

Michelle L. Kovarik, PhD

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EDUCATION

2009 **PhD**, Analytical Chemistry, Indiana University, Bloomington, IN
Dissertation: “Electrokinetic Transport, Trapping, and Sensing in Integrated Micro- and Nanofluidic Devices”

2004 **BS**, Chemistry, Saint Louis University, St. Louis, MO

RESEARCH EXPERIENCE AND INTERESTS

2010- **Postdoctoral Scholar**

Advisor: Prof. Nancy L. Allbritton, University of North Carolina – Chapel Hill

- Single-cell enzyme assays on a microfluidic platform

2004-2009 **Graduate Research & Teaching Assistant**

Advisor: Prof. Stephen C. Jacobson, Indiana University – Bloomington

- Transport in and applications of nanofluidic devices

2002-2004 **Undergraduate Researcher**

Advisors: Profs. Dana M. Spence and R. Scott Martin, Saint Louis University

- Amperometric detection for a microvasculature biomimic

2003 **Research Experience for Undergraduates**

Advisor: Prof. Michael Jay, University of Kentucky

- Optimization of aqueous-based nanosuspensions for liquid scintillation counting
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TEACHING EXPERIENCE

Instructor

Spring 2011 **Quantitative Analysis II** (instrumental analysis)

North Carolina Agricultural & Technological State University, Greensboro, NC

- Average Evaluation: 4.6 out of 5, Class size: 11 students
- Emphasized writing in the discipline with publication of a class magazine

Spring 2011 **Quantitative Analysis II Laboratory**

North Carolina Agricultural & Technological State University, Greensboro, NC

Class size: 9 students

- Developed a new lab manual, including independent capstone projects
- Incorporated a semester-long service learning project with local 5th graders

Fall 2011 **General Chemistry VI** (first semester general chemistry)

North Carolina Agricultural & Technological State University, Greensboro, NC

- Average Evaluation: 4.7 out of 5, Class size: 62 students

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Assistant Instructor / Teaching Assistant

- Fall 2009 **Nanoscience Problem-Based Learning Module**
Indiana University Nanoscience Center, Bloomington, IN jointly with
Columbus Signature Academy New Tech High School, Columbus, IN
- Fall 2007 **Service Learning in Chemistry**
Indiana University, Department of Chemistry, Bloomington, IN jointly with
Boys' and Girls' Club of Bloomington
- 2004-2005 **Introduction to Chemical Principles**
Indiana University, Department of Chemistry, Bloomington, IN
- 2001-2004 **General Chemistry Laboratory**
Saint Louis University, Department of Chemistry, St. Louis, MO
- 2002-2003 **General Physics Laboratory**
Saint Louis University, Department of Physics, St. Louis, MO

Guest Lecturer

- Spring 2012 **Chemistry Seminar** at Guilford College, Greensboro, NC
Topic: Microscale Devices for Single-Cell Analysis
- Summer 2011 **Undergraduate Journal Club** at the University of North Carolina, Chapel Hill, NC
Topic: Instrumental and Biological Noise
- Spring 2011 **Biotechnologies** at the University of North Carolina, Chapel Hill, NC
Fall 2010 Topic: Microfabrication at the Interface of Biology & Engineering
- Spring 2008 **Separations** at Indiana University, Bloomington, IN
Fall 2009 Topic: Nanofluidics & Separation
- Fall 2007 **Analytical Chemistry** at Indiana University, Bloomington, IN
Topic: Luminescence Spectroscopy

UNIVERSITY AND COMMUNITY SERVICE

Committee Work

- Scientific Review Committee, North Carolina Science & Engineering Fair (2012, 2013)
- Planning & Budget Committees, Biennial Chemical Sciences Symposium, North Carolina A&T State University (2011)
- Undergraduate Committee, SPIRE Distinguished Scholar Seminar, UNC (2010, 2011)

Panelist

- Teaching Your First Undergraduate Course, University of North Carolina (2011)
- How to Have a Successful Summer Research Experience, University of North Carolina (2010)
- Introduction to the Postdoc Application Process, Indiana University-Bloomington (2009)
- How to Make a Successful Research Poster, Indiana University-Bloomington (2009)

Other Service

- Reviewer for *Analytical Chemistry*, *Lab on a Chip*, *Electrophoresis*, *Analytical Methods*, and *Analytica Chimica Acta*

Michelle L. Kovarik

- Judged 6 science fairs at the local, regional, and state levels since 2009
 - Organized 5 and helped with an additional 8 science outreach events since 2007
 - Co-organized workshops on identifying funding opportunities for chemistry postdocs and preparing an online portfolio, University of North Carolina, 2011-2012
 - Mentored a Harmony School high school student in independent laboratory study on redox reactions, Bloomington, IN, 2008
 - Worked as an algebra tutor for Indiana University Upward Bound Program (paid), 2007
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ACADEMIC HONORS, AWARDS, AND FELLOWSHIPS

- 2010-2012 SPIRE Postdoctoral Fellowship, University of North Carolina-Chapel Hill, funded by the National Institutes of General Medical Sciences (NIGMS) at NIH
- 2008 Merck Research Laboratories Fellowship in Analytical/Physical Chemistry
2nd place student poster in materials science, Indiana Microscopy Society Spring Meeting
1st place in natural science, Indiana University Women in Science Research Conference
Academic Travel Award to attend LabAutomation 2008, ALA
- 2007 Felix Haurowitz Award for outstanding performance through the candidacy exam, Indiana University Chemistry Department
1st place in math/technology, Indiana University Women in Science Research Day
- 2005 Merck Graduate Analytical/Physical Travel Award
Graduate Research Fellowship, National Science Foundation
- 2004 Women in Science Fellowship, Indiana University-Bloomington
Outstanding Senior Chemistry Student, American Institute of Chemists
Coryell Award for Undergraduate Research, ACS Division of Nuclear Chemistry & Technology
I. M. Kolthoff Award for Undergraduate Research, ACS Division of Analytical Chemistry
- 2003 Saint Louis Rubber Group Scholarship
Outstanding Junior Chemistry Student, Saint Louis University
Alpha Sigma Nu (Jesuit Honor Society)
Phi Beta Kappa
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PROFESSIONAL MEMBERSHIPS & DEVELOPMENT

- American Association for the Advancement of Science (AAAS)
 - American Chemical Society (ACS)
 - Founding Member: UNC Chemistry Department Postdoctoral Association
 - Founding Member: Iota Sigma Pi Iron Chapter (Women in Chemistry Honor Society)
- 2012 Becoming an Effective Mentor Seminar, University of North Carolina-Chapel Hill
- 2011 Diversity Advocate Certificate, University of North Carolina-Chapel Hill

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- Metacognition and Critical Thinking Workshop with Dr. Sandra McGuire, NCA&TSU
Gordon Research Conference on Chemistry Education Research & Practice, Davidson, NC
- 2010 Active Learning Workshop with Drs. Richard Felder & Rebecca Brent, UNC-CH
SPIRE Seminar on College Teaching with Dr. Ed Neal, UNC-CH
POGIL Southeast Regional Meeting, College of William & Mary
5 Center for Faculty Excellence Workshops at the University of North Carolina-Chapel Hill
Strategies for Success Professional Development Workshop, North Carolina State University
HAVEN Training: to create informed allies of students affected by sexual violence, UNC-CH
- 2006 Electron Microbeam Analysis Laboratory Workshop, University of Michigan
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GRANTS FUNDED

- 2011 “Pesticide Detection: A Joint Project between NCATSU Instrumental Analysis Students and the Rankin Elementary School 5th Grade Class,” ACS Division of Analytical Chemistry International Year of Chemistry program, \$500
- 2010 “Giant Unilamellar Vesicles as Proxy Cells in Microfluidic Analyses,” SPIRE program, University of North Carolina-Chapel Hill, \$2000
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INVITED LECTURES

- “Microfabrication as a tool for biomedical sciences,” *Oakwood University*, Huntsville, AL, Nov. 9, 2012.
- “Understanding cellular heterogeneity through single-cell analyses,” *North Carolina A&T State University*, Greensboro, NC, Sept. 9, 2010.
- “Cells in small spaces,” *Johnson C. Smith University, North Carolina A&T State University, North Carolina Central University, University of North Carolina – Pembroke, and Fayetteville State University*, campuses throughout North Carolina during Feb. 2010.
- “Nanofluidic devices for bacterial chemotaxis assays,” *DePauw University*, Greencastle, IN, Oct. 15, 2009.
- “Integrated micro- and nanofluidic systems for chemical analysis,” *Saint Louis University*, St. Louis, MO, Sept. 19, 2008.
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SELECTED PRESENTATIONS

26 submitted presentations since 2004, including 6 talks and 20 posters at local, regional, national and international meetings.

- “Incorporating Service Learning in a Laboratory Course: A Practical Guide” (Poster), *IRACDA 2012*, Philadelphia, PA, 2012.

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- “Seeding Postdoctoral Innovators in Research and Education” (Poster), *Gordon Research Conference on Chemistry Education Research & Practice*, Davidson, NC, 2011.
 - “Characterizing sample injection on a microfluidic device for chemical cytometry” (Poster), *Microscale Bioseparations*, San Diego, CA, 2011.
 - “Vesicle-based tools for single cell analysis” (Poster), *FACSS*, Raleigh, NC, 2010.
 - “Trapping, sensing, and bioassays in multilayer microchannel-membrane devices” (Podium), *Microscale Bioseparations*, Boston, MA, 2009.
 - “Electrokinetic trapping at single nanopores integrated in microfluidic devices” (Poster), *Micro Total Analysis Systems*, San Diego, CA, 2008.
 - “An integrated nanopore/microchannel device for electrokinetic trapping” (Podium), *LabAutomation*, Palm Springs, CA, 2008.
 - “Nanofluidic devices for attoliter-scale sample handling” (Poster), *Microscale Bioseparations*, Vancouver, BC, 2007.
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PUBLICATIONS

Undergraduate co-authors are underlined. Equal contribution indicated by *.

Peer-Reviewed Research Articles

11. **Kovarik, M.L.**, Lai, H.-H., Xiong, J.C., and Allbritton, N.L. “Sample transport and electrokinetic injection in a microchip device for chemical cytometry,” *Electrophoresis*, **2011**, *32*, 3180-3187.
10. **Kovarik, M.L.**, Brown, P.J.B., Kysela, D.T., Berne, C., Kinsella, A.C., Brun, Y.V., and Jacobson, S.C. “A microchannel-nanopore device for bacterial chemotaxis assays,” *Analytical Chemistry*, **2010**, *82*, 9357–9364.
9. **Kovarik, M.L.**, Zhou, K.,* and Jacobson, S.C. “Effect of conical nanopore diameter on ion current rectification,” *Journal of Physical Chemistry B*, **2009**, *113*, 15960-15966.
8. Zhou, K., **Kovarik, M.L.**, and Jacobson, S.C. “Surface-charge-induced ion depletion and sample stacking near single nanopores in microfluidic devices,” *Journal of the American Chemical Society*, **2008**, *130*, 8614-8616.
7. **Kovarik, M.L.** and Jacobson, S.C. “Integrated nanopore/microchannel devices for ac electrokinetic trapping of particles,” *Analytical Chemistry*, **2008**, *80*, 657-664.
6. **Kovarik, M.L.** and Jacobson, S.C. “Attoliter-scale dispensing in nanofluidic channels,” *Analytical Chemistry*, **2007**, *79*, 1655-1660.
5. Zhu, D., Mu, Z., Mooty, C., **Kovarik, M.**, and Jay, M. “Suspensions of fluor-containing nanoparticles for quantifying β -emitting radionuclides in non-hazardous media,” *Journal of Pharmaceutical Innovation*, **2006**, *Sept/Oct*, 76-82.
4. **Kovarik, M.L.** and Jacobson, S.C., “Fabrication of three-dimensional micro- and nanoscale features with single-exposure photolithography,” *Analytical Chemistry*, **2006**, *78*, 5214-5217.
3. **Kovarik, M.L.**, Li, M.W., and Martin, R.S., “Integration of a carbon microelectrode with a fabricated palladium decoupler for use in microchip capillary electrophoresis/electrochemistry,” *Electrophoresis*, **2005**, *26*, 202-210.

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2. Spence, D.M., Torrence, N.J., **Kovarik, M.L.**, and Martin, R.S., “Amperometric determination of nitric oxide derived from pulmonary artery endothelial cells immobilized in a microchip channel,” *Analyst*, **2004**, 995-1000.
 1. **Kovarik, M.L.**, Torrence, N.J., Spence, D.M., and Martin, R.S., “Fabrication of carbon microelectrodes with a micromolding technique and their use in microchip-based flow analyses,” *Analyst*, **2004**, 400-405.
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Review Articles

4. **Kovarik, M.L.**, Ornoff, D.M., Melvin, A.T., Dobes, N.C., Wang, Y., Dickinson, A.J., Gach, P.G., Shah, P.K., and Allbritton, N.L., “Micro Total Analysis Systems: Fundamental Advances and Applications in the Laboratory, Clinic, and Field,” *Analytical Chemistry*, DOI: 10.1021/ac3031543.
 3. **Kovarik, M.L.**, Gach, P.C., Ornoff, D.M., Wang, Y., Balowski, J., Farrag, L., and Allbritton, N.L., “Micro Total Analysis Systems for Cell Biology and Biochemical Analysis,” *Analytical Chemistry*, **2012**, *84*, 516-540.
 2. **Kovarik, M.L.** and Allbritton, N.L. “Measuring enzyme activity in single cells,” *Trends in Biotechnology*, **2011**, *29*, 222-230.
 1. **Kovarik, M.L.** and Jacobson, S.C. “Nanofluidics in lab-on-a-chip devices,” *Analytical Chemistry*, **2009**, *81*, 7133-7140.
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