

BABAK ESLAMI

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One University Pl. Chester, PA 19031

EDUCATION

The George Washington University, Washington, DC

Ph.D., Mechanical Engineering, School of Engineering and Applied Science

Aug 2016

Advisor: Prof. Santiago Solares

University of Maryland, College Park, MD

Ph.D., Mechanical Engineering, A. James Clark School of Engineering (two years completed, transferred to The George Washington University with advisor)

Aug 2012 –

Aug 2014

M.S., Mechanical Engineering, A. James Clark School of Engineering

May 2012

B.S. Mechanical Engineering, A. James Clark School of Engineering

Dec 2010

PROFESSIONAL APPOINTMENTS

- **Assistant Professor**, Widener University Aug 2018- Present
 - **Visiting Scholar**, The George Washington University, DC Sept 2016– Present
 - **Director of Nanometrology Core Facility**, University of Maryland Aug 2017– June 2018
 - **Teaching Faculty**, University of Maryland Sep 2016 –June 2018
 - **Adjunct Professor**, George Mason University Jan 2017– June 2017
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RESEARCH EXPERIENCE

Micro- and Nano-manufacturing by Multifrequency SPM Sept 2016– Present

- Transformation of SPM techniques to expand its capabilities to surface modification
- Modification of surface drag coefficient by AFM tip

Development of Nano-metrology technique for Subsurface Imaging by AFM Aug 2012–Present

- Development of new techniques in multifrequency AFM to study soft matter
- In-situ measurements on polymers for varying environmental conditions

Effect of Temperature and Humidity on Additive Manufacturing Filament Sept 2017–Present

- Studying the effect of relative humidity on quality of 3D printed parts
- Designing and developing automated environmental controlled 3D printer

Development of an Automated Assembly Line for Visually Indicating Fasteners Jan 2011 – May 2012

- Refinement of manufacturing process for visual tension indicating fasteners
- Design and fabrication of an automated assembly line of visual tension indicating fasteners

Development of Automated Subsystem Measuring Density of Synthetic Filaments Jan 2010 – Dec 2010

- Development of a novel concept for measuring density of synthetic filaments and bristles
- Design of a full-scale automated subsystem for the assembly line of paint brushes

ACADEMIC INSTRUCTION

Assistant Professor, Widener University, Chester, PA Aug 2018 – Present

- ME217: Design of Material
- ME303: Mechanical Measurement and Instrumentation I
- ME488: Introduction to Nanotechnology
- ENGR214: Dynamics
- ME353: Engineering Vibrations
- ENGR401: Senior Design Project (Faculty Advisor)

Teaching Faculty, University of Maryland, College Park, MD Sept 2016 – Aug 2018

- ENME272: Introduction to Computer Aided Design
- ENME361: Vibration, Control, and Optimization I
- ENME371: Product Development Design
- ENME400: Machine Design
- ENME472: Integrated Product and Process Development

Course Instructor, University of Maryland, College Park, MD Jan 2012–May 2012

- ENME371: Product Engineering and Manufacturing (Spring 2012)

Teaching Assistant, University of Maryland, College Park, MD Sep 2010 – May 2013

- ENME332: Thermodynamics (Fall 2010)
- ENME371: Product Engineering and Manufacturing (Spring & Fall 2011)
- ENME361: Vibrations (Spring 2013)

Laboratory Manager, University of Maryland, College Park, MD Jan 2010 – May 2012

- Automation and Design Laboratory
- Mechanical Engineering Machine Shop
- Product Innovation & Realization Laboratory Suite (PIRLS)

COMPUTER SKILLS

- Igor Pro
 - Programming: MATLAB, C++
 - Proficiency in CAD software: CreO, SolidWorks, AutoDesk Inventor, NX
 - FEA: Pro/Mechanica, SolidWorks, ANSYS
 - MasterCAM, Catalyst, G&M Generator
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PERSONNEL MANAGEMENT, MENTORING and ADVISING

- Graduate advising (Widener University, Chester) May 2019–present
Carlos Lugo Gonzalez (Exp. Graduation May 2022): Design and Development of Environmental Humidity System for 3D Printers
Dylan Caputo (Exp. Graduation May 2022): *graduate research assistant (non-thesis track)*.
Franklin Livolsi (Graduated May 2021): Characterization of NinjaTek polymers with AFM
Thoma May (Graduated May 2021): CFD Model of 3D Printer Enclosure
Jesse Putnam (Graduated May 2020): Effect of laser location on AFM
- Undergraduate advising (Widener University, Chester) May 2019–August 2019
Brandon Jackson (Best poster award winner SURCA)
Andrew O'Donohue
Michael Hutchinson
- Graduate Student advising (University of Maryland, College Park) Sep 2016 – Jan 2018
Miead Nikfarjam (Graduate Student): Optimization of imaging parameters for AFM

David Kriesberg (Graduate Student): Design and development of environmental controlled 3D

Printer

- Direct Reports (University of Maryland, College Park): June 2014 – Aug 2014
Ramya Durvasula (High School Intern): Application of viscoelastic models in AFM simulation and experimental property measurements using amplitude modulation modes.
- Trainees Directly Supervised (University of Maryland, College Park): Jan 2014 – Aug 2014
Dr. Haijuan Ding (Visiting Professor): Instruction on different AFM imaging modes, including contact mode, amplitude modulation, bimodal imaging, both in air and liquid measurements

Tao Chao, Fudong Han (PhD Candidates): Instruction on electrochemical cell studies in the context of AFM imaging

Alfredo Diaz, Enrique Lopez, Sarice Barkley (New Laboratory Mates, PhD Students): Instruction on different imaging techniques, force spectroscopy and multifrequency imaging, both in air and liquid environments

PUBLICATIONS & PRESENTATIONS

- **Invited Talks:**

“Enhancing or Diminishing Atomic Force Microscopy Sensitivity”, 2019, School of Engineering, Temple University, Philadelphia, PA.

“Multifrequency Atomic Force Microscopy”, 2017, IEEE Nano, Pittsburg, PA.

- **Journal Publications:**

Eslami, B., & Caputo, D. (2021). Effect of Eigenmode Frequency on Loss Tangent Atomic Force Microscopy Measurements. *Applied Sciences*, 11(15), 6813.

- May, T., **Eslami, B.** & Fouladi, K. Optimization of 3D printer enclosure environment. *Int J Adv Manuf Technol* (2021). <https://doi.org/10.1007/s00170-021-08034>
- Saha, D, Gismondi, P, Kolasinski, S., Shumlas, S., Rangan, S., **Eslami, B.**, McConnell, A. Bui, T. and Cunfer, K. "Fabrication of Electrospun Nanofiber composite of g-C₃N₄ and Au Nanoparticles as Plasmonic Photocatalyst." *Surfaces and Interfaces* (2021): 101367.
- Livolsi, F., May, T., Caputo, D., Fouladi, K., **Eslami, B.**, "Multiscale Study of Effect of Humidity on Shape Memory Polymers Used in 3D Printing." *Journal of Manufacturing Science and Engineering*, 2021, 143(9), 091010-091019.
- Damircheli, M.; **Eslami, B.**; "V-Shaped Cantilever Design for Enhanced Multifrequency AFM Measurements," *Beilstein Journal of Nanotechnology*. 2020. *11(1)*, 1525-1541.
- Putnam, J.; Damircheli, M.; **Eslami, B.**; "Effect of Laser Spot Positioning with Optical Beam Deflection Method on Atomic Force Microscopy," *Proceedings of the Institution of Mechanical Engineers, Part K: Journal of Multi-body Dynamics*. 2020. <https://doi.org/10.1177/1464419320951343>.
- Divid, S.; Ma, X.; Pierre, R.; **Eslami, B.**; Patek, S.; Bergbreiter, S.; "Latch-based control of energy output in spring actuated system," *J R Soc Interface*. 2020; 17 (168):20200070. doi:10.1098/rsif.2020.0070.
- Putnam, J.; **Eslami, B.**; "Controllable Surface Damage by AFM – Imaging with Higher Eigenmodes and Its Advantages" *Imaging & Microscopy* 2020, Issue 2, Pg 24.
- Eslami, B.**; Damircheli, M.; "Biharmonic versus Bimodal AFM: Numerical and Experimental Study on Soft Matter," *J. App. Phys.* 2019, 126, 095301. <https://doi.org/10.1063/1.5116794>.
- Ehasnipour, M.; Damircheli, M.; **Eslami, B.**; "Effect of Cantilever's Dimensions on Phase Contrast in Multifrequency Atomic Force Microscopy," *Microsc Res Tech.* 2019, 1-10. <https://doi.org/10.1002/jemt.23297>.
- Damircheli, M.; **Eslami, B.**; "Enhancing Phase Contrast for Bimodal AFM Imaging in Low Quality Factor Environment," *Ultramicroscopy* 2019, 204, 18-26. <https://doi.org/10.1016/j.ultramic.2019.05.001>.
- Nikfarjam, M.; Lopez-Guerra, E.A.; Solares, S.D.; **Eslami, B.**; *Imaging of Viscoelastic Soft Matter with Low Indentation Using Higher Eigenmodes in Single-Eigenmode Amplitude-Modulation Atomic Force Microscopy*, *Beilstein J. Nanotech.* 2018, 9, 1116-1122.
- Nikfarjam, M.; Lopez-Guerra, E.A.; Solares, S.D.; **Eslami, B.**; "Higher eigenmode tricks in multifrequency atomic force microscopy," *Imaging & Microscopy* 2017, issue 3, 38-39.
- Eslami, B.**; Solares, S.D.; "Imaging of surface nanobubbles by atomic force microscopy in liquids: influence of the drive frequency on the characterization of ultra-soft matter," *Microscopy Research and Technique* 2017, 80, 41-49.
- Eslami, B.**; Lopez-Guerra, E.A., Raftari, M., Solares, S.D.; "Evolution of nano-rheological properties of Nafion® thin films during pH modification by strong base treatment: A static and dynamic force spectroscopy study," *J. Appl. Phys.* 2016, 119, 165301.

Eslami, B.; Solares, S.D.; “*Experimental approach for selecting the excitation frequency for maximum compositional contrast in viscous environments for piezo-drive bimodal atomic force microscopy*,” *J. Appl. Phys.* 2016, 119, 084901.

Eslami, B.; Lopez-Guerra, E.A.; Diaz, A.J.; Solares, S.D.; “*Optimization of the excitation frequency for high probe sensitivity in single eigenmode and bimodal tapping-mode AFM*,” *Nanotechnology* 2015, 26, 165703.

Diaz, A.J; **Eslami, B.;** López-Guerra, E.A.; Solares, S.D.; “*Selection of higher eigenmode amplitude based on dissipated power and virial contrast in bimodal atomic force microscopy*,” *J. Appl. Phys.* **2014**, in press.

Eslami, B.; Ebeling, D.; Solares, S.D.; “*Trade-offs in sensitivity and sampling depth in bimodal atomic force microscopy and comparison to the trimodal case*,” *Beilstein J. Nanotech.* **2014**, 5, 1144-1151.

Ebeling, D.; **Eslami, B.;** Solares, S.D.; “*Visualizing the subsurface of soft matter: simultaneous topographical imaging, depth modulation, and compositional mapping with triple frequency atomic force microscopy*,” *ACS Nano* **2013**, 7, 10387-10396.

▪ **Conference Publications:**

Pierre, R.; **Eslami, B.;** Bergbreiter, S.; “*Ground Reaction Force Sensing in Milligram-Scale Legged Microrobots*”, *Transducers 2019-EUROSENSORS XXXIII*. Submitted in November 2018.

Eslami, B.; Ganya, R.; Bunai, C.; Thamire, C.; “*Smart fasteners and their application in flanged joints*”, *ASME 2011 International Mechanical Engineering Congress and Exposition*, Paper No. IMECE2011-64214, Volume 3: Design and Manufacturing, 707-714.

▪ **Conference Presentations:**

“*Enhancing or Diminishing Sensitivity in Multifrequency AFM*”, *Proceeding of the ISPM 2019, International Scanning Probe Microscopy 2019*, Louvain, Belgium.

“*Sensitive Imaging by Multifrequency Atomic Force Microscopy*”, 4th International Nanotechnology Conference & Expo April 2019, Philadelphia, PA.

“*Visualizing the subsurface of soft matter using trimodal AFM*”, *International Conference of Nanoscience and Technology July 2014, Symposium: Novel SPM Techniques*, Vail, Colorado.

“*Smart fasteners and the applications in flanged joints*”, *Graduate Research Interaction Day 2011*, University of Maryland College Park. (1st Prize Winner)

“*Automated Assembly Line Design for Manufacturing Smart Fasteners*”, *International Mechanical Engineering Congress and Exposition 2010*.
