

## EDUCATION

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- Ph.D. Bioengineering – UC Berkeley** 2017  
NSF Graduate Research Fellow  
Dissertation: “Microfluidic tools for high throughput, multiparameter analysis of single cells”
- M.S. Mechanical Engineering – California Polytechnic State University, San Luis Obispo** 2012  
NSF Graduate Research Fellow  
Thesis: “Prediction of Articular Cartilage Remodeling During Dynamic Compression with a Finite Element Model”
- B.S. Mechanical Engineering – California Polytechnic State University, San Luis Obispo** 2012  
Focus: Mechatronics/controls
- Study Abroad – Hochschule München, Munich, Germany** Sept. 2009 - March 2010

## EXPERIENCE

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- Senior R&D Engineer**, Chan Zuckerberg Biohub July 2017 - Present
- Collaborated with biologists to build tools that enable them to ask new questions.
  - Designed and validated an automated in situ transcriptomics platform that is currently in use by four research groups.
  - Wrote image processing pipelines for in situ transcriptomics including spot detection/decoding and cell segmentation (CellProfiler and Ilastik)
  - Contributed to open source scientific software including napari (python n-dimensional image viewer) and starfish (python image processing toolbox for in situ transcriptomics).
- Graduate Student Researcher**, Advisor: Dr. Amy Herr May 2013 - May 2017
- Designed microfluidic tools for high-specificity single-cell protein analysis
  - Invented a device for measurement of protein localization and expression in single cells without fixation
  - Designed, demonstrated, and validated first reported single-cell resolution isoelectric focusing (IEF) assay capable of resolving isoforms of endogenous proteins from single cells
  - Designed and fabricated pump-less PDMS microfluidic devices for chemical gradient formation
  - Simulated digital chromatic aberration correction with lightfield imaging (MATLAB + Zemax)
  - Developed image processing software for quantifying single-cell western blotting data
  - Course developer, teaching assistant, and participant in the Cold Spring Harbor Laboratories Single Cell Analysis course (2014-2016)
  - Coursework in microfluidics, optical engineering, and computational biology
- Microfluidics Intern**, 10X Genomics June 2016 - Aug. 2016
- Designed, built, and tested an automated imaging system for microfluidic device characterization
  - Collaborated with a cross-functional team to determine system specifications and validate system performance
- Microscopy Museum Exhibit**, Advisor: Dr. Daniel Fletcher Sept. 2013 - Present
- Designed a microscopy-based museum exhibit with automated sample recognition and assisted focus for the Deutsches Museum (Munich, Germany)
  - Led the development of the sample recognition and focusing systems
  - Gained experience prototyping and integrating electromechanical and optical systems
- M.S. Thesis**, Advisor: Dr. Stephen Klisch April 2011 - June 2012
- Created a finite element model of articular cartilage with custom subroutines to predict changes in glycosaminoglycan density and collagen volume fraction distribution due to mechanical stimuli
  - Developed a method to estimate collagen fiber distribution with quantitative polarized light microscopy
- Low-cost Prosthetic Foot Design**, Advisor: Dr. Brian Self Sept. 2010 - June 2011
- Worked with an interdisciplinary team to design a low-cost prosthetic foot for use in developing countries
  - Tested the prosthetic foot onsite at Vida Nueva, a prosthesis clinic in Choluteca, Honduras

**Undergraduate Researcher**, Advisors: Dr. Stephen Klisch and Dr. Robert Sah June 2009 - Sept. 2010

- Developed and carried out a study to elucidate the effects of dynamic unconfined compression on the biomechanical properties of articular cartilage
- Designed a method to study the deformation of articular cartilage during dynamic unconfined compression using optical methods

**Mechanical Engineering Intern**, Consolidated Metco June 2008 - Aug. 2008

- Determined the cause of failure of a frame bracket (heavy duty truck) through finite element analysis and mechanical testing
- Collaborated with failure analysts and design engineers to prototype solutions to improve the fatigue resistance of the component

#### MANUSCRIPTS IN PREPARATION

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**Yamauchi KA** et al. InSituToolkit: modular hardware for automating in situ transcriptomics assays.

Vo-Phamhi J, **Yamauchi KA**, Gomez-Sjoberg R. Crowd-sourced annotations for optimizing in situ transcriptomics image processing parameter selection.

Linnarsson, L, **Yamauchi KA**, Gomez-Sjoberg R. A pipetting robot compatible flow cell for surface-based sample preparation.

Vlassakis J, **Yamauchi KA**, Herr AE. Summit: a semi-automated algorithm for high-throughput single-cell electrophoresis image analysis

Jeeawoody S, **Yamauchi KA**, Su A, Herr AE. Investigating the impact of gel microarchitecture on immunoprobed isoelectric focusing performance in thin-film gels

#### PUBLICATIONS

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Pan Q, **Yamauchi KA**, and Herr AE. Controlling Dispersion during Single-Cell Polyacrylamide-Gel Electrophoresis in Open Microfluidic Devices. *Analytical Chemistry*, 2018.

**Yamauchi KA\***, Tentori AM\*, and Herr AE. Arrayed isoelectric focusing using photopatterned multi-domain hydrogels. *Electrophoresis*, 2018. \*equal contribution.

Abdel-Sayed P, **Yamauchi KA**, Gerver RE, Herr AE. Fabrication of an open microfluidic device for immunoblotting. *Analytical Chemistry*, 2017.

Sinkala E et al. Profiling protein expression in circulating tumor cells using microfluidic western blotting. *Nature Communications*, 2017.

**Yamauchi KA** and Herr AE. Subcellular Western Blotting of Single Cells. *Microsystems and Nanoengineering*, 2017.

Tentori AM\*, **Yamauchi KA\*** and Herr AE. Detection of Isoforms Differing by a Single Charge Unit in Individual Cells. *Angewandte Chemie*, 2016. \*equal contribution.

Kang CC, **Yamauchi KA\***, Vlassakis J\*, Sinkala E, Duncombe T, Herr AE. Single-cell resolution Western blotting. *Nature Protocols*, 2016. \*equal contribution

Stender ME, Raub CB, **Yamauchi KA**, Shirazi R, Vena P, Sah RL, Hazelwood SJ, and Klisch SM. Integrating qPLM and biomechanical test data with an anisotropic fiber distribution model and predictions of TGF-1 and IGF-1 regulation of articular cartilage fiber modulus. *Biomechanics and Modeling in Mechanobiology*, 2012

#### PRESENTATIONS

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Sofroniew N, Evans K, Axelrod S, Freeman J, Can Solak A, Chhun B, **Yamauchi K**, Royer L, Nunez-Iglesias J. napari: multi-dimensional image visualization in python. *BioImage Informatics 2019* (Oral)

Ganguli D, Carr A, Long B, **Yamauchi K**, Tung T, Axelrod S, Evans K, Kiggins J, Freeman J. A comparative and unifying approach to image-based transcriptomics data analysis. *BioImage Informatics 2019* (Oral)

**Yamauchi KA**, Tentori AM, and Herr AE. Isoform Cytometry: Isoelectric focusing resolves protein isoforms differing by a single-charge unit with single-cell resolution *The 20th International Conference on Miniaturized Systems for Chemistry and Life Sciences (microTAS2016)* (Oral)

**Yamauchi KA**, Tentori AM, and Herr AE. Isoelectric focusing resolves protein isoforms differing by a single-charge unit with single-cell resolution. *International Symposium on High Performance Liquid Phase Separations and Related Techniques (HPLC2016)* (Oral)

- Yamauchi KA** and Herr AE. Sub-cellular Western Blotting of Single Cells. *2016 Berkeley Stem Cell Center Retreat (Oral)*
- Yamauchi KA** and Herr AE. Sub-cellular Western Blotting of Single Cells. *The 18th International Conference on Miniaturized Systems for Chemistry and Life Sciences (microTAS2014) (Oral)*
- Yamauchi KA**, Raub CB, Chen AC, Sah RL, Hazelwood SJ, and Klisch SM. Glycosaminoglycan and collagen remodeling during *in vitro* dynamic compression of articular cartilage: experiments and finite element modeling. *2013 ASME Summer Bioengineering Conference (Poster)*
- Yamauchi KA**, Williams GM, Chen AC, Hazelwood SJ, Klisch SM, and Sah RL. Radial expansion of immature cartilage during cyclic unconfined compression quantified as dynamic poisson ratio. *2011 ORS Annual Meeting (Poster)*

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#### PATENTS AND PATENT APPLICATIONS

- A.E. Herr, et al., “Electrophoresis devices and methods for making and using the same.” US Patent No. US20150316547
- A.E. Herr, et al., “Isoelectric Focusing Arrays and Methods of Use Thereof.” PCT Application No. PCT/US2015/33375
- A.E. Herr, et al., “Subcellular Western Blotting of Single Cells.” US Application No. 62/217,530

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#### COURSE DEVELOPMENT & TEACHING EXPERIENCE

- Course Developer & Teaching Assistant**, UCSF Fab@Lab course 2019
- Developed a three week intensive lab course teaching biology PhD students how to design, build, and test an automated luminometer
  - Lectured on programming Arduino microcontrollers.
  - Course evaluation: 4.8/5.0 (university and department averages are 4.3)
- Course Developer & Teaching Assistant**, Cold Spring Harbor Single Cell Analysis course 2015 - 2016
- Developed a hands-on course module to teach the theory and practice of the single-cell western blotting assay
  - Taught the first course on single-cell western blotting to a class of 17 scientists from around the world
  - Consulted with students on ways to integrate single-cell western blotting into their scientific inquiry
- Graduate Student Instructor**, UC Berkeley BioE Senior Capstone Design 2014
- Taught the engineering design method to a class of 30 senior bioengineering undergraduate students
  - Developed and taught a workshop on rapid prototyping of mechatronics and automation with Arduino
  - Advised students on applying the engineering design process to real clinical problems

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#### SKILLS

##### Microfluidics:

- Assay design and validation
- Image Processing
- Mass transport
- Microfabrication
- Microscopy
- Simulation driven design

##### Mechatronics:

- Arduino/Atmel
- PCB design (EAGLE)
- Embedded system design

##### Simulation and Design:

- Abaqus
- COMSOL
- Pro/Engineer
- SolidWorks
- Zemax OpticStudio
- Rapid prototyping ( $\mu\text{m}$  - m length scale)

##### Programming:

- MATLAB
- Python
- C++

SELECTED AWARDS AND HONORS

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<b>Siebel Scholar</b>	2016 - 2017
<b>National Science Foundation Graduate Research Fellowship</b>	2011 - 2016
<b>Lloyd Graduate Fellow</b>	2016
<b>Outstanding Graduate Student Instructor</b>	2014
Awarded to top 9% of teaching assistants at UC Berkeley by faculty nomination	
<b>CBMS Student/Young Researcher Grant</b>	2014
<b>Outstanding Graduate Student</b>	2012
Awarded at California Polytechnic State University - San Luis Obispo to one graduate student per year	

LEADERSHIP AND MENTORSHIP

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<b>Intern mentor</b> , Chan Zuckerberg Biohub	2018 - present
<ul style="list-style-type: none"> <li>• Mentor to an intern writing image processing software in support of the in situ transcriptomics platform. We currently have a manuscript in progress reporting our work.</li> <li>• Mentor to an intern designing custom hardware for a pipetting robot. We are currently co-authoring a manuscript sharing the designs and device characterization.</li> </ul>	
<b>Research mentor</b> , UC Berkeley	2013 - Present
<ul style="list-style-type: none"> <li>• Mentor to junior researchers in the Herr Lab with a focus on experimental design and quantitative measurement. Mentorship approach includes weekly one-on-one meetings, training on laboratory and data analysis methods, and iterative feedback on scientific communication.</li> <li>• Mentees include: <ul style="list-style-type: none"> <li>– Two undergraduate students through BEGROw (initiative to recruit and retain underrepresented minorities)</li> <li>– Two undergraduates students through the UC Berkeley Undergraduate Research Apprenticeship Program</li> <li>– One UC Berkely Stem Cell Center Research Fellow</li> <li>– Two graduate rotation students</li> </ul> </li> </ul>	
<b>Fellowship Mentor</b> , Latino/a Association of Graduate Students in Engineering and Science	2015 - 2016
<b>Admissions Committee</b> , UC Berkeley/UCSF Graduate Program in Bioengineering	2014 - 2016
<b>Leadership Team Member</b> , Point-of-Care Diagnostics IdeaLab	2013 - Present
<ul style="list-style-type: none"> <li>• Organized a one-day conference on the role of technology in global health (January 2014)</li> <li>• Curated a biweekly seminar on point-of-care diagnostics featuring invited speakers</li> </ul>	
<b>Mentor</b> , Big Bear Bioengineering Undergraduate Mentoring Program	2012 - 2013
<b>Volunteer</b> , Centro de Miembros Artificiales - La Paz, Bolivia	2012
<ul style="list-style-type: none"> <li>• Volunteered for two months at Centro de Miembros Artificiales, a prosthetics clinic in La Paz, Bolivia</li> <li>• Assessed prosthetic foot fabrication methods and designed a new, optimized protocol</li> <li>• Redesigned inventory system, reducing procurement costs and downtime due to low supplies</li> <li>• Gained experience in evaluating local resources for project planning</li> </ul>	
<b>Engineering World Health - Cal Poly Chapter</b>	2010 - 2012
<ul style="list-style-type: none"> <li>• Senior Project Mentor: 2011-2012</li> <li>• Vice President: 2010-2011</li> <li>• Design Project Leader: 2010</li> </ul>	
<b>Tutor</b> , Statics, Dynamics, and Mechanics of Materials	2011 - 2012
<b>Tutor</b> , Mechanism Design	2009 - 2010