

Holly McIlwee Golecki

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3134 Everitt Laboratory
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Education

PhD, Bioengineering, Harvard University, Cambridge, MA; August **2018**

MS, Materials Science and Engineering, Drexel University, Philadelphia, PA; June **2008**

BS, Materials Science and Engineering, Drexel University, Philadelphia, PA; June **2008**

Pennoni Honors College, Drexel University, Philadelphia, PA; June 2008

Professional Experience

University of Illinois at Urbana-Champaign, Urbana, IL

Teaching Assistant Professor, 8/19-present

Department of Bioengineering, Grainger College of Engineering

University of Pennsylvania, Philadelphia, PA

Part-time Lecturer, 1/19-5/19

MSE460 Phase Transformations and Diffusion in Solids

Department of Materials Science and Engineering, School of Engineering and Applied Sciences

Drexel University, Philadelphia, PA

Adjunct Faculty, 1/19-4/19

MATE580 Special Topics in Soft Robotics

Department of Materials Science and Engineering, College of Engineering

The Haverford School, Haverford, PA

Director of Robotics, 8/16-6/19

- Founded a soft robotics research group for students in grades 8-12, where students entered and won the 2017 and 2018 Harvard University Soft Robotics Toolkit competition. High school students also file patents, publish in peer-reviewed journals, and present at the Materials Research Society conference.
- Managed a team of 6 coaches, 70+ students participating in competitive robotics.
- Develop and deliver robotics curriculum for K-12 teachers and students.

Faculty Member, 8/14-6/19

- Courses Developed: (1) Engineering electives: Developed and teach 3 semester-long project-based courses in engineering that include the following topics: materials science, mechanics, structural engineering, robotics, and science of cooking. (2) Developed and executed project based curriculum for science and math faculty throughout the school.
- Programs started: Lunch & Learn symposium for students to present independent work, STEM Day for upper level students to demonstrate STEM concepts for lower and middle school students.

Harvard University, Cambridge, MA

Graduate Research Assistant, 09/09-06/14

Disease Biophysics Group

Project Title: Development of Biopolymer Nanofibers for Dermal Wound Healing

Teaching Fellow, 01/13-05/13

ES96 Engineering Approaches to Fashion Design

School of Engineering and Applied Sciences

Concord-Carlisle High School, Concord, MA

Curriculum Design and Seminar Instructor, 2011. 2014

Concord-Carlisle High School

Introduction to Engineering Seminar: “Engineering Wearable Technologies”

Introduction to Engineering Seminar: “Engineering Structures from the Macro- to the Nanoscale”

Drexel University, Philadelphia, PA

NSF-IREU Research Assistant, 6/08

Institute d’Electronique, de Microelectronique, et de Nanotechnologie, Lille, France

Project Title: Detection of hexachromium ions by localized surface plasmon resonance measurements using gold nanoparticle/chitosan composite interfaces

NSF-REU Research Assistant, 6/07-8/07

Natural Polymers and Photonics Group, Drexel University

Project Title: Control of structural color effects, bioinspired chitosan thin films for metal ion Sensing

Research Assistant, 9/05 – 6/08

Natural Polymers and Photonics Group, Drexel University

Projects: Biopolymer thin films, structural color, metal ion sensing, coatings

Pharmaceutical Packaging Technology & Development Co-op, 3/06 – 9/06

Merck & Co., Inc. Landsdale, PA

Projects: Characterizing long-term stability of developmental pharmaceuticals for polymer stability and environmental impacts to delivery.

Polymer Additives Co-op, 3/05 – 9/05

Cognis Corporation

Projects: Material and mechanical testing of pvc lubricants, plasticizer formulation, and near IR spectrometry.

NCAA Division I Crew Athlete, 09/03 – 04/06

Colonial Athletic Association Scholar Athlete Award, 06

A.J. Drexel Athletic Scholarship, 04-06

Patents

1) M. Baumholtz, R. Buonocore, Y. Chen, **H.M. Golecki**, A. Sardesai, X. Segel, B. Schork, R. Sun, K. Wagner, W. Baltrus, G. Haabestad. “Edible Pneumatic Soft Robotic Actuators” US Patent Application Number 62/517,299. May 1, 2018

- 2) K.K. Parker, J.A. Goss, S.J. Park, A.K. Capuli, **H.A. McIlwee**, J.C. Nawroth, J.O. Dabiri. “Tissue-engineered pumps and valves and uses thereof”, US20150182679A1, June 2, 2015.
- 3) K.K. Parker, G.M. Gonzalez, **H.M. Golecki**, K. Shin, J.A. Goss, “Immersed rotary jet spinning devices (irjs) and uses thereof”, WO2014127099A2, February 13, 2013.
- 4) K.K. Parker, J.A. Goss, M.R. Badrossamay, **H.A. McIlwee**, patent, “Systems, Devices, and Methods for the Fabrication of Polymeric Fibers”. WO/2012/068402. May. 23, 2012.
- 5) C.L. Schauer, M.D. Cathell, **H.A. McIlwee**, patent, “Multilayer Thin Films”. US 2010/0062232 A1, Mar. 11, 2010.

Peer-reviewed Publications

- 1) A.N. Sardesai, X.M. Segel, M.N. Baumholtz, Y. Chen, R. Sun, B.W. Schork, R. Buonocore, K.O. Wagner, **H.M. Golecki**, Design and Characterization of Edible Soft Robotic Candy Actuators. *MRS Advances*. July 2018, DOI: 10.1557/adv.2018.557
- 2.) C.O. Chantre P.H. Campbell, **H.M. Golecki**, A.T. Buganza, A.A. Capulli, L.F. Deravi1, S. Dauth, S.P. Sheehy, J.A. Paten, C.A. Higgins, K. Gledhill, Y.S. Doucet, E.H. Abaci4, J.W. Ruberti, S.P. Hoerstrup, A.M. Christiano4, K.K. Parker, Production-scale fibronectin nanofibers promote wound closure and tissue repair in a dermal mouse model. *Biomaterials* 166:96-108, Mar 5, 2018.
- 3) G.M. Gonzalez, L.A. MacQueen, J.U. Lind, S.A. Fitzgibbons, C.O. Chantre, I. Huggler, **H.M. Golecki**, J.A. Goss, K.K. Parker. Production of synthetic, para-aramid and biopolymer nanofibers by immersion rotary jet-spinning. *Macromolecular Materials and Engineering*. 7 October 2016; doi: 10.1002/mame.201600365.
- 4) **H. M. Golecki**, H. Yuan, C. Glavin, B. Potter, M. Badrossamay, J. Goss, M.D. Phillips, K.K. Parker, “Effect of solvent evaporation on fiber morphology in rotary jet spinning.”, *Langmuir*. 2014 Nov 11;30(44):13369-74.
- 5) M.R. Badrossamay, K. Balachandran, A.K. Capulli, **H.M. Golecki**, A. Agarwal, J.A. Goss, H. Kim, K. Shin, K.K. Parker. Engineering hybrid polymer-protein super-aligned nanofibers via rotary jet spinning. *Biomaterials*. 2014 Mar;35(10):3188-97.
- 6) L.F. Deravi, **H.M. Golecki**, and K.K. Parker. Protein-Based Textiles: Bio-Inspired and Bio-Derived Materials for Medical and Non-Medical Applications. *J. Chem. Biol. Interfaces*. 2013; 1(1): 25-34
- 7) P. Mellado*, **H.A. McIlwee***, M.R. Badrossamay, J.A. Goss, L. Mahadevan, K.K. Parker. “A Simple Model for Nanofiber Formation by Rotary Jet-Spinning”. *Appl Phys Lett*. 2011, 99, 203107.
- 8) M.R. Badrossamay, **H.A. McIlwee**, J.A. Goss, K.K. Parker, “Nanofiber Assembly by Rotary Jet-Spinning”, *Nano Letters*, 2010, 10 (6) 2257-2261.
- 9) K.J. Fahnstock, M. Manesse, **H.A. McIlwee**, C.L. Schauer, R. Boukherroub, S. Szunerits, “Selective detection of hexachromium ions by localized surface plasmon resonance measurements using gold nanoparticles/chitosan composite interfaces”, *The Analyst*, 2009, 134 (5) 881-6.
- 10) V.G. Praig, **H.A. McIlwee**, C.L. Schauer, R. Boukherroub, S. Szunserits, “Heavy-metal sensing utilizing localized surface plasmon resonance on gold nanoparticle-modified chitosan films”. *Journal of Nanoscience and Nanotechnology* (Invited) 2009, 9 (1) 350-7.
- 11) **H.A. McIlwee**, C.L. Schauer, R. Boukherroub, S. Szunerits, "Metal ion sensing on chitosan modified gold substrates using surface plasmon resonance spectroscopy" *The Analyst*, 2008, 133, 673-7.
- 12) **H.A. McIlwee**, J.D. Schiffman, M.D. Cathell, C.L. Schauer, "Deposition of Chitosan: Electrospinning and Thin Films" in Current Research and Developments on Chitin and Chitosan in Biomaterial Science. R. Jayakumar and M. Prabakaran, Eds., Research Signpost, Kerala (2008) 81-122. Invited book chapter.

Conference Presentations

- 1) **Golecki HM**, “How Materials Science Research in Secondary Schools Prepares the Next Generation of Materials Innovators”, Materials Research Society (MRS) Fall Meeting, Boston, MA, November 2018.

- 2) **Golecki, HM**, “It's never too early to innovate: Engaging secondary students with professionals”, Teacher Research and Knowledge: A Celebration of Writing and Literacy, University of Pennsylvania, October 2018.
- 3) **Golecki HM**, “Building Soft Robotic Devices in the Classroom: Edible Actuator”, IEEE Robosoft Conference, Livorno, Italy, April 2018.
- 4) Sardesai A, Segel X, Sun R, Chen Y, Baumholtz M, Schork B, Wagner K, Buonocore R, **Golecki HM**. “Design and Characterization of Edible Soft Robotic Candy Actuators”. Materials Research Society (MRS) Spring Meeting, Phoenix, AZ, April 2018. (Best Poster Award)
- 5) **Golecki HM**, “Teaching Engineering through the Field of Soft Robotics”, Learning and the Brain: Merging Minds and Technology Conference, Boston, MA, October 2017.
- 6) Golecki HM, Trocano T, Mitchell S, “Tiered Approach to Project Based Learning in Mathematics and Engineering”. NCTM 2016 Regional Conference & Exposition, Philadelphia, PA, November 2016.
- 7) **Golecki HM**, Mitchell S, “If You Build It, They Will Learn.” STEMathon, Lancaster, PA, August 2015.
- 8) Glavin C, Potter B, **Golecki HM**, Phillips MP, Parker KK. Effect of Polymer and Solvent Properties on Nanofiber Morphology in Rotary Jet-Spinning. Materials Research Society (MRS) Fall Meeting, Boston, MA, November **2012**. (Honorable Mention Poster Award)
- 9) **Golecki HA**, Deravi LF, Paten JA, Goss, JA, Ruberti JW, Parker KK. Shear Induced Fibrillogenesis of Fibronectin Nanofibers by Rotary Jet-Spinning. Materials Research Society (MRS) Fall Meeting, Boston, MA, November **2012**.
- 10) **McIlwee HA**, Badrossamay MR, Goss, JA, Parker KK. Parametric Study of Nanofiber Formation by Rotary Jet-Spinning. Materials Research Society (MRS) Fall Meeting, Boston, MA, November **2011**.
- 11) **McIlwee HA**, Badrossamay MR, Deravi LF, Goss, JA, Parker KK. Novel Method of Fibronectin Fibrillogenesis by Rotary Jet-Spinning. Materials Research Society (MRS) Fall Meeting, Boston, MA, November **2011**.
- 12) Deravi LF, Bell G, Magyar A, **McIlwee HA**, Mathger L, Kuzirian A, Hu E, Hanlon R, Parker, KK. Assembly of Bio-Photonic Materials using Proteins Isolated from cuttlefish *Sepia officinalis*. Materials Research Society (MRS) Fall Meeting, Boston, MA, November **2011**.
- 13) **McIlwee HA**, Badrossamay MR, Deravi LF, Goss, JA, Parker KK. Novel Method of Fibronectin Fibrillogenesis by Rotary Jet-Spinning. Biomedical Engineering Society (BMES) Annual Meeting, Hartford, CT, October **2011**.
- 14) Badrossamay MR, Deravi L, **McIlwee HA**, Feinberg, AW, Goss JA, Parker KK. De novo Assembly of Extracellular Matrix Proteins, New Frontiers in Fiber Material Science, Charleston, SC, October **2011**.
- 15) **H.A. McIlwee**, M.R. Badrossamay, J.A. Goss, K.K. Parker. “Parametric Study of Nanofiber Formation by Rotary Jet-Spinning”, International Materials Research Congress (IMRC) Annual Meeting, Cancun, Mexico. August **2011**.
- 16) K. Balachandran, **H.A. McIlwee**, K. Tiwari, J. Wylie-Sears, J. Bischoff, R.A. Levine, K.K. Parker, “Anisotropic Extracellular Matrix Nanofibers for Heart Valve Tissue Engineering”, Wyss Institute for Biologically Inspired Engineering Annual Retreat, Boston, MA, November **2010**.
- 17) Badrossamay MR, **McIlwee HA**, Goss, JA, Parker KK. Rotary Jet-Spinning: A Novel Technique of Nanofibrous Scaffold Fabrication. Biomedical Engineering Society (BMES) Annual Meeting, Austin, TX. October **2010**.
- 18) **H.A. McIlwee**, K. Fahnstock, S. Szunerits, C.L. Schauer, "Chitosan Thin Films for SPR and LSPR Detection of Metal Ions", Presented at ASM Liberty Bell Chapter Poster Contest, Horsham, PA, April **2008**
- 19) **H.A. McIlwee**, C.L. Schauer. “Controlling Structural Color of Biopolymer Thin Films”. Presented at Drexel University NSF-REU Poster Session, Aug **2007**.
- 20) **H.A. McIlwee**, M.D. Cathell, C.L. Schauer. "Physical and Optical Measurements of Biomimetic Thin Films" Presented at American Chemical Society (ACS) Middle Atlantic Regional Meeting Poster Session, May **2007**.

Select Honors

- 1) National Science Foundation Graduate Research Fellowship Program, 2008-2012
- 2) Drexel University Research Day Undergraduate Physical Science & Engineering Poster Award, 2008
- 3) 2nd Place, American Society of Materials (ASM) Liberty Bell Chapter Poster Competition, 2008
- 4) Drexel University College of Engineering Undergraduate Student Research Award, 2008
- 5) Poster Award, Drexel University NSF-REU Sensors Program, 2007
- 6) Milton Rosenberg Scholarship for excellence in junior year studies, 2007
- 7) A.J. Drexel Academic Scholarship, 2003 – 2008

Select Student Awards

- 1) Best Venture Capital Pitch, 2019 BMES Coulter College, 2019
- 2) Harvard University Soft Robotics Toolkit Design Competition, 1st place high school division, 2017, 2018
- 3) Best Poster Award, Materials Research Society Spring Meeting, 2018
- 4) PennDOT Innovations Challenge 1st place Winner, 2018
- 5) VEX Eastern PA State Champions 2017, 2018
- 6) VEX 3rd place Robot Skills, 4th place, 3rd place, Vex Robotics World Championship, 2017-2019

Media

- 1) Main Line science kids' winning formula: Wet clay, soft robots. [Philadelphia Inquirer](#)
- 2) Food for Thought – Edible Soft Robotic Candy Actuators [MRS Bulletin](#)
- 3) Haverford School students make soft robots that could be used in the body...and they taste good too. [Philadelphia Inquirer](#)
- 4) Soft Robotics Follow-Up: Haverford School Scores Win in the 2017 Annual Soft Robotics Competitions [Adafruit Blog](#)
- 5) Snow Day Science: Bringing Learning Home [Main Line Parent Magazine](#)
- 6) The Haverford School wins Harvard's International Soft Robotics Design Competition. [Main Line Times](#)
- 7) Using Dissolvable Materials in Soft Robotics Actuator Manufacturing @HaverfordRobots [Adafruit Blog](#)