

# Zhuyun (Maggie) Xiao

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## Education

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**University of California, Los Angeles (UCLA)**

Los Angeles, CA

Ph.D. Candidate, Electrical and Computer Engineering, GPA: 3.95/4.0

2017 – Expected: Dec 2021

Dissertation Supervisor: Prof. Rob N. Candler

**University of California, Los Angeles (UCLA)**

Los Angeles, CA

M.S. in Electrical Engineering; *Edward K. Rice Outstanding Masters Award*

2015 - 2017

**Bryn Mawr College (BMC)**

Bryn Mawr, PA

B.A. in Physics (Honors); Minor: Computer Science, French; *Magna Cum Laude*

2011 - 2015

## Research Interest

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Nanomagnetism, Energy-efficient Multiferroics Devices, Micro/nanoelectronic systems, Micronanosystems, Straintronics, Magnetic and Ferroelectric, Magnetic Spectroscopy, Biomedical Devices, Application of Machine Learning and Artificial Intelligence in Magnetism, Advanced Microscopy Image Processing, Large-scale Synchrotron X-ray data mining, Robotics

## Journal Publications

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1. R. Khojah\*, **Z. Xiao\***, K. P. Mohanchandra\*, M. Goiriena, R. Chopdekar, G. P. Carman, J. Bokor, R. N. Candler, D. Di Carlo “Programmable Single Domain Magnetoelastic Terfenol-D Micromagnets For Single-cell Manipulation”, *Advanced Materials* (2021)
2. M. K. Panduranga, **Z. Xiao**, J. D. Schneider, T. Lee, C. Klewe, R. Chopdekar, P. Shafer, A. T. N’Diaye, E. Arenholz, R. N. Candler, G. P. Carman, “Single Magnetic Domain Terfenol-D Microstructures with Passivating Oxide Layer”, *Journal of Magnetism and Magnetic Materials* (2021)
3. M. Goiriena, **Z. Xiao**, A. El-Ghazaly, C. V. Stan, J. Chatterjee, A. Ceballos, A. Pattabi, N. Tamura, R. Lo Conte, F. Hellman, R. Candler, J. Bokor, “Influence of dislocations and twin walls in BaTiO<sub>3</sub> on the voltage-controlled switching of perpendicular magnetization”, *Physics Review Materials* (2021)
4. **Z. Xiao\***, R. Lo Conte\*, M. Goiriena, R. Chopdekar, C-H. Lambert, X. Li, S. Tiwari, A. Chavez, A. Barra, A. Scholl, K. Wang, S. Salahuddin, E. Arenholz, G. P. Carman, J. Bokor, R. N. Candler, “Tunable magneto-elastic effect in voltage-controlled exchange-coupled composite multiferroic microstructures”, *ACS Appl. Mater. Interfaces* (2020)
5. Y-C. Hsiao, R. Khojah, X. Li, A. Kundu, C. Chen, D. B. Gopman, A.C. Chavez, T. Lee, **Z. Xiao**, A. E. Sepulveda, R. N. Candler, G. P. Carman, D. Di Carlo, C. S. Lynch “Capturing Magnetic Bead-based Arrays Using Perpendicular Magnetic Anisotropy”, *Applied Physics Letters* 115 (8), 082402 (2019)
6. C. Chen, J. Sablik, J. Domann, R. Dyro, J. Hu, S. Mehta, **Z. Xiao**, R. N. Candler, G. P. Carman, A. Sepulveda, “Voltage Manipulation of Magnetic Particle using Multiferroics”, *Journal of Physics D: Applied Physics* (2019)
7. **Z. Xiao\***, R. Khojah\*, M. Chooljian, R. Lo Conte, J. D. Schneider, K. Fitzell, Y. Wang, R. Chopdekar, A. Scholl, J. Chang, G. P. Carman, J. Bokor, D. Di Carlo, and R. N. Candler, “Cytocompatible magnetostrictive microstructures for nano- and microparticle manipulation on linear strain response piezoelectrics”, *IOP Multifunctional Materials* 1, 014004 (2018)
8. **Z. Xiao**, R. Lo Conte, C. Chen, C-Y. Liang, A. Sepulveda, J. Bokor, G. P. Carman, R. N. Candler, “Bi-directional coupling in strain-mediated multiferroic heterostructures with magnetic domains and domain wall motion”, *Scientific Reports* 8, 5270 (2018)

9. R. Lo Conte, **Z. Xiao**, C. Chen, C. V Stan, J. Gorchon, A. El-Ghazaly, M. E Nowakowski, H. Sohn, A. Pattabi, A. Scholl, N. Tamura, A. Sepulveda, G. P Carman, R. N. Candler, J. Bokor, "Influence of Nonuniform Micron-Scale Strain Distributions on the Electrical Reorientation of Magnetic Microstructures in a Composite Multiferroic Heterostructure," *Nano Lett.*, 18 (3), pp 1952–1961 (2018)
  10. **Z. Xiao**, K. P. Mohanchandra, R. Lo Conte, T. Karaba, J. D. Schneider, A. Chavez, S. Tiwari, H. Sohn, M. E Nowakowski, A. Scholl, S. H Tolbert, J. Bokor, G. P Carman, R. N Candler, "Enhanced magnetoelectric coupling in a composite multiferroic system via interposing a thin film polymer", *AIP Advances* 8 (5), 055907 (2018)
- \*: Equal contribution**

## Submitted Manuscripts to Journals

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1. **Z. Xiao\***, C. Lai\*<sup>†</sup>, R. Zheng, M. Goiriena, N. Tamura, C. T. Juarez<sup>†</sup>, C. Perry<sup>†</sup>, H. Singh, J. Bokor, G. P. Carman, R. N. Candler, "Localized Strain Profile in Surface Electrode Array for Programmable Composite Multiferroic Devices" (*Under review, APL*)  
<sup>†</sup>: **Mentored 3 Undergraduates** in Electrical and Computer Engineering, Mechanical Engineering
2. X. Wang, A. Stuart, C. M. Q. Flores, A. T. Clark, A. Fiagbenu, R. V. Chopdekar, P. N. Lapa, **Z. Xiao**, D. Keavney, R. Rosenberg, M. Vogel, J. E. Pearson, S.G.E. te Velthuis, A. Hoffmann, K. S. Buchanan, X. Cheng "Spin memory of synthetic ferrimagnetic skyrmions in Co/Gd/Pt multilayers after cycling through the spin reorientation transition" (Under Review, *Nature Materials*)

## Conference Publications

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1. **Z. Xiao**, R. Lo Conte, M. Goiriena, R. V. Chopdekar, X. Li, S. Tiwari, C-H. Lambert, S. Salahuddin, G. P. Carman, K. Wang, J. Bokor, R. N. Candler, "Electric-field controlled magnetic reorientation in exchange coupled CoFeB/Ni bilayer microstructures", *Journal of Physics: Conference Series*, IOP Publishing. The 18th International Conference on Micro and Nanotechnology for Power Generation and Energy Conversion Applications (PowerMEMS), 2018  
 $\Delta$  **Best Paper Finalists (1/8)**
2. A. Abiri, X. Guan, Y. Dai, A. Tao, **Z. Xiao**, E. P. Dutson, R. N. Candler, W. S. Grundfest, "Depressed-Membrane Pneumatic Actuators for Robotic Surgery". 38th Annual International Conference of the IEEE Engineering in Medicine and Biology Society, 2016
3. Y. Dai, O. Paydar, A. Abiri, **Z. Xiao**, X. Guan, S. Liu, A. Tao, E. P. Dutson, W. S. Grundfest, R. Candler, "Miniature Multi-Axis Force Sensor for Haptic Feedback System in Robotic Surgery". 38th Annual International Conference of the IEEE Engineering in Medicine and Biology Society, 2016

## Selected Conference Presentations

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1. **Z. Xiao**, R. Lo Conte, M. Goiriena, R. V. Chopdekar, X. Li, C-H. Lambert, S. Tiwari, A. T. N'Diaye, P. Shafer, A. Chavez, A. Barra, G. P. Carman, S. Salahuddin, K. Wang, E. Arenholz, J. Bokor, Rob N. Candler, "Electric-field controlled coupled bilayer microsystems with tunable magnetoelastic effect". Magnetism and Magnetic Materials Conference, Las Vegas, CA, USA, 2019  
 The 40th International Conference on Vacuum Ultraviolet and X-ray Physics, San Francisco, USA, 2019
2. **Z. Xiao**, R. Khojah, M. K. Panduranga, M. Goiriena-Goikoetxea, R.V. Chopdekar, A. N'Diaye, R. Lo Conte, E. Arenholz, J. Bokor, G. P. Carman, D. Di Carlo, R. N. Candler, "Single Domain Magnetoelastic Terfenol-D Microdisks for Particle and Cell Manipulation". Joint Intermag-MMM Conference, Washington DC, USA, 2019  
 $\Delta$  **Best Student Presentation Award Winner**
3. **Z. Xiao**, R. Lo Conte, M. Goiriena, R. V. Chopdekar, X. Li, S. Tiwari, C-H. Lambert, S. Salahuddin, G. P. Carman, K. Wang, J. Bokor, Rob N. Candler, "Electric-field controlled magnetic reorientation in exchange coupled CoFeB/Ni bilayer microstructures". PowerMEMS Conference, Daytona Beach, FL, USA IOP Conference Series, 2018

4. **Z. Xiao**, R. Lo Conte, C. Chen, C. Stan, J. Gorchon, A. El-Ghazaly, M. Nowakowski, H. Sohn, P. Akshay, A. Scholl, T. Nobumichi, A. Sepulveda, G. Carman, J. Bokor, R. N. Candler, “Effect of Non-Uniform Micron-Scale Strain Distributions on the Electrical Reorientation of Magnetic Micro-Structures in a Composite Multiferroic Heterostructure”.  
Advanced Light Source Cross-Cutting Review, Berkeley Lab, CA, USA, 2017 (**Invited**)
5. **Z. Xiao**, M. K. Panduranga, R. Lo Conte, H. Sohn, J. Bokor, G. Carman, R. N. Candler, “Enhancement of coupling efficiency of ferroelectric to magnetoelastic thin film via interposing thin film polymer,” Annual Conference on Magnetism and Magnetic Materials (MMM), Pittsburgh, PA, USA, 2017
6. **Z. Xiao**, C. Liang, G. Carman and R. N. Candler, “Modeling of domain wall motion in multiferroic heterostructures”.  
Annual Conference on Magnetism and Magnetic Materials (MMM), New Orleans, LA, USA, 2016
7. **Z. Xiao**, X. Wang, Y. Liu, X. Xu, W. Wang, D. Keavney, X. M. Cheng, “Magnetic Properties of hexagonal HoFeO<sub>3</sub> thin films”.  
American Physics Society Mid-Atlantic Meeting, University Park, PA, USA, 2014
8. **Z. Xiao**, X. Wang, Y. Liu, S. G. E. te Velthuis, D. Rosenmann, R. Divan, X. M. Cheng, “Magnetization Reversal of Patterned Disks with Perpendicular Magnetic Anisotropy”.  
American Physical Society, March Meeting, Baltimore, MD, USA, 2013

## Awarded Research Proposals

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1. “Electrically-controlled magnetization and strain profile in highly magnetostrictive microstructures”  
Peer-Reviewed Beamtime Proposal, ALS, LBNL, Berkeley, CA, 2019
2. “Probing magnetic behavior in magnetostrictive composite microstructures for multiferroics applications”  
ALS Doctoral Fellowship Proposal, ALS, LBNL, Berkeley, CA, 2018
3. “Electrical control of magnetization in epitaxial FeGa on PMN-PT single crystal”  
Peer-Reviewed Beamtime Proposal, ALS, LBNL, Berkeley, CA, 2017

## Selected Awards & Honors

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- Dissertation Year Fellowship, UCLA**, Los Angeles, CA 2020 – 2021
- TANMS CLIMB Award for Graduate Research**, Los Angeles, CA 2020
- Fellow, The Data Incubator**, San Francisco, CA (2 % awarded) Summer 2020
- 2019 CESASC Scholarship**, Chinese-American Engineers and Scientists Association of Southern CA 2019
- Best Student Presentation Award Winner**, Joint MMM-Intermag Conference, Washington, DC 2019
- Awarded to 1 out of 5 finalists selected by the committee. The conference, sponsored by IEEE Magnetics, includes a wide range of topic on magnetism and magnetic materials and has historically drawn more than 1800 conference registrants, of which more than 500 are students.
- Edward K. Rice Outstanding Masters Award**, UCLA Henry Samueli School of Engineering Mar. 2019
- The award honors the achievements of 1 distinguished master’s students of academic year (2017-18) who has demonstrated academic and research excellence, leadership, and service to the school, university or community.
- Best Paper Award Finalist (1/8)**, 2018 PowerMEMS Conference, Daytona, FL Dec. 2018
- Selected as 1 of the 8 finalists for the Best Paper Award at the 18th International Conference on Micro and Nanotechnology for Power Generation and Energy Conversion Applications.
- ALS Doctoral Fellowship in Residence**, ALS, Berkeley National Laboratory, Berkeley, CA 2018 – 2019
- 1/10 Ph.D. students awarded internationally to conduct research onsite with scientists.
- Advanced Light Source Cross-cutting Review Travel Grant**, ALS, LBNL Jun. 2017
- Distinguished Master’s Thesis Award**, Electrical & Computer Engineering, UCLA 2017 – 2018
- Award to 1 master’s student from the Physical and Wave Electronics track each year.
- Department Fellowship**, Department of Electrical Engineering, UCLA 2015 – 2016
- Big Data Fellowship**, Center for Science of Information (soihub.org) 2015
- Leadership, Innovation, and Liberal Arts Center Research Funding**, LILAC, Bryn Mawr College 2014
- HHMI-funded Science Horizon Fellowship**, Howard Hughes Medical Institute (HHMI) 2013

## Research Experience

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### Graduate Researcher

Sep. 2015 – Present

Sensors and Technology Laboratory, UCLA

Los Angeles, CA

- Applied machine learning to segment and improve resolution of synchrotron x-ray magnetic images to speed up beamline experiments.
- Developed simulation and analyzed experimental data from x-ray microdiffraction for strain map reconstruction.
- Designed, fabricated and tested magnetoelastic microstructures on ferroelectrics as the energy-efficient microscale motor prototypes for cell sorting applications and magnetoelectric memory devices.
- Simulated and demonstrated both the time-dependent strain and magnetization behavior in multiferroic heterostructures with finite element analysis (FEA). Highlighted the necessity of bi-directional coupling in modeling the multiferroics heterostructure.
- Led and conducted experiments (authored proposals) in the Lawrence Berkeley National Laboratory. Collaborated with researchers and scientists from UCLA, UC Berkeley, Berkeley Lab and Cornell University.
- Modeled and analyzed  $\sim$ TB data with Python, MatLab, OriginLab of the beamline experiment results including magnetic spectroscopy, x-ray linear dichroism, and x-ray microdiffraction data.

### Doctoral Fellowship in Residence & Facility User

2016 – 2019

Advanced Light Source, Berkeley National Lab

Berkeley, CA

- Conducted synchrotron x-ray beamline experiments for various projects, built experiment tools, processed and analyzed spectroscopy and image data with Python, ImageJ, OriginLab and joined beamline maintenance with beamline scientists (Advised By Dr. Elke Arenholz & Dr. Alpha T. N'Diaye).

### Undergraduate Research Assistant

2013 – 2015

Nanomaterials and Spintronics Lab, Bryn Mawr Physics

Bryn Mawr, PA

- Projects: Magnetization reversal of magnetic disks with Perpendicular Magnetic Anisotropy; Characterization of perovskite  $\text{La}_{(1-x)}\text{Sr}_x\text{MnO}_3$  hexagonal  $\text{LuFeO}_3$  and  $\text{HoFeO}_3$  magnetic thin films.

### Summer Undergraduate Researcher

Summer 2014

Department of Physics and Astronomy, Rutgers University

Rutgers, NJ

- Examined the ferroelectricity of hexagonal  $\text{LuFeO}_3$  and  $\text{HoFeO}_3$  via piezoelectric force microscope. Incorporated the homemade PFM system to an atomic force microscope.

### Summer Undergraduate Research Assistant

Summer 2013

Center of Nanoscale Materials, Argonne National Laboratory

Lemont, IL

- Designed and fabricated a photomask in the cleanroom, and patterned microstructures on chips for magnetization reversal and magnetic bubble domain study.

## Teaching & Mentoring & Outreach

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### TANMS Undergraduate Research Program, Los Angeles, CA

Feb.2020 – Present

- Mentor two groups of engineering undergraduates (3 per cohort) on various research projects.
- Co-authored a journal manuscript (resubmitted after minor revision) with three undergraduates in 2020.

### Teaching Assistant, MEMS Physics & Design (Graduate), Los Angeles, CA

Spring 2020

- Designed homework problems for the Microelectromechanical Systems (MEMS) Device Physics and Design course.
- Taught a lecture on COMSOL simulation for MEMS device applications and hosted weekly office hours. Recorded video tutorials and training modules for students to get familiar with COMSOL simulations.

### Student Leader, Emerging Research National Conference in STEM, Washington, DC

Feb. 2020

- Led a group of 9 underrepresented college and high school students with the education director from TANMS research center to present at ERN conference.
- Actively participated in professional development discussion panels for mentors and educators with NSF EFRI/ERC Program Managers.

**NSF research experience for undergraduates (REU) Mentor**, Los Angeles, CA Summer 2019

- Mentored 3 undergraduate students from community and local colleges on summer research projects.
- Students presented their research at the TANMS summer research meetings and 2020 Emerging Research National Conference in Washington, DC.

**Pilot High School Outreach Program**, Los Angeles, CA 2016 – 2018

- Developed curriculum and co-taught interdisciplinary classes with three TANMS research center graduate students to 200 students at Lawndale High School in Centinela Valley High School District, Los Angeles.
- Coordinated with Los Angeles high school science teachers and UCLA faculties to revise curriculum to include more engineering materials.

**Teaching Assistant in Physics, Math and Computer Science**, Bryn Mawr, CA 2013 – 2015

- Courses: Discrete Mathematics (CS), Physics for PostBacs (Physics), Calculus (Math)

**Outreach with Society of Physics Students, Bryn Mawr Chapter**, Bryn Mawr, CA 2013 – 2015

- Invited bimonthly local K-12 and high school student to college physics classrooms. Organize lab events to get students involved in a variety of experiments.
- Attended regional CATlyst STEM outreach conference and events at Swarthmore college. Co-taught mini lectures on nanotechnology to K-12 students. Special emphasis has been placed on broadening the participation of female students in science and engineering.

### Professional Memberships

- Student Member: IEEE Magnetics Society, American Physics Society (APS), Society of Physics Students
- Member/User: Nanoelectronics Research Facility at UCLA, California Nano Systems Institute (CNSI), Center for High Frequency Electronics at UCLA, Nanofabrication Facility at Molecular Foundry, Advanced Light Source, Lawrence Berkeley National Lab (LBNL)

### Professional Experiences

<b>Session Chair</b> NSF Site Visit TANMS Poster Session, UCLA	2020
<b>Session Chair</b> 40th International Conference on Vacuum Ultraviolet and X-ray Physics, CA, USA	2019
<b>Session Chair</b> TANMS Annual Review Strategy Meeting, UCLA	2019
<b>Undergraduate Representative</b> Bryn Mawr College Physics Faculty Search Committee	2015

### Activities & Leadership

<b>Invited Panel Speaker for Undergraduate Internship Program</b> Lawrence Berkeley National Lab	2020
<b>Organizer of Safety Circle for Postdocs &amp; Students</b> Lawrence Berkeley National Lab	2018 – 2019
<ul style="list-style-type: none"> <li>• Invited speakers from different divisions in the Lawrence Berkeley National Laboratory, hosted monthly meetings for postdocs and students with high attendance rate.</li> </ul>	
<b>TANMS Education Program for Los Angeles High School</b>	2016 – 2018
<ul style="list-style-type: none"> <li>• Collaborated with university professors, graduate students and high school teacher to design a new high school curriculum and teacher professional development project.</li> <li>• Developed science module to incorporate into high school physics curriculum to promote students' interest in continuing STEM education. (More details in TANMS newsletter).</li> </ul>	
<b>President/Vice President, Society of Physics Students</b> Bryn Mawr College Chapter	2013 – 2015
<b>French to English Translator/Vocal Contributor</b> WorldPulse.com	2013 – 2014
<ul style="list-style-type: none"> <li>• Translated and commented on blog posts on behalf of Congolese women to bring them a global voice, to empower them and to build them a global network of support.</li> </ul>	
<b>Student Member, Beyond the Borders: Global Vision Panel</b> Tri-Co Consortium, PA	2014
<ul style="list-style-type: none"> <li>• Engaged in a variety of conversations and presentations on cultural diversity with a cohort of students from different socioeconomic and cultural backgrounds.</li> </ul>	
<b>Volunteer, African Family Health Organization (AFAHO)</b> Philadelphia, PA	2013 – 2014
<ul style="list-style-type: none"> <li>• Facilitated weekly community discussion with French speaking immigrants in English and French to assisted them in adapting to the new environment, and preparing for new jobs.</li> </ul>	

**Coordinator, Fellow, Leadership Empowerment & Advancement Program** BMC, PA 2011 – 2013

- Selected into a cohort of 16 fellows campus-wide and participated in weekly leadership advancement trainings and meetings (2011 – 2012).
- As one of the two student coordinators – Planned and coordinated weekly meeting with school leadership counselor; Created and organized online learning platform; Outreached alumni for panel discussions; Collected participants' feedback and communicated with school administrators (2012 – 2013).

**Campus Ambassador, Asian Women's Leadership University Project** Bryn Mawr, PA 2012

- Assisted AWLU project which aimed to provide top liberal arts college education to Asian Women; Raised awareness of accessible high education for women in developing countries through on campus meetings.

## Relevant Coursework

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**Physical & Wave Electronics:** Advanced Engineering Electrodynamics, Applied Optics, Advanced Electromagnetics, Advanced Quantum Mechanics, Terahertz Technologies & Applications, Classical Laser Theory, Antenna Theory & Design, Microwave & Millimeter Wave, Principles of Photonics, Solid State Electronics, Solid State Physics & Magnetism, Micro- and Nano-scale Biosensing for Molecular Diagnostics, Microelectromechanical systems (MEMS) Device Physics & Design (also TA'ed)

**Machine Learning & Artificial Intelligence:** Digital Image Processing, Computer Vision, Natural Language Processing, Neural Networks & Deep Learning, Fundamentals of Statistical Machine Learning, Computational Robotics (with Reinforcement Learning)

**Data Science & Analytics:** Data Incubator Intensive Data Science Fellowship Program, Matrix Analysis for Scientists and Engineers, Large-Scale Data Mining, Large-Scale Social & Complex Network, Statistics

## Professional Skills

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**Experimental Tools & NanoFab:** MOKE, Vibrating Sample Magnetometer, Photoemission Electron Microscopy, Magnetic Force Microscopy, Atomic Force Microscopy, X-ray Spectroscopy, Ferromagnetic resonance spectrometer, Superconducting quantum interference device, Electron Beam Lithography, Photolithography, Metal Evaporation/Sputtering, Dry Etching, Scanning Electron Microscopy

**Programming/Software Skills:** Python (proficient), Java, R, C, Apache Spark, SQL, MATLAB, L<sup>A</sup>T<sub>E</sub>X, OriginLab, L-edit, COMSOL Multiphysics (Finite Element Analysis), mumax3, AutoCAD

**Languages:** English (Fluent), Chinese (Fluent), French (Academic proficiency), German (Elementary)