analysis Using Same-Cell, Multi-mode DNA and Proteoform Electrophoresis", *ACS Measurement*

Science Au, 2021, (12):2427-2436. doi: 10.1039/d11c00073j PMID: 33978041 PMCID: PMC8206029

E. Rosàs-Canyelles, A. J. Modzelewski, **A.E. Gomez Martinez**, A. Geldert, A. Gopal, L. He, A.E. Herr. “Multimodal detection of protein isoforms and nucleic acids from low starting cell numbers”, 2021, *Lab on Chip*. 21(12):2427-2436. doi: 10.1039/d11c00073j.

H.R. Holmes, **A.E. Gomez**, K.F Böhringer. (2016, January). “Timing and synchronization of droplets on ratchet conveyors”. In *Micro Electro Mechanical Systems (MEMS)*, 2016 IEEE 29th International Conference on (pp. 796-799).

H.R. Holmes, **A.E. Gomez**, K.F Böhringer. “Enabling Droplet Functionality on Anisotropic Ratchet Conveyors”, 2017, *Micromachines*, 8(12), 363.

PRESENTATIONS

“Same-cell, Single-Cell Detection of protein isoform and nucleic acids”. The 24th International Conference on Miniaturized Systems for Chemistry and Life Sciences (μ TAS 2021). Oct 10-14, 2021. Oral Presentation.

“Simultaneously Identifying Cell Death and Protein Expression Through Single-Cell Electrophoresis”. SLAS 2021 Digital International Conference and Exhibition, Online. Jan. 23-27, 2021. Oral Presentation.

“Detecting Cell Death Through Electrophoretic Cytometry”. The 24th International Conference on Miniaturized Systems for Chemistry and Life Sciences (μ TAS 2020). October 4-9, 2020. Poster.

“Simultaneous Detection of DNA Damage and Protein Expression with Single-Cell Resolution”. UC Berkeley/UCSF Bioengineering Retreat. Santa Cruz, California. October 25, 20109. Poster.

“Amplification Method for a Portable Timber DNA Species Identification System”. UW Bioengineering– 50/20 Anniversary Celebration. University of Washington, Seattle, May 21st, 2018: Oral Presentation.

“Method for Identifying Failure Modes of DNA Amplification”. UW Undergraduate Research Program– Undergraduate Research Symposium 2018. University of Washington, Seattle, May 18, 2018: poster.

"Automated Species Identification Device for Conservation Biology". Educational Opportunity Association– National Ronald E. McNair Conference 2017. Schaumburg, IL., Oct. 21, 2017: poster.

“Anisotropic Ratchet Conveyors for Point-of-Care Diagnostics”. UW Undergraduate Research Program - Undergraduate Research Symposium 2016. University of Washington, Seattle, May 20, 2016: poster.

“Sequence Elements Required for the Insertion of Base J in Leishmania”. National Science Foundation - Emerging Researchers National Conference 2015. Washington DC., Feb. 23, 2015: poster.

RELEVANT EXPERIENCE/SKILLS

Programming and Computer Skills

Basic understanding of AutoCAD, COMSOL, MATLAB, and R

Mentorship/Teaching

Providing constructive feedback, ability to adapt teaching

COMMUNITY SERVICE

LAGSES BASIS

Berkeley, CA

2019 - Present

- Assisting with engineering activities in Berkeley Unified School District elementary schools
- Helped develop a lesson for elementary school students (2nd and 3rd grade) about plant biology and the work of Ynes Mexia, a Mexican-American botanist

GenOM ALVA Tutoring
Seattle, WA

2015 - 2016

- Assisting students with math, chemistry, and wet lab homework
-

PROFESSIONAL AFFILIATIONS

Bay Area Microfluidics Network

Lambda Theta Alpha Latin Sorority, Inc.