Mariana Tsacoumis Meyer

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EDUCATION

University of Maryland, College Park
Ph.D. in Bioengineering, GPA: 3.9 Expected Fall 2013
Dissertation Title: Design and Implementation of Microfluidic Systems for Bacterial Biofilm Monitoring and Manipulation
Advisor: Prof. Reza Ghodssi

Stanford University
B.S. in Mechanical Engineering, GPA: 3.5 Received June 2007
Undergraduate Independent Research Project: Characterization of Piezoresistive Cantilever Sensitivity
Advisor: Prof. Beth Pruitt

RESEARCH EXPERIENCE

University of Maryland, College Park, MEMS Sensors and Actuators Laboratory
Graduate Research Assistant 08/07 to present
- Developed microfluidic testbeds for evaluating bacterial biofilms and anti-biofilm drugs
    - Characterized the use of optical density monitoring as a continuous means of evaluating bacterial biofilm growth in microfluidic channels; results published in the *Journal of Micromechanics and Microengineering (JMM)*
    - Proved efficacy of new biofilm inhibitors using microfluidic platform as a pharmaceutical testbed with optical monitoring of biofilms; results published in *Applied Microbiology and Biotechnology*
    - Overcame incompatibilities in polymer fabrication using atomic layer deposition in a novel process for building multi-depth microfluidic channels with integrated pneumatic valves for biofilm sectioning

Stanford University Microsystems Group
Undergraduate Research Assistant 03/06–06/07
- Evaluated piezoresistive microcantilever sensitivity and its dependence on fabrication parameters
    - Developed standard measurement procedures for piezoresistor sensitivity
    - Modeled piezoresistor fabrication using TSUPREM software
    - Gathered contributing data for article published in *Applied Physics Letters*

National Institute of Standards and Technology (NIST), Building and Fire Research Laboratory
Intern, Summer Undergraduate Research Fellowship (SURF) Program Keynote Speaker 06/05-08/05
- Evaluated the efficiency of thermoelectric cooling devices
    - Developed testing platform and procedures
    - Collected and analyzed data

National Institute of Standards and Technology (NIST), Electronics and Electrical Engineering Laboratory
Intern 06/03-09/03, 06/04-09/04
- Designed and maintained websites using HTML
- Edited code for STEP-AP210 Project (Standard for the Exchange of Product Model Data) using SGML and EXPRESS languages to render original EXPRESS documentation useable in an XML environment
- Migrated computers previously on local division network to NIST domain

AWARDS AND PRESS

- Best Poster Award, Bioengineering Division, "Multi-Depth Microfluidic Biofilm Reactor Fabricated with ALD Passivation of a Photoresist Mold", University of Maryland Bioscience Research and Technology Review Day 2012.
- "*New Microfluidic Device Could Speed Drug Evaluation",* News item featured by University of Maryland Institute for Systems Research (http://www.isr.umd.edu/news/news_story.php?id=6948), Fischell Department of Bioengineering (http://bioe.umd.edu/news/news_story.php?id=6948), and Department of Electrical and Computer Engineering (http://www.ece.umd.edu/News/news_story.php?id=6948).
- "*Preventing Costly, Life-Threatening Catheter Infections*", Clark School of Engineering at the University of Maryland Press Release, January 18 2012 (http://www.eng.umd.edu/html/news/news_story.php?id=6225).
- "*Deutsch Foundation Renews Commitment to Clark School",* E@M, the Magazine of the Clark School of Engineering at the University of Maryland, Spring 2011 (http://www.marianameyer.com/deutschfoundationbiochiprenewal.pdf).

PATENTS

Patents Pending

- "Atomic Layer Deposition Passivation of Photoresist Structures for Microfluidic Channel Molding", M.T. Meyer, R. Ghodssi, Y.W. Kim, M. Gnerlich. Provisional patent application filed 4/9/2013.

PUBLICATIONS

Published Journal Papers

1. V. Roy*, **M.T. Meyer***, J.A.I. Smith, S. Gamby, H.O. Sintim, R. Ghodssi, and W. E. Bentley, "AI-2 analogs and antibiotics: a synergistic approach to reduce bacterial biofilms," *Applied Microbiology and Biotechnology*, vol. 97, pp. 2627-2638, March 2013. **[*These authors contributed equally to this work]**
2. Y.W. Kim, S.E. Sardari**, M.T. Meyer**, A.A. Iliadis, H.C. Wu, W.E. Bentley, and R. Ghodssi, "An ALD aluminum oxide passivated surface acoustic wave sensor for early biofilm detection," *Sensors and Actuators B:* Chemical, vol. 163, pp. 136-145, January 2012.
3. **M.T. Meyer**, V. Roy, W.E. Bentley, and R. Ghodssi, "Development and validation of a microfluidic reactor for biofilm monitoring via optical methods", *Journal of Micromechanics and Microengineering (JMM)—Special Issue: MEMS in Biology and Medicine*, vol. 21, no. 044023, May 2011. **[Invited]**
4. J.R. Mallon, A.J. Rastegar, A.A. Barlian, **M.T. Meyer**, and B.L. Pruitt, "Low 1/f noise, full bridge microcantilever with longitudinal and transverse piezoresistors", *Applied Physics Letters*, vol. 92, January 2008. **[Article chosen for inclusion in Feb. 11 2008 issue of Virtual Journal of Nanoscale Science & Technology]**

Manuscripts in Progress

1. **M.T. Meyer**, Y.W. Kim, H. Ben-Yoav, M. Gnerlich, R. Ghodssi, "Multi-depth valved microfluidics for biofilm studies", for *Lab on a Chip*, October 2013.
2. Y.W. Kim, H. Ben-Yoav, H.C. Wu, D. Quan, K. Carter, **M.T. Meyer**, K. Gerasopoulos, W.E. Bentley, R. Ghodssi, "Bacterial biofilm treatment via the superpositioned bioelectric effect", resubmission to *Applied and Environmental Microbiology*, October 2013.
3. Y.W. Kim, M.P. Mosteller, **M.T. Meyer**, W.E. Bentley, R. Ghodssi, "On-chip demonstration of bioelectric effect for biofilm treatment", for *Lab on a Chip*, October 2013.

Refereed Conference Proceedings

([S]: Short abstract, [L]: Long abstract, [P]: Paper; Presenting authors underlined)

1. **M.T. Meyer**, Y.W. Kim, H. Ben-Yoav, M. Gnerlich, and R. Ghodssi, "ALD-Assisted Passivation Technology for Biofilm Studies in Microfluidics," *The 7th International Conference on Microtechnologies in Medicine and Biology (MMB)*, Marina Del Rey, CA, April 10-12, 2013. [L]
2. Y.W. Kim, M.P. Mosteller, **M.T. Meyer**, H. Ben-Yoav, W.E. Bentley, and R. Ghodssi, "Microfluidic Biofilm Observation, Analysis, and Treatment (Micro-BOAT) Platform," *Hilton Head Workshop 2012: A Solid-State Sensors, Actuators and Microsystems Workshop*, pp. 233-236, Hilton Head, SC, June 3-7, 2012. [P]
3. **M.T. Meyer**, V. Roy, W.E. Bentley, and R. Ghodssi, "A Microfluidic Device for Optical Absorbance Monitoring of Bacterial Biofilms", *IEEE Sensors 2010*, pp. 2291-2294, Waikoloa, HI, November 1-4 2010. [P]
4. **M.T. Meyer**, Y.W. Kim, V. Roy, S.E. Sardari, A. Iliadis, W.E. Bentley, and R. Ghodssi, "Development of Lab on a Chip Platforms for Bacterial Biofilm Monitoring and Detection", *2010 International Conference on Biofabrication*, Philadelphia, PA, October 4-6 2010. [L]
5. **M.T. Meyer**, V. Roy, W.E. Bentley, and R. Ghodssi, "A Microfluidic Platform for Optical Monitoring of Bacterial Biofilms", *The 26th Southern Biomedical Engineering Conference (SBEC)*, pp. 426-429, College Park, MD, April 30-May 2 2010. [P]
6. **M.T. Meyer**, S.T. Koev, R. Fernandes, W.E. Bentley, and R. Ghodssi, "Toward a Selective Optical Biosensor for Integrated Biofilm Detection", *The American Vacuum Society 55th International Symposium*, Boston, MA, October 19-24, 2008. [S]
7. P. Dykstra, S. T. Koev, **M. Meyer**, X. Luo, G. W. Rubloff, G. F. Payne, W. E. Bentley, and R. Ghodssi, "The Biopolymer Chitosan for Functionalization of MEMS Sensors," *The 2008 Solid-State Sensor, Actuator and Microsystems Workshop (Hilton Head 2008)*, Open Poster Session, Hilton Head, SC, June 1-5, 2008. [S]

Poster Presentations

(Presenting authors underlined)

1. M.P. Mosteller, **M.T. Meyer**, V. Roy, J. Smith, H. Sintim, W.E. Bentley, and R. Ghodssi, "Growth and Optical Monitoring of Bacterial Biofilms in Microfluidic Integrated Systems," *The Mid-Atlantic Micro/Nano Alliance Symposium,* Annapolis, MD, March 27, 2012.
2. V. Roy, **M.T. Meyer**, W.E. Bentley, and R. Ghodssi, "AI-2 analogs and antibiotics: A synergistic approach to reduce E. coli biofilms in a microfluidic setting ", *Biomedical Engineering Society 2011 Annual Meeting*, Hartford, CT, October 12-15, 2011.
3. **M.T. Meyer**, V. Roy, W.E. Bentley, and R. Ghodssi, "A Microfluidic Platform for Optical Monitoring of Bacterial Biofilms", *The Mid-Atlantic Micro/Nano Alliance Symposium*, Laurel, MD, October 19, 2010.
4. **M.T. Meyer**, S.T. Koev, R. Fernandes, W E. Bentley, and R. Ghodssi , "A Microfluidic Platform for Optical Monitoring of Bacterial Biofilms," *The Mid Atlantic MEMS Alliance 10th Annual Special Topics Symposium*, Washington, DC, November 30, 2009.
5. **M.T. Meyer**, S.T. Koev, V. Roy, W. E. Bentley, and R. Ghodssi , "Toward an Optical Biosensor for Integrated Biofilm Detection," *Grace Hopper Celebration of Women in Computing Poster Session*, Tuscon, AZ, September 30-October 3, 2009.

TEACHING ASSISTANT EXPERIENCE

University of Maryland, College Park

Graduate level

- Transport Phenomena in Bioengineering Systems (BIOE604) 16 students
  - Held office hours providing students individual support for COMSOL simulations of heat and mass transfer required for homework
  - Graded homework and generated solution sets
- Design and Fabrication of Micro-electromechanical Systems (ENEE605) 19 students
  - Mentored 5 students comprising a class project group, guiding and monitoring their progress in creating a comprehensive microdevice design proposal
  - Graded homework, progress reports, and presentations for entire class

Undergraduate level

- Integrated Circuit Fabrication Laboratory (ENEE416) 13 students
  - Held office hours providing homework guidance for students
  - Maintained course website; graded homework, lab reports, and exams

MENTORING EXPERIENCE

Graduate student mentor at MEMS Sensors and Actuators Laboratory to:

2 high school students	Summer 2009, Summer 2011
2 undergraduate research assistants	Summer 2008, Summer 2010
2 graduate rotation students	Fall 2008, Fall 2011
2 graduate research assistants	Fall 2010 - Spring 2013

RESEARCH PROPOSAL EXPERIENCE

- Contributing author to three research proposals
  - "*Detection, characterization, and treatment of biofilm infections in vivo*", PI: Dr. Anjan Nan, Co-PIs: Dr. Reza Ghodssi, Dr. William Bentley, submitted to *National Institutes of Health* (July 2010). Status: not selected for funding
  - "*Real-time monitoring and characterization of biofilm infections",* Co-PIs: Dr. Anjan Nan, Dr. Reza Ghodssi, submitted to *University of Maryland, College Park (UMCP) and the University of Maryland, Baltimore (UMB) RESEARCH Seed Program* (February 2010). Status: not selected for funding
  - "*Real-time monitoring and characterization of biofilm infections*", PI: Dr. Anjan Nan, Co-PI: Dr. Reza Ghodssi, submitted to *National Institutes of Health* (October 2009). Status: not selected for funding

JOURNAL REVIEWING ACTIVITIES

- Technical manuscript reviewer for
  - Journal of Micromechanics and Microengineering 2012-present
  - Biomedical Microdevices 2012-present

TECHNICAL SKILLS

Computer Skills

- MEMS Design (L-Edit, TSUPREM)
- Data Collection and Analysis (LabVIEW, MATLAB, JMP)
- Mechanical Design and Simulation (Solidworks, COMSOL)
- Microscopy Image Processing and Analysis (ZEN, Imaris, COMSTAT)
- Microsoft Office
- Adobe Photoshop, Dreamweaver

Metrology and Characterization Tools

- Confocal Microscopy
- Optical Microscopy
- Profilometry

Machining

- Lathe
- Mill
- LaserCamm
- Soldering
- Brazing

Microfabrication

- Atomic Layer Deposition (ALD)
- Contact Lithography
- Wet Etching
- Dicing Saw
- PDMS Microfluidic Packaging

Programming Languages

- C/C++
- HTML
- CSS

Molecular Biology and Microbiology

- Bacterial Cell Culture
- Absorption Spectroscopy
- Protein Expression and Purification
- Gel Electrophoresis

REFERENCES

Available upon request