# 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

## PROFESSIONAL APPOINTMENTS

2013-present **Assistant Professor of Chemistry**
Trinity College, Hartford, CT

2010-2013 **Postdoctoral Scholar**
University of North Carolina, Chapel Hill, NC

## RESEARCH EXPERIENCE AND INTERESTS

### Current Research

Interests: microchip electrophoresis with laser-induced fluorescence detection, lipid-based coatings for microfluidics, kinase and peptidase assays in *Dictyostelium discoideum*

2010-2013 **Postdoctoral Research**
Advisor: Prof. Nancy L. Allbritton, University of North Carolina – Chapel Hill
Project: single-cell enzyme assays on a microfluidic platform

2004-2009 **Graduate Research**
Advisor: Prof. Stephen C. Jacobson, Indiana University – Bloomington
Project: transport in and applications of nanofluidic devices

2002-2004 **Undergraduate Research**
Advisors: Profs. Dana M. Spence and R. Scott Martin, Saint Louis University
Project: amperometric detection for a microvasculature biomimic

Advisor: Prof. Michael Jay, University of Kentucky
Project: optimization of aqueous nanosuspensions for liquid scintillation counting

## TEACHING EXPERIENCE

### Assistant Professor, Trinity College, Hartford, CT

- Introductory Chemistry I (Fall 2015)
- Introductory Chemistry II (Spring 2014)
- Analytical Chemistry (Fall: 2013, 2014)

- Instrumental Methods of Chemical Analysis (Spring: 2014-2016)
- Biological Chemistry (Spring 2016)
- Independent Study – Chemistry and Chemical Analysis of Wine (Spring: 2014, 2015)
- First Year Seminar – $cience: Intersections of Money and Discovery (Fall 2015)

**Visiting Instructor, North Carolina A&T State University, Greensboro, NC**

- Quantitative Analysis II (Fall 2011)
- General Chemistry VI (Spring 2011)

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## UNDERGRADUATE RESEARCH MENTORSHIP

**Trinity College, Hartford, CT**

- Senior Theses
  - Lorena Lazo de la Vega ’14
  - Kathy Rodogiannis ’17 (biology)
- Undergraduate Research
  - Livia Shehaj ’15 (Fall 2013-Spring 2015)
  - Berjana Nazarko IDP (Summer 2014)
  - Eleanor Clerc ’17 (Spring-Fall 2014)
  - Kunwei Yang ’17 (Fall 2014-Fall 2016)
  - Allison Tierney ’17 (Spring 2015-Spring 2017)
  - Zachary Garber ’16 (Summer-Fall 2015)
  - Jessica Duong ’19 (Spring 2016-Summer 2017)
  - Casey Crowley ’19 (Spring 2016)
  - Kathy Rodogiannis ’17 (Summer 2016-Spring 2017)
  - Julia Clapis ’18 (Fall 2016-Summer 2017)
  - Josh Knopf ’17 (Fall 2016-Spring 2017)
  - Greg Kalminskii ’20 (Spring 2017-Summer 2017)
  - Rahuljeet Chadha ’20 (Summer 2017)

**University of North Carolina, Chapel Hill, NC**

- Senior Thesis
  - Ranjit Poonnen (2012-2013)
- Undergraduate Research
  - Uduak Udoeyo (2012) *while enrolled at Temple University
  - Ronald Smith (2011) *while enrolled at North Carolina A&T State University
  - Jessie Xiong (2010-2011)

**Indiana University, Bloomington, IN**

- Undergraduate Research
  - Graham Erwin (2008-2009)
  - Samuel Sudhoff (2006)
  - Noah Herron (2005)

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## ACADEMIC HONORS, AWARDS, AND FELLOWSHIPS

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| 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 |
| 2005-2008 | Graduate Research Fellowship, National Science Foundation |
| 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 |
| 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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## GRANTS FUNDED

2017 "Biological noisiness of reactive oxygen species in *Dictyostelium discoideum*," Cottrell Scholar Award, Research Corporation, $100,000.

2016 "RUI: Substrate reporters and microelectrophoretic tools for lysate and single-cell studies of PKB activity in *Dictyostelium discoideum*" National Science Foundation, Molecular and Cellular Biosciences, Award No. 1615482, $212,253.

2013 "Analyses of water samples from the Connecticut River watershed: A collaboration between Trinity College instrumental analysis students and 6th graders at Hartford Magnet Trinity College Academy," ACS Division of Analytical Chemistry 75th Anniversary Grant, $500.

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 Grant, $500.

2010 "Giant unilamellar vesicles as proxy cells in microfluidic analyses," SPIRE program, University of North Carolina-Chapel Hill, $2000.

## PROFESSIONAL MEMBERSHIPS

- American Association for the Advancement of Science (AAAS)
- American Chemical Society (ACS)
    - Division of Analytical Chemistry
    - Subdivision of Chromatography and Separations Chemistry
        - Executive Committee Member (2015-present)
- Curriculum development team and workshop facilitator for the Analytical Sciences Digital Library Active Learning site (June 2014-present)

## SERVICE

### Committee Member

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| 2017-present | Organizing Committee for Venture Pre-Orientation Women's Leadership Conference, Trinity College |
| 2016-present | New Faculty Orientation Organizing Committee, Trinity College |
| 2015-present | Individualized Degree Program (IDP) Council, Trinity College |
| 2015-2016 | Faculty Diversity Working Group, Trinity College |
| 2012-2013 | Scientific Review Committee, North Carolina Science & Engineering Fair |
| 2011 | Planning & Budget Committees, Biennial Chemical Sciences Symposium, North Carolina A&T State University |
| 2010-2011 | Undergraduate Committee, SPIRE Distinguished Scholar Seminar, University of North Carolina |

### Panelist

2014 Establishing Your Voice in the Classroom, Trinity College
Winter Institute on Technology and Teaching, Trinity College
2013 Finding Teaching Faculty Positions, University of North Carolina
2011 Teaching Your First Undergraduate Course, University of North Carolina
2010 How to Have a Successful Summer Research Experience, University of North Carolina
2009 Introduction to the Postdoc Application Process, Indiana University
How to Make a Successful Research Poster, Indiana University

### Other Service

- Reviewer for *Analytical Chemistry*, *Lab on a Chip*, *Electrophoresis*, *Analytical and Bioanalytical Chemistry*, *Analytical Methods*, *Analytica Chimica Acta, Journal of Micromechanics and Microengineering, Journal of Applied Polymer Science,* and *Chemical Educator*
- Judge for 8 science fairs at the local, regional, and state levels since 2009

## INVITED LECTURES

2017 "Capillary and microchip electrophoresis for fluorescence-based assays of enzyme activity in *Dictyostelium*," International Conference on Analytical Sciences and Spectroscopy, Quebec City, Canada.

"Starting a research program at a primarily undergraduate institution: Practical strategies and supportive policies," American Chemical Society Spring National Meeting, San Francisco, CA.

"Articles from the primary literature as a platform for active learning," American Chemical Society Spring National Meeting, San Francisco, CA.

"Adapting microfluidic and molecular tools for single-cell analysis of a social amoeba," Connecticut College, New London, CT.

2016 "New analytical tools for exploring cellular heterogeneity," Fairfield University, Fairfield, CT.

"New analytical tools for exploring cellular heterogeneity," Northern Kentucky University, Newport, KY.

"Microfluidic chemical cytometry and peptide substrate reporters: Expanding applications and access," American Chemical Society Fall National Meeting, Philadelphia, PA.

"Using the primary literature in analytical chemistry teaching," Canadian Chemistry Conference and Exhibition (CSC), Halifax, Nova Scotia.

"Microfluidic and peptide-based tools for biochemical investigations of social amoebae," Wesleyan University, Middletown, CT.

2015 "Probing the biochemistry of cellular heterogeneity," Hartwick College, Oneonta, NY.

2014 "Bringing instrumental analysis into the K-12 classroom: Service learning projects and laboratory coursework," Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy (Pittcon), Chicago, IL.

2013 "Small scale for a large audience: Outreach projects on microfabrication and microfluidics," Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy (Pittcon), Philadelphia, PA.

2012 "Microfabrication as a tool for biomedical sciences," Oakwood University, Huntsville, AL.

2010 "Understanding cellular heterogeneity through single-cell analyses," North Carolina A&T State University, Greensboro, NC.

2009 "Nanofluidic devices for bacterial chemotaxis assays," DePauw University, Greencastle, IN.

2008 "Integrated micro- and nanofluidic systems for chemical analysis," Saint Louis University, St. Louis, MO.

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## SELECTED RECENT SUBMITTED PRESENTATIONS

***31 submitted presentations since 2004, including 9 talks and 22 posters at local, regional, national and international meetings.***

2017 "Assay conditions and new applications of a peptide substrate reporter" (podium), the Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy (Pittcon), Chicago, IL

2016 "Quantitation of kinase activity in a social amoeba using capillary electrophoresis and a peptide substrate reporter" (podium), the Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy (Pittcon), Atlanta, GA

2015 "Implementing a peptide reporter substrate in *Dictyostelium discoideum*" (poster), the Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy (Pittcon), New Orleans, LA

2013 "Signaling in single cancer cells" (podium), Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy (Pittcon), Philadelphia, PA.

"Chemical cytometry of peptidase activity in acute myeloid leukemia cells" (poster), Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy (Pittcon), Philadelphia, PA.

"Microtechnology to interrogate signaling in single cells" (podium), Symposium on Single Cell/Single Molecule Biology, Albuquerque, NM.

***Additionally, Trinity undergraduate research students have given 19 submitted poster and podium presentations on our work at local, regional, and national meetings since 2014.***

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## PUBLICATIONS

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

### Peer-Reviewed Research Articles

14. AJ Tierney, N Pham, K Yang, BK Emerick, and **ML Kovarik**, "Interspecies comparison of peptide substrate reporter metabolism using compartment-based modeling," *Analytical and Bioanalytical Chemistry*, **2017**, *409*, 1173-1183.

13. **ML Kovarik**, AJ Dickinson, P Roy, RA Poonnen, JP Fine, NL Allbritton, "Response of single leukemic cells to peptidase inhibitor therapy across time and dose using a microfluidic device," *Integrative Biology*, **2014**, *6*, 164-174.

12. **ML Kovarik**, PK Shah, PM Armistead, and NL Allbritton, "Microfluidic chemical cytometry of peptide degradation in single drug-treated acute myeloid leukemia cells," *Analytical Chemistry*, **2013**, *85*, 4991–4997.

11. **ML Kovarik**, HH Lai, JC Xiong, and NL Allbritton, "Sample transport and electrokinetic injection in a microchip device for chemical cytometry," *Electrophoresis*, **2011**, *32*, 3180-3187.
10. **ML Kovarik**, PJB Brown, DT Kysela, C Berne, AC Kinsella, YV Brun, and SC Jacobson, "A microchannel-nanopore device for bacterial chemotaxis assays," *Analytical Chemistry*, **2010**, *82*, 9357–9364.
9. **ML Kovarik**, K Zhou,* and SC Jacobson, "Effect of conical nanopore diameter on ion current rectification," *Journal of Physical Chemistry B*, **2009**, *113*, 15960-15966.
8. K Zhou, **ML Kovarik**, and SC Jacobson, "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. **ML Kovarik** and SC Jacobson, "Integrated nanopore/microchannel devices for ac electrokinetic trapping of particles," *Analytical Chemistry*, **2008**, *80*, 657-664.
6. **ML Kovarik** and SC Jacobson, "Attoliter-scale dispensing in nanofluidic channels," *Analytical Chemistry*, **2007**, *79*, 1655-1660.
5. D Zhu, Z Mu, C Mooty, **M Kovarik**, and M Jay, "Suspensions of fluor-containing nanoparticles for quantifying β-emitting radionuclides in non-hazardous media," *Journal of Pharmaceutical Innovation*, **2006**, *Sept/Oct*, 76-82.
4. **ML Kovarik** and SC Jacobson, "Fabrication of three-dimensional micro- and nanoscale features with single-exposure photolithography," *Analytical Chemistry*, **2006**, *78*, 5214-5217.
3. **ML Kovarik,** MW Li, and RS Martin, "Integration of a carbon microelectrode with a fabricated palladium decoupler for use in microchip capillary electrophoresis/electrochemistry," *Electrophoresis*, **2005**, *26*, 202-210.
2. DM Spence, NJ Torrence, **ML Kovarik**, and RS Martin, "Amperometric determination of nitric oxide derived from pulmonary artery endothelial cells immobilized in a microchip channel," *Analyst*, **2004**, 995-1000.
1. **ML Kovarik**, NJ Torrence, DM Spence, and RS Martin, "Fabrication of carbon microelectrodes with a micromolding technique and their use in microchip-based flow analyses," *Analyst*, **2004**, 400-405.

**Review Articles & Book Chapters**

7. **ML Kovarik**, "Use of primary literature in the undergraduate analytical class," *Analytical and Bioanalytical Chemistry*, **2016**, *408*, 3045-3049.
6. L Shehaj, L Lazo de la Vega, **ML Kovarik**, "Microfluidic Chemical Cytometry for Enzyme Assays of Single Cells," Chapter 15 in *Single Cell Protein Analysis: Methods and Protocols*, eds. A Singh and A Chandrasekaran, vol. 1346, Methods in Molecular Biology, Humana Press, 2015.
5. **ML Kovarik**, "Analytical chemistry research at primarily undergraduate institutions: training tomorrow's investigators," *Analytical Methods*, **2015**, *7*, 6960-6966.

4. **ML Kovarik**, DM Ornoff, AT Melvin, NC Dobes, Y Wang, AJ Dickinson, PG Gach, PK Shah, and NL Allbritton, "Micro total analysis systems: Fundamental advances and applications in the laboratory, clinic, and field," *Analytical Chemistry*, **2013**, *85*, 451-472.

3. **ML Kovarik,** PC Gach, DM Ornoff, Y Wang, J Balowski, L Farrag, and NL Allbritton, "Micro total analysis systems for cell biology and biochemical analysis," *Analytical Chemistry*, **2012**, *84*, 516-540.

2. **ML Kovarik** and NL Allbritton, "Measuring enzyme activity in single cells," *Trends in Biotechnology*, **2011**, *29*, 222-230.

1. **ML Kovarik** and SC Jacobson, "Nanofluidics in lab-on-a-chip devices," *Analytical Chemistry*, **2009**, *81*, 7133-7140.