E. Tomas Barraza

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Duke University
2016 - May 2020

PhD, Electrical Engineering
Dissertation: "*Foundational Studies of the Deposition of Metal-Halide Perovskite Thin Films by RIR-MAPLE*"
GPA: 4.0 major, 3.8 overall

Master of Science, Electrical Engineering
July 2016 – May 2018

North Carolina State University
2012 - 2016

Bachelor of Science, Electrical Engineering (cum laude)
GPA: 3.61 major, 3.46 overall

SKILLS & ATTRIBUTES

Scientific Toolset	Electron microscopy (SEM, TEM), atomic force microscopy (AFM), X-ray diffraction (XRD), energy-dispersive spectroscopy (EDS/EDX), spectroscopy (PL, FTIR, & UV-Vis), deposition and metallization (spincoating, PLD, thermal evaporation)
Programming Languages	MATLAB (*intermediate*), Python (*intermediate*), C (*beginner*)
Programming Tools & Modules	Visual Studio Code, git, GitHub, Jupyter, matplotlib, pandas
Other Software	Adobe Illustrator, Microsoft PowerPoint & Excel, Gwyddion
Operating Systems	Linux, Mac OS X, Windows
Languages	English (*native*), Spanish (*native*)
Citizenship	United States, Argentina

EXPERIENCE

Doctoral Research *July 2016- present*

Stiff-Roberts Lab, Electrical & Computer Engineering Department
Duke University, Durham, NC

- Developed novel thin film synthesis techniques for hybrid nanomaterials with applications in solar cells and LEDs using a Matrix-Assisted Pulsed Laser Evaporation (MAPLE) system
- Developed first-of-their-kind synthesis guidelines to promote stability and reliably increase solar cell efficiencies from 0.1% to over 12%
- Wrote and edited manuscripts for publication in scientific journals, presenting findings at national conferences
- Organized and participated in regular project meetings with local, national, and international collaborators to review data analyses and align on Design of Experiments (DOE)
- Trained and mentored 10 undergraduate and graduate students in scientific and lab safety methods
- Oversaw laboratory operation as lab manager, including maintenance of lab equipment worth >$10,000

EXPERIENCE – CONTINUED

Research Assistant *May 2014 – January 2015*

Real-Time Engine Part Coating Monitoring, Air Force Research Laboratory STTR
NC State University, Raleigh, NC

- Pioneered the usage of light polarimetry to monitor condition of military aircraft ceramic coatings
- Published 2 peer-reviewed articles describing the broad applications of polarimetry technique
- Worked independently in graduate optics laboratory environment with little supervision
- Performed extensive data analysis on over 100 samples using MATLAB software

Research Assistant *September 2013 – May 2014*

Nanofabrication of PDMS Membranes, NSF REU Engineering the Grid
NC State University, Raleigh, NC

- Used soft lithography processing techniques to prototype a microfluidics biomedical device
- Designed experiments to fill sample space as broadly defined by mentoring PhD student
- Defined priorities efficiently to maintain scientific output while participating in full-time coursework

HONORS & AWARDS

- John T. Chambers Scholars Fellowship (2018 - 2020) (2017 Honorable Mention)
  One of 3 students to earn prestigious award from research center made up of 39 departments at Duke
- GEM Consortium Associate Fellowship (2016 - 2020)
- Research Triangle MRSEC Graduate Fellowship (2016 - 2018)
  Earned support from NSF-funded research center spanning Duke, UNC-Chapel Hill, and NC State University
- NCSU Dean's List Member (2013, 2014)
- NCSU Wolfpack Recognition Scholarship (2012)

ACADEMIC PUBLICATIONS – ARCHIVAL JOURNALS

- W.A. Dunlap-Shohl, **E.T. Barraza,** et al. "Tunable internal quantum well alignment in rationally designed oligomer-based perovskite films deposited by RIR-MAPLE." *Materials Horizons*. March 2019.
- D.A. Luo, **E.T. Barraza,** M.W. Kudenov. "Aircraft Skin Defect Localization Using Imaging Polarimetry." *Optical Engineering.* August 2018.
- **E.T. Barraza*,** W.A. Dunlap-Shohl*, D.B. Mitzi, A.D. Stiff-Roberts. "Deposition of Methylammonium Lead Triiodide by Resonant Infrared Matrix-Assisted Pulsed Laser Evaporation." *Journal of Electronic Materials*. February 2018.
- W.A. Dunlap-Shohl*, **E.T. Barraza*,** A. Barrette, K. Gundogdu, A.D. Stiff-Roberts, D.B. Mitzi. "MAPbI3 Solar Cells with Absorber Deposited by Resonant Infrared Matrix-Assisted Pulsed Laser Evaporation." *ACS Energy Letters*. December 2017.
- D.A. Luo, **E.T. Barraza,** M.W. Kudenov. "Mueller Matrix Polarimetry on Plasma Sprayed Thermal Barrier Coatings for Porosity Measurement." *Applied Optics*. December 2017.

ACADEMIC PUBLICATIONS – CONFERENCE PROCEEDINGS

- **E.T. Barraza**, N.E. Wright, M.C. Folgueras, A. Rastogi, R. Li, M. Fukuto, A.D. Stiff-Roberts, "Concentration and Precursor Delivery Effects on Hybrid Perovskites Deposited by Resonant Infrared Matrix-Assisted Pulsed Laser Evaporation." *MRS Spring Meeting*, Phoenix, AZ. April 2019.
- W.A. Dunlap-Shohl, **E.T. Barraza**, A. Barrette, K. Gundogdu, A.D. Stiff-Roberts, and D.B. Mitzi, "Deposition of Halide Perovskite Thin Films and Solar Cells Using the RIR-MAPLE Technique." *MRS Fall Meeting*, Boston, MA. November 2018.
- A.D. Stiff-Roberts, D.B. Mitzi, **E.T. Barraza**, and W.A. Dunlap-Shohl, "Resonant Infrared, Matrix-Assisted Pulsed Laser Evaporation of Hybrid Perovskites." (Invited) *Novel Materials and Applications Conference, The Optical Society (OSA) Advanced Photonics Congress*, ETH Zürich, Switzerland. July 2018.
- **E.T. Barraza,** W.A. Dunlap-Shohl, Y. Liu, D.B. Mitzi, A.D. Stiff-Roberts. "Deposition of Crystalline Organic-Inorganic Hybrid Materials by RIR-MAPLE." *Electronic Materials Conference,* South Bend, IN. June 2017.
- **E.T. Barraza,** M.C. Folgueras, A.D. Stiff-Roberts. "Exploration of Solvent Effects on Morphology of Polyaniline & Other Polymer Films Deposited Through RIR-MAPLE." *APS March Meeting*, New Orleans, LA. March 2017.

PROFESSIONAL PRESENTATIONS

- **E.T. Barraza,** W.A. Dunlap-Shohl, D.B. Mitzi, A.D. Stiff-Roberts. "Deposition of Metal-Halide Perovskites by RIR-MAPLE: Materials & Processing Advances." *Duke ECE Department Graduate Workshop,* Durham, NC. September 2017.
- **E.T. Barraza,** A.D. Stiff-Roberts. "Resonant-Infrared Matrix-Assisted Pulsed Laser Evaporation: Enabling Room-Temperature Mid-Infrared Detection Through Intraband Transitions". *Duke ECE Department Graduate Workshop,* Durham, NC. September 2016.

OTHER WRITTEN WORKS

- **E.T. Barraza,** D. Copple, J. Zhou. "Science Module: Solar Power." *Duke University Initiative for Science & Society: SciPol Learning Database.* http://sciencepolicy.duke.edu/content/science-module-solar-power. March 2018.
- **E.T. Barraza,** et al. "Analysis of Crystal Formation in Vapor-Processed Hybrid Organic-Inorganic Perovskite Thin Films." *General User Proposal, Brookhaven National Laboratory.* ***Approved for 2018 beamtime cycle.***
- **E.T. Barraza,** A.D. Stiff-Roberts**.** "Breaking Down RIR-MAPLE." *Stiff-Roberts Research Group Website.* http://stiffrobertslab.pratt.duke.edu/research/overview. August 2016

PROFESSIONAL DEVELOPMENT

- "Python for Data Science: Visualization with Altair." Workshop. *Center for Data and Visualization Sciences, Duke University*, Durham, NC. September 2019.
- "Python for Data Science: Pandas and Jupyter Lab." Workshop. *Center for Data and Visualization Sciences, Duke University*, Durham, NC. September 2019.

PROFESSIONAL DEVELOPMENT – CONTINUED

- "Science Outside the Lab: Nanotechnology and Policy." Week-long workshop. *National Nanotechnology Coordinated Infrastructure & the School for the Future of Innovation in Society, Arizona State University.* Washington, DC. June 2018.
- "Polymer Colloids: Synthesis, Characterization and Application." Short course. *American Physical Society, DPOLY Division*. New Orleans, LA. March 2017.
- "Mentoring and Graduate Student Success." Day-long workshop. *The Graduate School, Duke University*, Durham, NC. August 2016.

UNIVERSITY SERVICE

Duke University

ECE Advocacy and Student Engagement (EASE) Volunteer (2016 -)
- Join current student volunteers in organizing activities that promote student wellbeing
- Organize and coordinate outreach activities throughout the year
- Host prospective engineering graduate students over hallmark recruiting weekend

Head Lab Designer/TA: ECE341L – Solar Cells (2018 -)
- Independently developed semester-long laboratory experience for solar cells course
- Led laboratory sessions of 15+ undergraduate students at a time as sole TA
- Exploited Duke resources to show students cleanroom solar cell fabrication procedure

Undergraduate Student Mentorship (2016 -)
- Responsible for developing comprehensive research plans for undergraduate students
- Coordinates training of students in all aspects related to working in laboratory settings

University Libraries Graduate Students Advisory Board Member (2016 - 2017)
- Participated in interdepartmental discussions on needs of students
- Represented home department in allocation of discretionary resources

North Carolina State University

Electrical & Computer Engineering Department Ambassador (2015 - 2016)
- Formalized expectations of department ambassadors as part of inaugural class
- Promoted activities and goals of the department at university-wide events
- Advised prospective and incoming students during one-on-one guided tours

Institute of Electrical & Electronics Engineers Student Chapter (2014 - 2016)
- Ensured university was represented at local, regional, and national IEEE events
- Charged with overseeing execution of events as chapter vice-president