

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
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Professional Appointments

- 2019-present **Associate Professor of Chemistry**
Trinity College, Hartford, CT
- 2013-2019 **Assistant Professor of Chemistry**
Trinity College, Hartford, CT
- 2010-2013 **Postdoctoral Scholar**
University of North Carolina, Chapel Hill, NC
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Research Experience and Interests

Current Research

Interests: microchip electrophoresis with laser-induced fluorescence detection, microfluidic single-cell analysis, 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
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Teaching Experience

Assistant Professor, Trinity College, Hartford, CT

Introductory Chemistry I (Fall: 2015, 2017)
Introductory Chemistry II (Spring: 2014, 2019)
Analytical Chemistry (Fall: 2013-14, 2017-19)
Instrumental Methods of Chemical Analysis (Spring: 2014-16, 2018-19, 2021)
Biological Chemistry (Spring: 2016, 2021)
Independent Study – Chemistry and Chemical Analysis of Wine (Spring: 2014-15)
First Year Seminar – Science: Intersections of Money and Discovery (Fall: 2015, 2019)

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

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

Undergraduate Research Mentorship

Trinity College, Hartford, CT

Lorena Lazo de la Vega '14 (Fall 2014-Spring 2015, senior thesis)
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)
Kathy Rodogiannis '17 (Summer 2016-Spring 2017, senior thesis-biology)
Jessica Duong '19 (Spring 2016-Fall 2017, Fall 2018-Spring 2019)
Casey Crowley '19 (Spring 2016)
Julia Clapis '18 (Fall 2016-Spring 2018)
Josh Knopf '17 (Fall 2016-Spring 2017)
Greg Kalminskii '20 (Spring 2017-Summer 2018)
Rahuljeet Chadha '20 (Summer 2017-Fall 2019)
Sababa Anber '20 (Spring-Fall 2018, Summer-Fall 2019)
Jason Deck '21 (Spring 2018-Fall 2019)
Daniel Feldman '21 (Spring-Fall 2019)
Misha Mehra '21 (Summer 2018-Spring 2021)
Mengqi (Jonathan) Fan '22 (Spring 2019-Spring 2021)
Tyler Allcroft '23 (Fall 2020-Spring 2021)
Will Krohg '23 (Fall 2020-Spring 2021)

University of North Carolina, Chapel Hill, NC

Ranjit Poonnen (2012-2013, senior thesis)
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

Graham Erwin (2008-2009)

Samuel Sudhoff (2006)

Noah Herron (2005)

Academic Honors and Awards

- 2019 Arthur H. Hughes Award for Achievement in Teaching, Trinity College
- 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 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 Hauowitz 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

Grants Funded

- 2017-2021 “Biological noisiness of reactive oxygen species in *Dictyostelium discoideum*,” Cottrell Scholar Award, Research Corporation, \$100,000.

- 2016-2021 “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 & Professional Development

American Association for the Advancement of Science (AAAS)

American Chemical Society (ACS)

Division of Analytical Chemistry (DAC)

Chair, DAC Education Committee (2020-present)

Subdivision of Chromatography and Separations Chemistry (SCSC)

SCSC Executive Committee Member (2015-2021)

Analytical Sciences Digital Library Active Learning group

Curriculum development team (2014-present)

Workshop facilitator (2016-present)

Steering committee member (2020-present)

2021 Equity Certificate Program, Trinity College

2018 Writing Fellows Program: “Writing in analytical chemistry: connecting the classroom and the laboratory”

2016 Center for Teaching & Learning Fellow: “Improving Laboratory Instruction with Interactive Pre-Lab Videos”

2012 Becoming an Effective Mentor Seminar, University of North Carolina-Chapel Hill

2011 Diversity Advocate Certificate, University of North Carolina-Chapel Hill

Metacognition and Critical Thinking Workshop with Dr. Sandra McGuire, NCA&TSU

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

Strategies for Success Professional Development Workshop, NCSU

HAVEN Training for informed allies of students affected by sexual violence, UNC-CH

2006 Electron Microbeam Analysis Laboratory Workshop, University of Michigan

Service

Committee Member

- 2021-present Curriculum Committee
Representative to Climate Emergency Committee (2021)
Petitions Subcommittee (2021)
- 2019-present Campus Climate Incident Response Team
- 2019 Quantitative Literacy Advisory Committee
- 2018-present Jury Pool for the College's Honor Council
- 2018-present Mellon Inclusive Teaching Program Advisory Committee
- 2017-present Faculty Research Committee (elected, chair – calendar year 2019)
- 2017-present Organizing Committee for Venture Pre-Orientation Women's Leadership Conference, Trinity College
- 2016-present New Faculty Orientation Organizing Committee, Trinity College
- 2015-2018 Faculty Diversity Working Group, Trinity College
- 2015-2017 Individualized Degree Program (IDP) Council, 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

- 2020 Remote Labs, Analytical Sciences Digital Library Active Learning Workshop
New Faculty Life Hacks: Developing a Quick-Start Plan, New England Future Faculty (Virtual) Workshop, Northeastern University
- 2018 Open Education in Practice: How Open Educational Resources Can Benefit a Private Liberal Arts College, Trinity College
- 2017 New Faculty Life Hacks: Developing a Quick-Start Plan, New England Future Faculty Workshop, Northeastern University
- 2014 Establishing Your Voice in the Classroom, Venture Pre-Orientation, 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*, *ACS Sensors*, *Analytica Chimica Acta*, *Journal of Micromechanics and Microengineering*, *Journal of Applied Polymer Science*, *Journal of Chemical Education* and *Chemical Educator*

Regular participant in Skype-A-Scientist and AAUW's TechSavvy

INVITED LECTURES

- 2019 “Single-cell measurements of stress response on microfluidic devices,” Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy (Pittcon), Philadelphia, PA.
- “The chromatography curriculum in a writing-intensive course,” Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy (Pittcon), Philadelphia, PA.
- “Cellular heterogeneity and active learning,” Stockton University, Galloway, NJ.
- “Capillary and microchip electrophoresis assays for enzyme activity,” International Symposium on Capillary Chromatography, Fort Worth, TX.
- “Reading & Writing Analytical Chemistry,” Northeast Regional Meeting of the ACS (NERM), Saratoga Springs, NY.
- 2018 “Quick, small, and complicated: Meeting the challenges of single cell measurements of stress responses,” College of the Holy Cross, Worcester, MA.
- “Quick, small, and complicated: Meeting the challenges of single cell measurements of stress responses,” Vassar College, Poughkeepsie, NY.
- “Cellular heterogeneity and active learning,” Fayetteville State University, Fayetteville, NC.
- 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.
- “Adapting microfluidic and molecular tools for single-cell analysis of a social amoeba,” Saint Louis University, St. Louis, MO.
- 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.

Recent Submitted Presentations

32 submitted presentations since 2004, including 9 talks and 23 posters at local, regional, national and international meetings.

- 2018 “Comparing peptide substrate reporter loading methods: How exogenous molecules enter cells affects their fate” (poster), the Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy (Pittcon), Orlando, FL, 2018.
- 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

Additionally, Trinity undergraduate research students have given 40 submitted poster and podium presentations on our work at local, regional, national, and international meetings since 2014.

Publications

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

Peer-Reviewed Research Manuscripts

18. JR Clapis,* MJ Fan,* and **ML Kovarik**, “Supported bilayer membranes for reducing cell adhesion in microfluidic devices,” *Analytical Methods*, **2021**, DOI: 10.1039/D0AY01992E.
17. **ML Kovarik** and JK Robinson, “Collaborative learning exercises for teaching protein mass spectrometry,” *Journal of Chemical Education*, **2019**, *96*, 905-911.
16. R Chadha,* G Kalminskii,* AJ Tierney, JD Knopf, L Lazo de la Vega, B McElrath, and **ML Kovarik**, “Effect of loading method on a peptide substrate reporter in intact cells,” *Analytical Chemistry*, **2018**, *90*, 11344-11350.
15. K Rodogiannis, JT Duong, and **ML Kovarik**, “Microfluidic single-cell analysis of oxidative stress in *Dictyostelium discoideum*,” *Analyst*, **2018**, *143*, 3643-3650.
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, Perspectives, Books & Book Chapters

10. **ML Kovarik**, JR Clapis, and KA Romano-Pringle, "A review of student-built spectroscopy instrumentation projects," *Journal of Chemical Education*, **2020**, *97*, 2185-2195.
9. NL Allbritton and **ML Kovarik**, eds. *Enzyme Activity in Single Cells*; Methods in Enzymology; Elsevier Academic Press: Cambridge, 2019; vol. 628.
8. **ML Kovarik**, CR Harrison, and TJ Wenzel, “Successfully navigating the early years of a faculty position,” *Analytical and Bioanalytical Chemistry*, **2018**, *410*, 1855-1861.
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, and **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.