Mark H. Schoenfisch

University of North Carolina at Chapel Hill
CB#3290, Chapel Hill, NC 27599
Group webpage: http://www.schoenfischlab.com

Work: (919) 843-8714
Email: mhs@unc.edu

EDUCATION

- 1992-1997 Ph.D. Chemistry, University of Arizona (Advisor: Prof. Jeanne Pemberton)
- 1988-1992 B.A. Chemistry and Germanic Languages & Literature, University of Kansas

PROFESSIONAL EXPERIENCE

- 2018-present Peter A. Ornstein Distinguished Professor, Department of Chemistry (College of Arts & Sciences) and Division of Pharmacoengineering and Molecular Pharmaceutics (Eshelman School of Pharmacy) at the University of North Carolina at Chapel Hill
- 2009-present Professor of Chemistry, University of North Carolina at Chapel Hill
- 2013-present Adjunct Professor of Biomedical Engineering, University of North Carolina
- 2005-2009 Associate Professor of Chemistry, University of North Carolina at Chapel Hill
- 2000-2005 Assistant Professor of Chemistry, University of North Carolina at Chapel Hill
- 1998-1999 NIH Postdoctoral Fellow, Department of Chemistry, University of Michigan (Advisor: Prof. Mark Meyerhoff)

HONORS AND AWARDS

- 2018 UNC Inventor of the Year (Office of Commercialization & Economic Development)
- 2015 Chapman Family Teaching Award for Distinguished Teaching of Undergraduates
- 2015 Institute for the Arts and Humanities Faculty Fellowship
- 2007 John L. Sanders Award for Distinguished Undergraduate Teaching and Service
- 2005 International Union of Pure and Applied Chemistry Young Observer Award
- 2004 National Science Foundation CAREER Award
- 2002 Eli Lilly and Company Young Investigator Award
- 2001 Society for Analytical Chemists of Pittsburgh Young Investigator Award
- 1998 National Institutes of Health Postdoctoral Fellowship

PROFESSIONAL AFFILIATIONS

- 2015-present American Society for Microbiology
- 1997-present Society of Biomaterials
- 1992-present American Chemical Society

ENTREPRENEURIAL ACTIVITIES

- Founder of Vast Therapeutics, Inc., 2016. Currently serving as consultant and director. Inventor of core technology.
  - Pre-clinical stage pharmaceutical company focused on the development of water-soluble nitric oxide-releasing oligosaccharides for the treatment of respiratory infections. Vast Therapeutics has raised ~$50 million funding to date.
  - 8 full-time employees in Durham, NC.

- Co-Founder of Novan, Inc., 2006. Currently not serving company in any capacity. Inventor of core technology.
  - Publically traded pharmaceutical company (NASDAQ: NOVN) focused on the development of nitric oxide release-based therapies for dermatological indications.
  - Prior to Sept 2016 Initial Public Offering, Novan raised $113 million. Lead product is a therapeutic for molluscum, which has successfully completed a Phase 3 clinical trial; NDA submitted to the FDA on January 6, 2023 At least two other products are being developed,

including a topical for treating acne vulgaris and an anti-viral drug for the treatment of external genital warts caused by the human papillomavirus (HPV).

– 30 full-time employees in Durham, NC.

PUBLICATIONS

*Refereed Papers at UNC-Chapel Hill (**bold** denotes Review; citations: 16,148; h-index: 65; i10-index: 172)*

169. E.S. Feura, S.E. Maloney, I.L. Conlon, C.A. Broberg, F. Yang, and M.H. Schoenfisch, "Injectable polysaccharide hydrogels as localized nitric oxide delivery formulations," *Adv. Mater. Tech*. **2023**, in press.
168. J.R. Hall, J.B. Taylor, T.M. Bradshaw, M.H. Schoenfisch, "Planar Carbon Electrodes for Real-Time Quantification of Hydrogen Sulfide Release from Cells," *Sensors & Diagnostics* **2023**, in press.
167. S.E. Maloney, C. Broberg, Q. Grayton, S. Picciotti, H. Hall, S. Wallet, R. Maile, and M.H. Schoenfisch, "Role of Nitric Oxide-Releasing Glycosaminoglycans on Wound Healing," *ACS Biomater. Sci. Eng.* **2022**, 8, 2537-2552.
166. M.J. Malone-Povolny, T.M. Bradshaw, E.P. Merricks, T.C. Nichols, and M.H. Schoenfisch, "Combination of Nitric Oxide Release and Surface Texture for Mitigating the Foreign Body Response," *ACS Biomater. Sci. Eng.* **2021**, 7, 2444-2452.
165. S.E. Maloney, K.V. McGrath, M.J.R. Ahonen, D.S. Soliman, E.S. Feura, R. Maile, S.M. Wallet, and M.H. Schoenfisch, Nitric Oxide-Releasing Hyaluronic Acid as an Antibacterial Agent for Wound Therapy," *Biomacromolecules* **2021**, 22, 867-879.
164. H. Jin, E.S. Feura, M.H. Schoenfisch, "Theranostic Activity of Nitric Oxide-Releasing Carbon Quantum Dots," *Bioconjug. Chem.* **2021**, 32, 367-375.
163. S.B. Wiegand, L. Traeger, H.K. Nguyen, K.R. Rouillard, A. Fischbach, F. Zadek, F. Ichinose, M.H. Schoenfisch, R.W. Carroll, D.B. Bloch, W.M. Zapol, "Antimicrobial Effects of Nitric Oxide in Murine Models of Klebsiella pneumonia," *Redox Biology* **2021**, *39*, 1-8.
162. K.R. Rouillard, O.P. Novak, A.M. Pistiolis, L. Yang, M.J.R. Ahonen, R.A. McDonald, and M.H. Schoenfisch, "Exogenous Nitric oxide Improves Antibiotic Susceptibility in Resistant Bacteria," *ACS Infectious Disease* **2021**, 7, 23-33.
161. E. Feura, L. Yang, M.H. Schoenfisch, "Antibacterial Activity of Nitric Oxide-Releasing Carboxymethylcellulose Against Periodontal Pathogens," *J. Biomed. Mater. Res. A* **2021**, 109, 713-721.
160. K.R. Rouillard, M. Markovetz, L. Bacudio, D.B. Hill, and M.H. Schoenfisch, "Pseudomonas aeruginosa Biofilm Eradication via Nitric Oxide-Releasing Cyclodextrins," *ACS Infectious Disease* **2020**, 6, 1940-1950.
159. L. Yang, F. Teles, W. Gong, S.A. Dua, L. Martin, and M.H. Schoenfisch, "Antibacterial Action of Nitric Oxide-Releasing Hyperbranched Polymers Against Ex Vivo Dental Biofilms," *Dental Mater*. **2020**, 36, 635-644.
158. K.R. Rouillard, D.B. Hill, and M.H. Schoenfisch, "Antibiofilm and Mucolytic Action of Nitric Oxide Delivered as a Gas or Via Macromolecular Donor Using in Vitro and Ex Vivo Models," *J. Cystic Fibr.* **2020**, 19, 1004-1010.
157. J.R. Hall, K.R. Rouillard, D.J. Suchyta, M.D. Brown, M.J.R. Ahonen, and M.H. Schoenfisch, "Mode of Nitric Oxide Delivery Affects Antibacterial Action," *ACS Biomat. Sci. & Eng.* **2020**, *6*, 433-441.
156. J.R. Hall, S.E. Maloney, H. Jin, J.B. Taylor, and M.H. Schoenfisch, "Nitric Oxide Diffusion Through Cystic Fibrosis-Relevant Media and Lung Tissue," *RSC Advances* **2019**, *68*, 40176-40183.
155. M.J. Malone-Povolny, E.P. Merricks, L.E. Wimsey, T.C. Nichols, and M.H. Schoenfisch, "Long-term Accurate Continuous Glucose Biosensors via Extended Nitric-Oxide Release," *ACS Sensors* **2019**, *4*, 3257-3264.
154. M.D. Brown and M.H. Schoenfisch, "Electrochemical Nitric Oxide Sensors: Principles of Design and Characterization," *Chem. Rev.* **2019**, *119*, 11551-11575.
153. L. Yang, L. Jing, Y. Jiao, L. Wang, J.T. Marchesan, S.N. Offenbacher, and M.H. Schoenfisch, "In Vivo Antibacterial Efficacy of Nitric Oxide-Releasing Hyperbranched Polymers against Porphyromonas gingivalis," *Mol. Pharmaceutics* **2019**, *16*, 9, 4017-4023.

152. M.J.R. Ahonen, D.B. Hill, and M.H. Schoenfisch "Nitric Oxide-Releasing Alginates as Mucolytic Agents," *ACS Biomater. Sci. Eng.* **2019**, *5*, 3409-3418.
151. M.D. Brown and M.H. Schoenfisch, "A Selective and Sensocompatible Electrochemical Nitric Oxide Sensor with a Bilaminar Design," *ACS Sensors* **2019**, *4*, 1766-1773.
150. M.J.R. Ahonen, J.M. Dorrier, and M.H. Schoenfisch, "Antibiofilm Efficacy of Nitric Oxide-Releasing Alginates against Cystic Fibrosis Bacterial Pathogens," *ACS Infect. Dis.* **2019**, *5*, 1327-1335.
149. M.J. Malone-Povolny, S.E. Maloney, and M.H. Schoenfisch, "Nitric Oxide Therapy for Diabetic Wound Healing," *Adv. Healthcare Mater.* **2019**, *1801210*, 1-18.
148. M.J. Malone-Povolny and M.H. Schoenfisch, "Extended Nitric Oxide-Releasing Polyurethanes via S-Nitrosothiol-Modified Mesoporous Silica Nanoparticles," *ACS Appl. Mater. & Interfaces* **2019**, *11*, 12216-12223.
147. M.D. Brown, J.R. Hall, and M.H. Schoenfisch, "A Direct and Selective Electrochemical Hydrogen Sulfide Sensor," *Anal. Chim. Acta* **2019**, *1045*, 67-76. PMC6641862.
146. A. Paula, C.A. Beltrame, D.A. Suchyta, I.A. Alraheam, A. Mohammed, M.H. Schoenfisch, R. Walter, I. Almeida, L.C. Souza, and P. A. Miguez, "Effect of Phosphorylated Chitosan on Dentin Erosion: An In Vitro Study," *Caries Res.* **2018**, *52*, 378-386.
145. K. Zhang, K.P.R. Crizer, M.H. Schoenfisch, D.B. Hill, and G. Didier, "Fluid Heterogeneity Detection Based on the Asymptotic Distribution of the Time-Averaged Mean Squared Displacement in Single Particle Tracking Experiments," *J. Phys. A: Math. Theor*. **2018**, *51*, 1-41. PMC6486181.
144. H. Jin, L. Yang, M.J.R. Ahonen, and M.H. Schoenfisch, "Nitric Oxide-Releasing Cyclodextrins," *J. Am. Chem. Soc.* **2018**, *140*, 14178-14184.
143. L. Yang and M.H. Schoenfisch, "Nitric Oxide-Releasing Hyperbranched Polyaminoglycosides for Antibacterial Therapy," *ACS Applied Bio Mater.* **2018**, *1*, 1066-1073.
142. L. Yang, M.J.R. Ahonen, E.S. Feura, and M.H. Schoenfisch, "Nitric Oxide-Releasing Macromolecular Scaffolds for Antibacterial Applications," *Adv. Healthcare Mat.* **2018,** *1800155*, 1-17. PMC6159924.
141. J. Marchesan, M.S. Girnary, L. Jing, M.Z. Miao, S. Zhang, L. Sun, T. Morelli, N. Inohara, M.H. Schoenfisch, S. Offenbacher, and Y. Jiao, "An Experimental Murine Model to Study Periodontitis," *Nature Methods* **2018**, *13*, 2247-2267.
140. J. Dunn, L. Kartchner, K. Gast, M. Sessions, R. Hunter, L. Thurlow, A. Richardson, M. Schoenfisch, B. Cairns, and R. Maile, "Mammalian Target of Rapamycin Regulates a Hyperresponsive State in Pulmonary Neutrophils Late after Burn Injury," *J. Leukoc Biol.* **2018**, *103*, 909-918. PMC6181446.
139. L. Yang, X. Wang, D.J. Suchyta, and M.H. Schoenfisch, "Antibacterial Activity of Nitric Oxide-Releasing Hyperbranched Polyamidoamines," *Bioconjugate Chem*. **2018**, *29*, 35-43.
138. J.R. Hall and M.H. Schoenfisch, "Direct Electrochemical Sensing of Hydrogen Sulfide without Sulfur Poisoning," *Anal. Chem.* **2018**, *90*, 5194-5200.
137. M.D. Brown and M.H. Schoenfisch, "Catalytic Selectivity of Metallophthalocyanines for Electrochemical Nitric Oxide Sensing," *Electrochimica Acta* **2018**, *273*, 98-104. PMC6366661.
136. M.J.R. Ahonen, D.J. Suchyta, H. Zhu, and M.H. Schoenfisch, "Nitric Oxide-Releasing Alginates," *Biomacromolecules* **2018**, *19*, 1189-1197.
135. R.J. Soto, E.P. Merricks, D.A. Bellinger, T.C. Nichols, and M.H. Schoenfisch, "Influence of Diabetes on the Foreign Body Response to Nitric Oxide-Releasing Implants," *Biomaterials* **2018**, *157*, 76-85. PMC6121707.
134. D.J. Suchyta and M.H. Schoenfisch, "Anticancer Potency of Nitric Oxide-Releasing Liposomes," *RSC Advances* **2017**, *7*, 53236-53246. PMC6366668.
133. D.J. Suchyta and M.H. Schoenfisch, "Controlled Release of Nitric Oxide from Liposomes," *ACS Biomater. Sci. Eng.* **2017**, *3*, 2136-2143.
132. K.P. Reighard, C. Ehre, Z. Rushton, M.J.R. Ahonen, D.B. Hill, and M.H. Schoenfisch, "Role of Nitric Oxide-Releasing Chitosan Oligosaccharides on Mucus Viscoelasticity," *ACS Biomater. Sci Eng.* **2017**, *3*, 1017-1026. PMC6178828

131. D.J. Suchyta, R.J. Soto, and M.H. Schoenfisch, "Selective Monophosphyorylation via Phosphorus Oxychloride," *Poly. Chem.* **2017**, *8*, 2552-2558. PMC5646824.
130. R.J. Soto, J. Schofield, S. Walter, M. Malone-Povolny, and M.H. Schoenfisch, "Design Considerations for Silica Particle-Doped Nitric Oxide-Releasing Polyurethane Glucose Biosensor Membranes," *ACS Sensors* **2017**, *2*, 140-150.
129. R.J. Soto, J. Hall, M. Brown, J. Taylor, and M.H. Schoenfisch, "In Vivo Chemical Sensors: Role of Biocompatibility on Performance and Utility," *Anal. Chem.* **2017**, *89*, 276-299.
128. M. Brown and M.H. Schoenfisch, "Nitric Oxide Permselectivity in Electropolymerized Films for Sensing Applications," *ACS Sensors* **2016**, *1*, 1453-1461.
127. J.L. Dunn, R.A. Hunter, K. Gast, R. Maile, B.A. Cairns, and M.H. Schoenfisch, "Direct Detection of Blood Nitric Oxide Reveals a Burn Injury-Dependent Decrease of Nitric Oxide in Response to *Pseudomonas Aeruginosa* Infection," *Burns* **2016**, *42*, 1522-1527. PMC5056119.
126. B.V. Worley, R.J. Soto, P.C. Kinsley, and M.H. Schoenfisch, "Active Release of Nitric Oxide-Releasing Dendrimers from Electrospun Polyurethane Fibers," *ACS Biomater. Sci. Eng.* **2016**, *2*, 426-437.
125. R.J. Soto, L. Yang, and M.H. Schoenfisch, "Functionalized Mesoporous Silica via an Aminosilane Surfactant Ion Exchange Reaction: Controlled Scaffold Design and Nitric Oxide Release," *ACS Appl. Mater. Interfaces* **2016**, *8*, 2220-2231.
124. C.J. Backlund, B.V. Worley, and M.H. Schoenfisch," Anti-Biofilm Action of Nitric Oxide-Releasing Alkyl-Modified Poly(amidoamine) Dendrimers against *Streptococcus Mutans*," *Acta Biomater.* **2016**, *29*, 198-205. PMC4695967.
123. K.P. Reighard, D.B. Hill, G.A. Dixon, and M.H. Schoenfisch, "Disruption and Eradication of P. aeruginosa Biofilms using Nitric Oxide-Releasing Chitosan Oligosaccharides," *Biofouling* **2015**, *31*, 775-787. PMC4695972.
122. D.J. Suchyta and M.H. Schoenfisch, "Encapsulation of N-Diazeniumdiolates within Liposomes for Enhanced Nitric Oxide Donor Stability and Delivery," *Mol. Pharm.* **2015**, *12*, 3569-3574.
121. K.P. Reighard and M.H. Schoenfisch, "Antibacterial Action of Nitric Oxide-Releasing Chitosan Oligosaccharides against Pseudomonas aeruginosa under Aerobic and Anaerobic Conditions," Antimicrob. *Agents Chemother.* **2015**, *59*, 6506-6513. PMC4576085.
120. R.J. Soto and M.H. Schoenfisch, "Pre-clinical Performance Evaluation of Percutaneous Glucose Biosensors: Experimental Considerations and Recommendations," *J. Diabetes Sci. Technol*. **2015**, *9*, 978-984.
119. C.J. Backlund, B.V. Worley, A.R. Sergesketter, and M.H. Schoenfisch, "Kinetic-Dependent Biocidal Action of Nitric Oxide-Releasing Silica Particles," *J. Dent. Res.* **2015**, *94*, 1092-1098.
118. B.V. Worley, K. Schilly, and M.H. Schoenfisch, "Anti-Biofilm Efficacy of Dual-Action Nitric Oxide-Releasing Alkyl Chain-Modified Poly(amidoamine) Dendrimers," *Molec. Pharmac.* **2015**, *12*, 1573-1583.
117. W.L. Storm, J.A. Johnson, B.V. Worley, D.L. Slomberg, and M.H. Schoenfisch, "Dual Action Antimicrobial Surfaces via Combined Nitric Oxide and Silver Release," *J. Biomat. Res. A*. **2015**, *103*, 1974-1984.
116. R.A. Hunter and M.H. Schoenfisch, "*S*-Nitrosothiol Analysis via Photolysis and Amperometric Nitric Oxide Detection in a Microfluidic Device," *Anal. Chem.* **2015**, 87, 3171-3176. PMC4682557.
115. Y. Lu, A. Shah, R.A. Hunter, R.J. Soto, and M.H. Schoenfisch, "*S*-Nitrosothiol-Modified Nitric Oxide-Releasing Chitosan Oligosaccharides as Antibacterial Agents," *Acta Biomater*. **2015**, *12*, 62-69. PMC5499378.
114. N.L. Brown, M.B. Rose, G. Blueschke, E.H. Cho, M.H. Schoenfisch, D. Erdmann, B. Klitzman, "Bioburden after Staphylococcus aureus Inoculation in Type 1 Diabetic Rates Undergoing Internal Fixation," *Plastic and Reconstructive Surgery* **2014**, *134*, 412e-419e. PMC4147680.
113. R.J. Soto, B.J. Privett, and M.H. Schoenfisch, "In Vivo Analytical Performance of Nitric Oxide Releasing Glucose Biosensors," *Anal. Chem*. **2014**, *86*, 7141-7149. PMC4116185.
112. C.J. Backlund, A.R. Sergesketter, S. Offenbacher, and M.H. Schoenfisch, "Antibacterial Efficacy of Exogenous Nitric Oxide on Periodontal Pathogens," *J. Dental Res*. **2014**, *93*, 1089-1094.

111. B.V. Worley, D.L. Slomberg, and M.H. Schoenfisch, "Nitric Oxide-Releasing, Quaternary Ammonium-Modified Poly(amidoamine) Dendrimers as Dual Action Antibacterial Agents," *Bioconjugate Chem*. **2014**, *25*, 918-927.
110. W.L. Storm, J. Youn, K.P. Reighard, B.V. Worley, H.M. Lodaya, J.H. Shin, and M.H. Schoenfisch, "Superhydrophobic Nitric Oxide-Releasing Xerogels," *Acta Biomater.* **2014**, *10*, 3442-3448.
109. A.W. Carpenter, J.A. Johnson, and M.H. Schoenfisch, "Nitric Oxide-Releasing Silica Nanoparticles with Varied Surface Hydrophobicity," *Coll. Surf. A* **2014**, *454*, 144-151.
108. Y. Lu, D.L. Slomberg, and M.H. Schoenfisch, "Nitric Oxide-Releasing Chitosan Oligosaccharides as Antibacterial Agents," *Biomaterials* **2014**, *35*, 1716-1724. PMC3889664.
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105. Y. Lu, D.L. Slomberg, A. Shah, and M.H. Schoenfisch, "Nitric Oxide-Releasing Amphiphilic Poly(amidoamine) (PAMAM) Dendrimers as Antibacterial Agents," *Biomacromolecules* **2013**, *14*, 3589-3598
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19. M. Schoenfisch et al. "Nitric Oxide-Releasing Alginates as Biodegradable Antibacterial Scaffolds and Methods Pertaining Thereto," U.S. Patent 11,072,668. Issued: July 27, 2021.
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Book Chapters

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SEMINARS AND PAPERS PRESENTED

Invited Academic Lectures

- Wake Forest University. Winston-Salem, NC. September 2022.
- University of Michigan. Ann Arbor, MI. September 2022.
- Purdue University. West Lafayette, IN. November 2018.
- St. Olaf College. Northfield, MN. October 2018.
- Carleton College. Northfield, MN. October 2018.
- University of North Carolina at Chapel Hill, Eshelman School of Pharmacy. August 2018.
- University of Notre Dame. South Bend, IN. November 2017.
- University of Arizona. Tucson, AZ. October 2017.
- University of Kansas. Lawrence, KS. May 2017.
- University of Arizona. Tucson, AZ. May 2016.
- University of North Carolina at Chapel Hill, School of Dentistry. Chapel Hill, NC. April 2015.
- North Carolina Central University. Durham, NC. March 2015.
- Virginia Tech University. Blacksburg, VA. February 2015.
- University of Texas at Arlington. Arlington, TX. January 2015.
- University of Washington. Seattle, WA. October 2014.
- University of North Carolina. Chapel Hill, NC. September 2014.
- Western Carolina University. Cullowhee, NC. November 2013.
- University of North Carolina at Chapel Hill. Chapel Hill, NC. September 2013.
- Georgia Reagents University. Augusta, GA. April 2013.
- Michigan State University. Lansing, MI. April 2013.
- University of Richmond. Richmond, VA. January 2013.
- St. Louis University. St. Louis, MO. November 2012.
- Kwangwoon University. Seoul, Korea. April 2012.
- Ewha Woman's University. Seoul, Korea. April 2012.
- University of North Carolina at Chapel Hill (TrACS Institute). Chapel Hill, NC. December 2011.
- University of North Carolina at Chapel Hill (Chemistry). Chapel, NC. August 2011.
- East Carolina University. Greenville, NC. December 2010.
- Pennsylvania State University. State College, PA. October 2010.
- North Carolina State University (Biomedical Engineering). Raleigh, NC. September 2010.
- Georgia State University. Atlanta, GA. May 2010.
- University of Arizona. Tucson, AZ. April 2010.
- Duke University (Biomedical Engineering). Durham, NC. February 2010.
- Michigan Technological University (Biomedical Engineering). Houghton, MI. April 2010.
- University of North Carolina at Chapel Hill (Orthopedics). Chapel Hill, NC. December 2008.
- North Carolina Agricultural and Technical State University. Greensboro, NC. November 2008.
- Indiana University. Bloomington, IN. October 2008.
- University of North Carolina at Chapel Hill (Chemistry). Chapel Hill, NC. September 2008.
- University of Utah (Biomedical Engineering). Salt Lake City, UT. August 2008.

- University of Iowa. Iowa City, IA. February 2007.
- North Carolina State University. Raleigh, NC. November 2005.
- Peking University. Beijing, China. August 2005.
- University of Memphis. Memphis, TN. February 2005.
- Virginia Commonwealth University. Richmond, VA. February 2005.
- University of Texas. Austin, TX. October 2004.
- University of Michigan. Ann Arbor, MI. October 2004.
- University of Utah (Chemistry). Salt Lake City, UT. September 2004.
- University of Minnesota. Twin Cities, MN. September 2004.
- Duke University (Chemistry). Durham, NC. February 2004.
- Wake Forest University. Winston-Salem, NC. February 2004.
- Pennsylvania State University. State College, PA. January 2004.
- University of Kansas. Lawrence, KS. November 2003.
- Truman State University. Kirksville, MO. November 2003.
- Southwest Missouri State University. Kirksville, MO. November 2003.
- Missouri Western State College. St. Joseph, MO. November 2003.
- University of Georgia. Athens, GA. October 2003.
- University of Pittsburgh. Pittsburgh, PA. September 2003.
- University of Louisville. Louisville, KY. March 2003.
- Virginia Tech University. Blacksburg, VA. February 2003.
- Auburn University. Auburn, AL. January 2003.
- Kalamazoo College. Kalamazoo, MI. November 2002.
- Hillsdale College. Hillsdale, MI. November 2002.
- University of Delaware. Newark, DE. October 2002.
- East Carolina University. Greenville, NC. September 2002.
- Duke University (Biomedical Engineering). Durham, NC. February 2001.

INVITED CONFERENCE LECTURES

- Pittsburgh Analytical Conference 2022. Symposium: Analytical Methods for the Investigation of Inflammation and Oxidative Stress. March 2023.
- 5th World Bronchiectasis & NTM Conference. Prague, Czechia. June 2022.
- Pittsburgh Analytical Conference 2022. Symposium: Analytical Methods for the Investigation of Inflammation and Oxidative Stress. March 2022. Cancelled due to COVID.
- 2020 Gordon Research Conference on New Antibacterial Discovery and Development. Lucca (Barga) Italy. February 2020. Cancelled due to COVID.
- 2019 Turkey Run Analytical Chemistry Conference (Keynote Speaker). Turkey Run State Park, IN. September 2019.
- Extreme Biosensing 2018. Kauai, HI. December 2018.
- 17th International Conference on Monitoring Molecules in Neuroscience. Oxford, UK. March 2018.
- American Chemical Society National Meeting. Polymeric Materials: Science and Engineering (PMSE) Division Symposium: 1D Nanomaterials: Synthesis, Assembly, Properties, and Applications. Washington DC. August 2017.
- Annual Meeting of the International Society of Electrochemistry 2017. Symposium: Electrochemical Approaches to Clinical Diagnostics and Medical Devices. Providence, RI. August 2017
- Bioelectrochemical Society 2017. Symposium: Bioelectrochemistry in the Service of Medicine. Lyon, France. July 2017.
- Warwick 2016 Polymer Conference. Symposium: Nanomedicine. Coventry, United Kingdom. July 2016.
- Extreme Biosensing 2015. Maui, HI. December 2015.
- Pittsburgh Analytical Conference 2015. Symposium: Analytical Strategies for Assessing Wound Infections and Healing. New Orleans, LA. March 2015.

- Gordon Research Conference on Bioanalytical Sensors. Salve Regina University. Newport, RI. June 2014.
- Pittsburgh Analytical Conference 2014. Symposium: Design and Application of Smart Materials for Chemical Sensing and Analysis. Chicago, IL. March 2014.
- American Chemical Society National Meeting. Symposium: New Frontiers and Challenges in Biomaterials Analysis. New Orleans, LA. April 2013.
- American Chemical Society National Meeting. Symposium: Chemical Pictures of Environmental Interfaces: Advances in Molecular-Level Understanding and Quantitative Analysis of Species. New Orleans, LA. April 2013.
- Pittsburgh Analytical Conference 2013. Symposium: Advances in Blood Glucose Monitoring. Philadelphia, PA. March 2013.
- Korean Electrochemical Society. Symposium: Contemporary electrochemical research. Gwangju, Korea. April 2012.
- Pittsburgh Analytical Conference 2012. Symposium: Measurement Tools for Reactive Oxygen and Nitrogen Species - Understanding the Good and the Bad. Orlando, FL. March 2012.
- Southeast Regional Meeting of the American Chemical Society. Symposium: Materials Electrochemistry. Richmond, VA. October 2011.
- Federation of Analytical Chemistry and Spectroscopy Societies. Symposium: Nanotechnology: Applications to Sensing and Energy I. Raleigh, NC. October 2010.
- 3rd Annual Thesinge Biofilm Conference. Thesinge, The Netherlands. September 2010.
- Pittsburgh Analytical Conference 2010. Symposium: Sol-Gel-Derived Materials for Chemical Analysis. Orlando, FL. March 2010.
- Pittsburgh Analytical Conference 2009. Symposium: Interfacial Bioanalytical Chemistry: Sensors, Probes, and Molecular Recognition. Chicago, IL. March 2009.
- Pittsburgh Analytical Conference 2009. Symposium: Advances in Electrochemical Materials. Chicago, IL. March 2009.
- Center for Biofilms Technical Advisory Conference. Bozeman, MT. July 2008 (Keynote speaker).
- Pittsburgh Analytical Conference 2008. Symposium: Miniature/Micro Gas Sensors for Biological and Biomedical Applications. New Orleans, LA. March 2008.
- Southeast Regional Meeting of the American Chemical Society. Greenville, SC. October 2007.
- International Society of Electrochemistry Annual Meeting. Banff, Canada. September 2007 (Keynote).
- American Chemical Society National Meeting. Symposium: Division of Analytical Chemistry Award Symposia Honoring Mike Ramsey and Jim Jorgenson. Boston, MA. August 2007.
- Pittsburgh Analytical Conference 2007. Symposium: ACS Division of Analytical Chemistry/Nanobiotechnology: From Single Cell to the Single Molecule. Chicago, IL. February 2007.
- International Union of Pure and Applied Chemistry General Assembly. Beijing, China. August 2005.
- Gordon Research Conference on Chemical Sensors and Interfacial Design. Oxford, UK. August 2005.
- Society of Industrial Microbiology National Meeting. Symposium: Prevention of Adhesion of Bacteria to Biomaterials: Formulation and Antimicrobials. Arlington, VA. April 2005.
- American Chemical Society National Meeting. Symposium: Biosensors and Sensors (1): Functional Polymers. San Diego, CA. March 2005.
- American Chemical Society National Meeting. Symposium: The Next Generation of Analytical Chemistry Professionals. San Diego, CA. March 2005.
- Pittsburgh Analytical Conference 2005. Symposium: Multifunctional Electrode Materials: New Architectures for Advanced Electroanalytical Applications. Orlando, FL. February 2005.
- American Chemical Society National Meeting. Symposium: In Vivo Bioanalytical Chemistry at the Frontiers of Molecular Medicine. Philadelphia, PA. August 2004.
- Gordon Research Conference on Bioanalytical Sensors. Oxford, UK. July 2004.
- Pittsburgh Analytical Conference. Symposium: Analytical Challenges in Immunoassay. Orlando, FL. March 2003.
- Federation of Analytical Chemistry and Spectroscopy Societies. Symposium: New Investigators in Analytical Science. Detroit, MI. October 2001.

- Society of Biomaterials Annual Meeting. Symposium: Biosensors. Saint Paul, MN. April 2001.
- Southeastern Association of Analytical Chemists. Greenville, NC. October 2000.

INVITED INDUSTRY LECTURES

- Know Bio, LLC. RTP, NC. April 2016.
- Becton Dickinson. RTP, NC. June 2011.
- Colgate-Palmolive Company. Piscataway, NJ. October 2008.
- Pfizer, Inc. Groton, CN. August 2008.
- Eli Lilly and Company. Indianapolis, IN. August 2007.
- Pfizer, Inc. Groton, CN. August 2007.
- Schering-Plough. June 2006.
- Eli Lilly and Company. Indianapolis, IN. June 2003.
- Pfizer, Inc. Groton, CN. August 2002.
- Becton Dickinson. RTP, NC. May 2002.
- Merck. West Point, PA. July 2002.

SYMPOSIA ORGANIZED

- Pittsburgh Analytical Conference 2015. Symposium: Analytical Strategies for Assessing Wound Infections and Healing. New Orleans, LA. March 2015.
- Pittsburgh Analytical Conference 2013. Symposium: Advances in Blood Glucose Monitoring. Philadelphia, PA. March 2013.
- Pittsburgh Analytical Conference 2009. Symposium: Interfacial Bioanalytical Chemistry: Sensors, Probes, and Molecular Recognition. Chicago, IL. March 2009.
- Pittsburgh Analytical Conference 2008. Symposium: Miniature/Micro Gas Sensors for Biological and Biomedical Applications. New Orleans, LA. March 2008.
- American Chemical Society National Meeting. Symposium: Biosensors and Sensors (1): Functional Polymers. San Diego, CA. March 2005.
- Southeast Regional Meeting of the ACS. Symposium: New Frontiers in Chemical Sensors. Research Triangle Park, NC. November 2004.
- Pittsburgh Analytical Conference 2003. Symposium: Advances in Scanning Force Microscopy: Towards Molecular Recognition Imaging. Orlando, FL. March 2003.

TEACHING (number of students in parentheses)

Spring 2023	Chem 441	Advanced Instrumental Analysis (20)
	Chem 395	Undergraduate Research (5)
	DPMP 738	Nanomedicine (Co-Instructor)
Fall 2022	Chem 448	Surfaces Analysis (10)
	Chem 395	Undergraduate Research (3)
Spring 2022	DPMP 738	Nanomedicine (Course Director & Co-Instructor; 9)
	Chem 395	Undergraduate Research (2)
Fall 2021	Chem 395	Undergraduate Research (3)
Spring 2021	DPMP 738	Nanomedicine (Course Director & Co-Instructor; 10)
Fall 2020	Chem 447	Bioanalytical Chemistry (8)
Spring 2020	DPMP 738	Nanomedicine (Course Director & Co-Instructor; 14)
	Chem 741	Analytical Seminar (20)
	Chem 395	Undergraduate Research (3)
Fall 2019	Chem 241	Analytical Methods (95)
	Chem 395	Undergraduate Research (4)
Spring 2019	DPMP 738	Nanomedicine (Co-instructor; 7)
	Chem 741	Analytical Seminar (22)
	Chem 395	Undergraduate Research (2)
Fall 2018	Chem 241	Analytical Methods (234)

	Chem 395	Undergraduate Research (3)
Spring 2018	Chem 441	Advanced Instrumental Analysis (25)
	Chem 441L	Advanced Instrumental Analysis Lab (20)
	Chem 395	Undergraduate Research (4)
Fall 2017	Chem 395	Undergraduate Research (5)
Spring 2017	Chem 447	Bioanalytical Chemistry (9)
	Chem 395	Undergraduate Research (3)
Fall 2016	Chem 89	Chemistry of Biomedical Implants (20)
	Chem 395	Undergraduate Research (3)
Summer 2016	Chem 241	Analytical Methods in Lund, Sweden (19)
	Chem 190	Chemistry of Biomedical Implants in Lund, Sweden (19)
Spring 2016	Chem 241H	Honors Analytical Methods (35)
	Chem 395	Undergraduate Research (5)
Fall 2015	Chem 395	Undergraduate Research (2)
	Bio 395	Undergraduate Research (2)
Spring 2015	Chem 241	Analytical Methods (205)
	Chem 395	Undergraduate Research (4)
Fall 2014	Chem 89	First Year Seminar: Chemistry of Biomedical Implants (22)
	Chem 395	Undergraduate Research (3)
Summer 2014	Chem 241	Analytical Methods (104)
Spring 2014	Chem 447	Bioanalytical Chemistry (7)
	Chem 395	Undergraduate Research (4)
Fall 2013	Chem 395	Undergraduate Research (4)
Summer 2013	Chem 241	Analytical Methods (138)
Spring 2013	Chem 70	First year seminar: You don't have to be a Rocket Scientist…(8)
Fall 2012	Chem 241	Analytical Methods (220)
	Chem 395	Undergraduate Research (5)
Summer 2012	Chem 241	Analytical Methods (113)
Spring 2012	Chem 70	First Year Seminar: You don't have to be a Rocket Scientist…(22)
	Chem 395	Undergraduate Research (4)
Fall 2011	Chem 447	Bioanalytical Chemistry (24)
	Chem 395	Undergraduate Research (4)
Spring 2011	Chem 741	Analytical Seminar (21)
	Chem 395	Undergraduate Research (4)
Fall 2010	Chem 241H	Honors Analytical Methods (34)
	Chem 395	Undergraduate Research (4)
Spring 2010	Chem 70	First Year Seminar: You don't have to be a Rocket Scientist…(9)
	Chem 395	Undergraduate Research (4)
Fall 2009	Chem 447	Bioanalytical Chemistry(26)
	Chem 395	Undergraduate Research (4)
Summer 2009	Chem 241	Analytical Methods (77)
Fall 2008	Chem 241H	Honors Analytical Methods (32)
	Chem 395	Undergraduate Research (4)
Spring 2008	Chem 447	Bioanalytical Chemistry (16)
Fall 2007	Chem 395	Undergraduate Research (3)
Spring 2007	Chem 741	Analytical Seminar (28)
	Chem 395	Undergraduate Research (4)
Fall 2006	Chem 241H	Honors Analytical Methods (32)
	Chem 395	Undergraduate Research (4)
Spring 2006	Chem 447	Bioanalytical Chemistry (18)
	Chem 395	Undergraduate Research (4)
Fall 2005	Chem 241	Analytical Methods (202)

	Chem 395	Undergraduate Research (3)
Spring 2005	Chem 147	Surface Analysis (14)
	Chem 99	Undergraduate Research (2)
Fall 2004	Chem 99	Undergraduate Research (3)
Spring 2004	Chem 147	Surface Analysis (12)
	Chem 99	Undergraduate Research (4)
Fall 2003	Chem 6	First Year Seminar: You don't have to be a Rocket Scientist…(12)
	Chem 99	Undergraduate Research (4)
Spring 2003	Chem 147	Surface Analysis (23)
	Chem 99	Undergraduate Research (4)
Fall 2002	Chem 45H	Honors Analytical Methods (51)
	Chem 99	Undergraduate research (4)
Spring 2002	Chem 147	Surface Analysis (12)
	Chem 99	Undergraduate Research (4)
Fall 2001	Chem 45H	Honors Analytical Methods (31)
	Chem 99	Undergraduate Research (4)
Spring 2001	Chem 147	Surface Analysis (12)
	Chem 99	Undergraduate Research (2)
Fall 2000	Chem 41	Analytical Methods (217)
	Chem 41L	Analytical Methods Lab (466)
	Chem 99	Undergraduate Research (1)
Spring 2000	Chem 41L	Analytical Methods Lab (480)
	Chem 99	Undergraduate Research (1)
	Chem 241	Analytical Seminar (38)

RESEARCH GROUP

Current Group

Postdoctoral Associate

- Ivie Conlon, Ph.D. Pharmaceutical Sciences 2020, University of Maryland Baltimore

Graduate Students

- Kyle Nguyen, B.S. Chemistry 2018, College of Wooster.
- Taron Bradshaw, B.S. Chemistry 2018, Clemson University.
- Quincy Dougherty, B.S. Chemistry 2019, Gordon College.
- Sami Picciotti, B.S. Chemistry 2020, University of Maryland.
- Courtney Johnson, B.S. Chemistry 2020, Kansas State University.
- Sarah Nagy, B.S. Chemistry 2020, Shippensburg University.
- Maggie Purvis, B.S. Chemistry 2021, Texas Christian University
- Mikaylin Nogler, B.S. Biochemistry 2021, Fairfield University.
- Taylor Teitelbaum, B.S. Chemistry 2022, Duquesne University.
- Tsian Ramrattan, B.S. Chemistry & Economics, Emory University.

Undergraduate Students (UNC-Chapel Hill unless noted otherwise)

- Paola Rosario, B.S. Chemistry, anticipated 2025
- Tori Jenkins, B.S. Chemistry, anticipated 2025.
- Tien Phan, B.S. Chemistry & Neuroscience, anticipated 2023.
- Lena Duke, B.S. Chemistry, anticipated 2023.
- Darci Anderson, B.S. Biomedical Engineering, anticipated 2023.

Former Students

Graduate Students

- Sara Maloney, Ph.D. Chemistry 2021, Thesis Title: Multi-Action Nitric Oxide-Release Systems for Biomedical Applications.
- Katherine Youmans, M.S. Chemistry 2021. Thesis Title: Enhanced Solubility and Dual Delivery of Hydrophobic Anti-Inflammatory Drugs via Nitric Oxide-Releasing Cyclodextrin Complexes.
- Evan Feura, Ph.D. Chemistry 2020. Thesis Title: Polysaccharide Formulations for Localized Nitric Oxide Delivery.
- James Taylor, Ph.D. Chemistry 2020. Thesis Title: Elucidating Biological Mechanisms of Host Response in Nitric Oxide-Releasing Glucose Biosensors.
- Kaitlyn Rouillard, Ph.D. Chemistry 2020. Thesis Title: Characterization of Pseudomonas aeruginosa Susceptibility to Nitric Oxide and Antibiotics under Cystic Fibrosis-Relevant Conditions.
- Maggie Malone-Povolny, Ph.D. Chemistry 2020. Thesis Title: Role of Sustained Nitric Oxide Release on the In Vivo Analytical Performance of Glucose Biosensors.
- Jackson Hall, Ph.D. Chemistry 2019. Thesis Title: Gasotransmitter Detection Methodologies for Real-Time Analysis and Studying Molecular Transport.
- Brian Tran, M.S. Chemistry 2019.
- Lei Yang, Ph.D. Chemistry 2019. Thesis Title: Nitric Oxide-Releasing Hyperbranched Polymers as Antibacterial Agents Against Dental Pathogens.
- Mona Ahonen, Ph.D. Chemistry 2019. Thesis Title: Nitric Oxide-Releasing Alginates as a Dual-Action Therapeutic for Cystic Fibrosis.
- Micah Brown, Ph.D. Chemistry 2018. Thesis Title: Strategies to Improve Electrochemical Detection of Nitric Oxide in Biological Environments.
- Dakota Suchyta, Ph.D. Chemistry 2017. Thesis Title: Synthesis and Anticancer Action of Nitric Oxide-Releasing Liposomes.
- Robert Soto, Ph.D. Chemistry 2016. Thesis Title: In Vivo Analytical Performance Assessment of Nitric Oxide-Releasing Glucose Biosensors.
- Shaylyn Walter, M.S. Chemistry 2016. Thesis Title: Alkylsilane-Modified Silica Particles: Strategies for Prolonging Nitric Oxide Release.
- Britney Worley, Ph.D. Chemistry 2016. Thesis Title: Structure-Activity Characterization of Nitric Oxide-Releasing Dendrimers as Dual-Action Antibacterial Agents.
- Katelyn Reighard, Ph.D. Chemistry 2015. Thesis Title: Antibacterial and Biophysical Characterization of Nitric Oxide-Releasing Chitosan Oligosaccharides-Towards a New Cystic Fibrosis Therapeutic.
- Christopher Backlund, Ph.D. Chemistry 2014. Thesis Title: Nitric Oxide-Release Vehicles as Oral Disease Therapeutics.
- Rebecca Hunter, Ph.D. Chemistry 2014. Thesis Title: Electrochemical Measurement of Nitric Oxide from Biological Systems.
- Wesley Storm, Ph.D. Chemistry 2013. Thesis Title: Combined Bactericidal/Bacterial Adhesion-Resistant Coatings through Nitric Oxide Release.
- Danielle Herrod, Ph.D Chemistry 2013. Title: Role of Nanomaterial Physicochemical Properties on Fate and Toxicity in Bacteria and Plants.
- Ahyeon Koh, Ph.D. Chemistry 2013. Thesis Title: Nitric Oxide-Releasing Polyurethane Membranes for Implantable Electrochemical Glucose Sensors.
- Angela Broadnax, M.S. Chemistry 2013.
- Ryan Lu, Ph.D. 2013. Thesis Title: Design of Nitric Oxide-Releasing Macromolecular Scaffolds for Antimicrobial Applications.
- Scott Nichols, Ph.D. 2012. Thesis Title: Tissue Integration and Antimicrobial Effects of Surface-Derived Nitric Oxide Release.
- Alexis Wells, Ph.D. 2012. Thesis Title: Synthesis of Hybrid Inorganic/Organic Nitric Oxide-Releasing Silica Nanoparticles for Biomedical Applications.
- Benjamin Privett, Ph.D. 2011. Thesis Title: Sol-Gel-Derived Materials for Antimicrobial Coatings and Electrochemical Nitric Oxide Analysis.
- Dan Riccio, Ph.D. 2011. Thesis Title: S-Nitrosothiol-Derived Nitric Oxide Delivery Vehicles: Synthesis and Detection.

- Peter Coneski, Ph.D. 2010 Thesis Title: Design and Synthesis of Nitric Oxide-Releasing Polymers for Biomedical Applications.
- Laurel Averett, Ph.D. 2010. Thesis Title: Single-Molecule Force Spectroscopy Studies of Fibrin 'A-a' Polymerization Interactions via the Atomic Force Microscope.
- Susan Deupree, Ph.D. 2009. Thesis Title: Bioanalytical Methods for Investigating Bacterial Adhesion and the Antibacterial Action of Nitric Oxide.
- Evan Hetrick, Ph.D. 2008. Thesis Title: Antimicrobial and Wound Healing Properties of Nitric Oxide-Releasing Xerogels and Silica Nanoparticles.
- Carri Brodnax, Ph.D. 2007. Thesis Title: Analytical Studies on the Mechanism of Fibrin Formation.
- Kevin Dobmeier, Ph.D. 2007. Thesis Title: Xerogel Coatings for Biomedical Sensing Applications.
- Nathan Stasko, Ph.D. 2007. Thesis Title: Synthesis and Characterization of Dendrimer-based Nitric Oxide Delivery Systems.
- Jae Ho Shin, Ph.D. 2006. Thesis Title: "Synthesis and Characterization of Nitric Oxide-Releasing Silica Materials for Sensing Applications.
- Aaron Rothrock, Ph.D. 2005. Thesis Title: Delivery of Nitric Oxide via Xerogel Coatings and Nanometer Scaled Gold Particles.
- Sara Metzger, M.S. 2005.
- Mark Polizzi, M.S. 2005.
- Kenyon Evans-Nguyen, Ph.D. 2005. Thesis Title: Studies of the Influence of Charge and Wettability on Fibrinogen Adsorption and Fibrin Formation at Surfaces.
- Mary Robbins, Ph.D. 2005. Thesis Title: Nitric Oxide-Releasing Xerogel Microarrays for Improving the Biocompatibility of Medical Implants.
- Stephanie Marxer, Ph.D. 2004. Thesis Title: Preparation and Characterization of Nitric Oxide-Releasing Sol-Gels for Sensor Applications.
- Kate Brogan, Ph.D. 2004. Thesis Title: Interfacial Investigations of Antibody Immobilization Strategies.
- Brian Nablo, Ph.D. 2004. Thesis Title: Influence of Nitric Oxide Release on Bacterial Adhesion and Tissue Implant Viability.
- Jason Breeding, M.S. 2004.

Undergraduate Students (UNC-Chapel Hill unless noted otherwise)

- Jeffrey Ocampo, B.S. Chemistry, anticipated 2023 (SUROC student from California State University, Dominguez Hills)
- Tori Gillespie, B.S. Chemistry, 2021.
- Alex Pistiolis, B.S. Chemistry, 2021.
- Chenyang Wang, B.S. Chemistry with Highest Honors, 2021.
- Jamie Dorrier, B.S. Biology, 2019.
- Kyle McGrath, B.S. Biology, 2019.
- Olivia Novak, B.S. Biology, 2019.
- Xingzhi Wang, B.S. Chemistry with Highest Honors, 2018.
- David Zhu, B.S. Chemistry with Highest Honors, 2018.
- Allie Piselli, B.S. Biology, 2017.
- Blake Shofield, B.S. Biology with Honors, 2016.
- Pedro De Jesus Cruz, B.S. Chemistry, 2016 (University of Puerto Rico at Cayey; 2015 summer REU student).
- Paige Kinsley, B.S. Chemistry, 2015.
- Kelci Shilly, B.S. Chemistry, 2015.
- Amanda Sergesketter, B.S. Chemistry with Highest Honors, 2015.
- Anna Meade, B.S. Public Health, 2015.
- Cindy Lee, B.S. Chemistry, 2014 (Summer REU student from Kalamazoo College).
- Karli Gast, B.S. Exercise Science, 2014.
- Aidan Berry, B.S. Biology with Highest Honors, 2014.
- Simon Menaker, B.S. Chemistry, 2014.

- Anand Shah, B.S. Business Administration, 2014.
- Hetali Lodaya, B.S. Chemistry, 2014.
- Shalini Chudasama, B.S. Chemistry, 2014.
- Sarah Newton, B.S. Nutrition, 2012 (Exchange Student from University of Manchester, Great Britain).
- Ani Gowd, B.S. Chemistry, 2012.
- Jessica Nash, B.S. Chemistry, 2012.
- Steven Nutz, B.S. Chemistry, 2012.
- Chris Chouinard, B.S. Chemistry, 2010.
- Nathan Wheeler, B.S. Chemistry. 2010.
- Julia Nugent, B.S. Chemistry. 2009.
- Alexander Wolf, B.S. Chemistry, 2009.
- Ashley White, B.S. Chemistry, 2008.
- Daniel Wespe, B.S. Chemistry with Honors, 2007.
- Greg Charville, B.S. Chemistry with Highest Honors, 2007.
- Bryce Johnson, B.S. Chemistry with Honors, 2007.
- Ioana Rus, B.S. Chemistry, 2007.
- Lauren Tolles, B.S. Chemistry, 2005.
- Michael Brinkley, B.S. Chemistry with Honors, 2005.
- Stephen Weinman, B.S. Chemistry with Highest Honors, 2004.
- Erin Hopper, B.S. Chemistry, 2004.
- Jordon Walker, B.S. Chemistry, 2004.
- Kristie Wolfe, B.S. Chemistry, 2003.
- Brooke McCollum, B.S. Exercise Science, 2003.
- David Roberts, B.S. Chemistry, 2002.
- Bill Bryan, B.S. Chemistry, 2002.

Postdoctoral Research Associates

- Dr. Chris Broberg, 2020-2023.
- Dr. Mingming Wang, 2019-2020.
- Dr. Haibao Jin, 2016-2019
- Dr. Bin Sun, 2010-2012.
- Dr. Kavitha Rao, 2009-2010.
- Dr. Jae Ho Shin, 2006-2008.
- Dr. Ryan Fuierer, 2004-2006.
- Dr. Bong Kyun Oh, 2004-2006.
- Dr. Ty-Yung Chen, 2000-2001.

RESEARCH FUNDING

Active

- "Role of Diabetes and Nitric Oxide Release Duration on Analytical Performance of In Vivo Glucose Biosensors," National Institutes of Health (NIDDK R01DK108318), 10/01/2020-4/30/2024, $1,905,732. Role: PI.
- "Correlating In Vitro and In Vivo Antibacterial and Mucolytic Activities of Small Molecule Versus Macromolecular Nitric Oxide Donors," Cystic Fibrosis Foundation (SCHOEN20), 09/01/2022-08/31/2023. Role: PI.
- "Nitric Oxide-Releasing Glycosaminoglycans for Treating Complex Wounds," National Institutes of Health (NIDDK R01DK132778), 12/21/2022-12/30/2026, $1,525,708. Role: PI.

Pending

- "Nitric Oxide-Releasing Dendrimers for the Treatment of Periodontal Disease," National Institutes of Health, 04/01/2023-03/30/2027, $2,839,853. Role: PI (Schoenfisch). Score received: 5th percentile.

Prior

- "Synthesis and Characterization of Next Generation Nitric Oxide-Releasing Polymers," KnowBIO, 01/01/2018-12/31/2022, $1,061,831. Role: PI.
- "Nitric Oxide-Releasing Hyaluronic Acid for Wound Healing Stimulation," UNC Eshelman Institute for Innovation, 06/01/2019-5/30/2022. $200,000. Role: PI.
- "Nitric Oxide-Releasing Dendrimers for the Treatment of Periodontal Disease," National Institutes of Health (NIDCR R01DE025207), 07/02/2015-04/30/2021 (NCE), $1,578,751. Role: PI.
- "Nitric Oxide-Releasing Cyclodextrins for Treating COVID-19 Infections," North Carolina Policy Collaboratory, 07/01/2020-12/30/2021, $900,000. Role: PI.
- "Role of Diabetes and Nitric Oxide Release Duration on Analytical Performance of In Vivo Glucose Biosensors," National Institutes of Health (NIDDK R01DK108318), 12/01/2015-11/30/2020 (NCE), $1,905,732. Role: PI.
- "Dual Antimicrobial/Mucolytic Therapeutics for Cystic Fibrosis," Cystic Fibrosis Foundation, 11/01/2018-10/31/2020, $269,156. Role: PI.
- "Osteogenesis Modulation via Co-Delivery of Nitric Oxide and Hesperidin," UNC Eshelman Institute for Innovation, 06/01/2019-05/30/2020. $50,000. Role: PI.
- "Improving the Host Response to Implantable Glucose Sensors via Nitric Oxide Release," National Institutes of Health (NIDDK R44DK093119), 09/25/2015-09/30/2017, $1,296,237. Role: MPI.
- "In Vivo Assessment of Biodegradable Nitric Oxide-Release Scaffolds as Monotherapeutics for Cystic Fibrosis," KnowBio, LLC, 09/01/2016-08/30/2017, $515,977. Role: PI.
- "SBIR: Point-of-Care Nitric Oxide Sensor for Wound Management," National Institutes of Health (NIGMS R43GM117948), 08/02/2016-08/01/2017, $217,086. Role: Sub-contract PI.
- "Nitric Oxide Microfluidic Sensor," National Institutes of Health (NIAID R41AI112064), 07/01/14-06/30/17, $600,000. Role: PI. "Nitric Oxide-Releasing Cystic Fibrosis Therapeutics," National Institutes of Health 1R21AI112029-01, 12/01/14-11/31/16, $404,122. Role: PI
- "HHMI Undergraduate Science Education 2010-Core," Howard Hughes Medical Institute (HHMI), 9/01/11-08/30/15, $1,200,000. Role: Director (6/1/13-5/30/15).
- "Silica-Derived Nitric Oxide Delivery Vehicles as Anti-Plaque Agents," National Science Foundation (NSF-DMR), 08/01/11-07/30/15, $450,000. Role: PI.
- "Nitric Oxide Sensor for Sepsis Risk Assessment," National Institutes of Health (NIAID AI094719), 07/01/12-06/30/15, $403,264. Role: PI.
- "Improving Host Response to Implantable Glucose Sensors via Nitric Oxide Release," National Institutes of Health (NIDK DK09311), 09/1/11-08/31/13, $254,636. Role: PI of subcontract.
- "Nitric Oxide-Releasing Glucose Biosensors," National Institutes of Health (NIBIB R01 EB000708), 04/01/08-03/30/12, $1,304,988. Role: PI
- "SBIR Phase 1: Nitric Oxide-Releasing Antibacterial Wound Dressing," National Institutes of Health, 09/1/08-08/30/10, $145,777.
- "CAREER: Molecular Imaging of Protein Adsorption with Immunoassay-Atomic Force Microscopy," National Science Foundation (CHE 0349091), 02/01/04-01/31/10, $545,000.
- "Targeted Delivery of Nitric Oxide-Releasing Silica Particles: Advanced Anti-Tumor Therapeutics via Nanotechnology," Carolina Center of Cancer Nanotechnology Excellence, 02/01/07-01/31/09, $100,000.
- "Reduced Myocardial Cell Injury Using Engineered Dendrimers for the Targeted Delivery of NO During Reperfusion of Regionally Ischemic Hearts," North Carolina Biotechnology Center, 08/01/06-07/30/08, $40,664.
- "Nitric Oxide Releasing Glucose Biosensors," National Institutes of Health, 10/1/02 to 9/30/07, $1,629,749.
- Eli Lilly and Company Young Analytical Investigator Award, 2002-2003, $40,000 (direct only).
- "Studies of Molecular Orientation and Order in Microcontact-Printed Self-Assembled Monolayers," American Chemical Society Petroleum Research Fund Type G Award, 5/1/02 to 8/31/04, $43,000.

- "Assessing the Antimicrobial Diversity of Nitric Oxide Release," UNC Foundation Fund Award, 1/1/02 to 12/31/02, $5,000.
- "Immunoassay-Scanning Probe Microscopy, Protein Patterning and Controlled Nitric Oxide Release: Strategies for Probing Biocompatibility," Society of Analytical Chemists of Pittsburgh, 4/1/01 to 3/31/02, $20,000.
- "Reducing Bacterial Adhesion via Nitric Oxide Release," University Research Council, 11/1/00 to 10/31/01, $4,000.

PROFESSIONAL SERVICE

Service to Discipline

- Standing member of the Instrumentation and Systems Development (ISD) Study Section, 2018-2021.
- Member of American Chemical Society's Instrumental Analysis Exam Committee, 2015-2016.
- Chair of the Enabling Bioanalytical and Imaging Technologies (EBIT) Study Section for NIH Center for Scientific Review, 2014-2016.
- Standing member of the Enabling Bioanalytical and Imaging Technologies (EBIT) Study Section for NIH Center for Scientific Review, 2011-2016.
- Ad hoc proposal reviewer for the National Science Foundation, National Institutes of Health, Department of Defense, Department of Energy, American Chemical Society, and Bank of America.
- Regular manuscript reviewer for Analytical Chemistry, Analyst, Biomaterials, Biomacromolecules, Chemistry of Materials, Journal of the American Chemical Society, Journal of Biomedical Materials Research, Langmuir, Nature, Journal of Dental Research, Chemical Society Reviews, ACS Nano, ACS Materials and Interfaces, Journal of Diabetes Science and Technology, Science.

Departmental Service

- 2022- Undergraduate Studies Committee (Chemistry)
- 2019-2020 Executive Committee (Chemistry)
- 2017 Post Tenure Review Committee (Chemistry)
- 2017 McKenzie Professor of Chemistry Search Committee
- 2016 Analytical Faculty Search Committee, Chair (hired Prof. Dick)
- 2016 Strategic Hiring Workgroup, Chair
- 2012-2015 Executive Committee
- 2010-2015 Director of Graduate Studies; Graduate Studies Committee, Chair
- 2012-2013 Analytical/Materials Faculty Search Committee, Chair (hired Profs. Hicks and Lockett)
- 2008-2010 Graduate Student Recruiting Committee, Chair
- 2005-2010 Graduate Recruiting Committee, Analytical Division Representative
- 2007-2008 Physical Faculty Search Committee (hired Profs. Fecko and Moran)
- 2000-2005 Graduate Studies Committee, Analytical Division Representative
- 2000-present Member of 45+ Graduate Student Committees
- 2000-2004 Facilities Committee
- 2002 Teaching Assistant Professor Search Committee (hired Prof. Tiani)

University Service

- 2014-2015 Biomedical Engineering Assistant Professor Faculty Search Committee
- 2013-2016 Administrative Board of the College of Arts & Sciences
- 2013-2014 Office of Technology Development Director Search (search unsuccessful)
- 2013 Internal Reviewer, Biomedical Engineering Degree Program
- 2012-2015 Educational Policy Committee (Elected, 3-year term)
- 2011-2012 Office of Technology Development Advisory Board
- 2009-2015 Priority Registration Advisory Committee
- 2008-2010 Royster Society of Fellows Committee Member (selection of Royster and Dissertation Fellows)
- 2008-2011 Faculty Council (Elected, 3-year term)

- 2008-2010 Department of Orthopedics Advisory Board
- 2008-2010 Curriculum in Applied Sciences & Engineering, Executive Committee
- 2007-2008 Educational Policy Committee (Invited, 1-year term)
- 2006-2010 Carolina Scholars Faculty Mentor, Class of 2010
- 2006-2007 Department of Biochemistry Chair Search Committee (hired Prof. Parise)
- 2004-2009 Program in Molecular and Cellular Biophysics, Executive Committee
- 2003-2006 First Year Seminar Steering Committee
- 2002-2003 Program in Molecular and Cellular Biophysics, Administration Board
- 2001-2004 UNC-CH Track Club Advisor

RESEARCH STATEMENT

My academic laboratory works at the interface of chemistry, engineering, pharmaceutical sciences, and medicine. Our research projects involve nitric oxide, an endogenous diatomic free radical critical to human physiology. We are currently pursuing multi-disciplinary research initiatives in the following four areas:

- Sensors that function reliably and continuously (real time) to facilitate disease management
- Microfluidic sensor design and fabrication for clinical, point-of-care, and diagnostic applications
- New macromolecular nitric oxide-release scaffolds that manipulate biology and physiology
- Therapeutics to treat oral health conditions (periodontitis) and respiratory diseases (cystic fibrosis)

Nitric oxide-releasing glucose biosensors. Implantable electrochemical glucose biosensors are currently used for home blood glucose measurement by diabetic patients. Despite the approval of these sensors for monitoring blood glucose by the U.S. Food and Drug Administration, an obstinate foreign body response (FBR) has been linked to their diminished and inadequate analytical performance. Typical characteristics of the FBR to all implanted devices include infiltration by inflammatory cells that consume glucose and release electroactive interfering chemical species, both of which negatively impact sensor performance. Eventually, the implant is isolated from native tissue by a thick collagen capsule that accelerates device failure, as glucose diffusion to the sensing electrode is impeded. In order to minimize the FBR and improve the fate of implanted glucose biosensors, we are developing nitric oxide (NO)-releasing polymeric membranes that serve as the sensor's outermost, tissue-contacting coating. We have developed a wide range of NO-release scaffolds (with respect to composition and release properties) to dope within biomedical grade polyurethanes to achieve NO release without compromising sensor performance. Total NO storage and NO-release kinetics from the coatings are readily controlled by changing the type of NO donor and/or the identity of the polyurethane coating. As a central theme in this research project, our group has carefully examined multiple aspects of the FBR with respect to NO-release kinetics for both subcutaneous and percutaneous implants, including inflammatory response/capsule formation, glucose transport, and real-time in vivo sensor performance. We have determined that extended (i.e., for several days) but not continuous NO release is important for improving tissue characteristics surrounding the implant and concomitant sensor performance relative to short-term (<1 day) or control (non-NO-releasing) implants. We are now evaluating the tissue response and performance of NO-releasing sensors in a diabetic animal model in order to more accurately recapitulate human physiology for which the sensors are designed. Testing in diabetic animals allows us to assess the potential benefits of NO to sensor performance under relevant tissue conditions of diabetes (e.g., impaired wound repair, restricted blood flow). Not surprisingly, the NO levels required for optimal performance are different in the diabetic model.

Microfluidic nitric oxide sensors. Related to point-of-care testing, we have designed and fabricated amperometric sensors to enable measuring analytes in complex milieu. Central to the focus of the research group, we have made significant advances in accurately and selectively measuring nitric oxide (NO) with sufficient sensitivity in biological media such as blood, despite the perception that NO is too reactive and/or short-lived to be measured in such solutions. (It is stable for several minutes.) Our initial studies have focused on the development/use of permselective membranes (that only allow NO to pass) for microelectrode sensors and single-cell analyses (e.g., release of nitric oxide from macrophages). Over time and based on what we have learned from microelectrode sensors, we have focused on the development of microfluidic-based devices to facilitate selective and sensitive measurement of NO in small volumes of blood. Using this technology, we are

evaluating our hypothesis that NO levels in blood rise in advance of infection (immune response to pathogens) and that monitoring NO can be useful in predicting the risk of sepsis as well as prognosis of pharmaceutical intervention. Beyond sepsis, we remain interested in measuring NO and its associated by-products (e.g., nitrosothiols, nitrite) to guide clinical treatment/decisions related to shock, wound healing, and cardiac output/function. In addition, we are pursuing research utilizing lab-on-a-chip devices to study the influence of NO on macrophage activity.

Macromolecular nitric oxide storage and release. Due to NO's diverse roles in mediating physiology including angiogenesis, blood pressure, tumor growth, wound healing, and the immune response to pathogens, my laboratory is also developing a range of macromolecular scaffolds capable of storing and releasing pharmacologically useful levels of nitric oxide. The role of NO as an antimicrobial agent inspired us to design NO-releasing macromolecular scaffolds as alternatives to traditional antibiotics and their shortcomings (bacterial resistance). To date, we have developed a toolbox of NO-releasing macromolecular scaffolds including silica, gold, dendrimers, liposomes, and lower molecular weight biopolymers such as chitosan. Among our most exciting work to date, we have synthesized hyperbranched polymers (dendrimers) as biocidal scaffolds with broad-spectrum antibacterial activity that is dependent on the dendrimer generation (size) as well as the identity, charge, and hydrophobicity of the terminal functional groups. As the number of terminal groups predictably increases with dendrimer generation, the size and number of functionalized surface groups are easily tailored, making this class of molecules well-poised for investigating the relationships between antibacterial efficacy and surface modification. To enhance bacteria killing, we have combined NO release with select functional groups that promote contact-based, non-depleting antibacterial properties. We are currently investigating the ability of these macromolecular NO-release scaffolds to eradicate bacteria common to dental caries (e.g., *S. mutans*) and periodontal disease (e.g., *P. gingivalis*, *A. actinomycetemcomitans*), as well as those bacteria and biofilms associated with chronic wounds (e.g., *P. aeruginosa*, *S. aureus*, *methicillin-resistant S. aureus*).

Therapeutic application. In airway diseases associated with inflammation or chronic infections (e.g., asthma and chronic obstructive pulmonary disease), exhaled NO concentrations are typically elevated, especially during exacerbations. In contrast, exhaled NO levels in cystic fibrosis (CF) patients are similar to or decreased compared to healthy individuals, despite a persistent bacterial burden and the intense inflammation associated with infection. While research into the causes and implications of low exhaled NO concentrations in CF patients is still ongoing, new therapeutic approaches are being designed to supplement NO levels in CF airways and enable greater killing of bacteria that reside in biofilms deep within the mucus and have become increasingly more resistant to traditional antibiotics. Towards this end, we are developing biopolymers capable of NO storage and release as antibacterial agents that can be cleared from the lungs. Our initial lead candidate is based on chitosan, a linear polysaccharide composed of randomly distributed β-linked D-glucosamine and N-acetyl-D-glucosamine. Chitosan oligosaccharides are particularly attractive as a NO-release scaffold for pulmonary delivery due to their mucoadhesive nature, low toxicity, and biodegradability. To date, we have demonstrated the antibacterial efficacy of chitosan against several pathogens common to CF infections in vitro and in vivo (preclinical). In addition, we have observed reduced mucus viscoelasticity that may impact mucus clearance. Current and future research directions include studying the influence of NO-release kinetics and payloads on the antibacterial action, understanding how NO and modification of the chitosan with specific functional groups impacts mucoadhesion, mucus properties, and the cytotoxicity and biodegradation of the scaffold. We also are poised to evaluate the therapeutic potential of chitosan and related biopolymer scaffolds for other respiratory diseases including pneumonia, lung cancer, and pulmonary hypertension.

My research program continues to evolve with each new set of experiments. Our earliest work whether related to sensors or nitric oxide was focused on chemistry and benchtop testing. Over time, we have come to realize the importance of full characterization—beyond just chemistry or the material's physical properties—and thus routinely carry out our own biological assays. We are currently at a stage of development where broader collaboration and input are necessary to further advance our studies and enable successful translation of our work to the clinic. This represents a necessary but exciting, new path for my lab.

TEACHING PHILOSOPHY

As a faculty member, I enjoy my job immensely—particularly the challenges of teaching and mentoring a wide range of students with diverse backgrounds and educational/career goals. The connection between chemistry, biology, engineering and materials science in my research program represents a unique platform from which to train students. In both my research group and the classroom, my goal is to provide students with an appreciation for how different disciplines must be combined to tackle the most challenging problems in science and medicine. This research has helped me attract truly outstanding graduate students to my group, including three National Science Foundation Predoctoral Fellows, two State of North Carolina Board of Governors' Fellows, and a Royster Society Fellow.

In addition to fostering critical thinking, experimentation/data analysis know-how, writing and oral communication skills, I utilize my research program to teach my student colleagues the importance of creativity, curiosity, leadership and teamwork. My graduate students each have their own independent research projects that I assist in developing as they start working in my lab. I strongly believe that it is important to give students their own set of problems and topics to work on as part of their journey to becoming independent scientists. As their mentor, I feel that it is my role to provide them with the tools and resources, both financial and intellectual, for designing experiments and disseminating the ensuing knowledge to others. In this respect, I maintain a high level of involvement in the training of my graduate students. For example, we have weekly group meetings during which students present the current literature, ideas about their project area as they start, and/or their research once underway. In addition, I meet with small groups of students a few times more each month to discuss progress, challenges, and next steps. With my guidance, the graduate students take the lead role in organizing and writing the journal articles that we publish from my lab on our research. Often, manuscripts go back and forth between the student and me many times before being of appropriate quality for submission. This skill (writing) is one that I'm certain has helped many of my students apply for and receive many internal and external awards and fellowships. I also require each of my graduate students to mentor at least a couple of undergraduate students as part of their professional development. Indeed, this experience both allows them to further hone their own mentoring skills that will undoubtedly be important after their time at UNC-Chapel Hill and excite a newcomer about science.

I take significant pride in how I mentor students in my group, particularly as they wrap up their research projects, write manuscripts and dissertation chapters, seek jobs, and start their post-UNC careers. I have come to appreciate how different each student is, what they need versus want, and how effective mentoring and sometimes just some encouragement are particularly important as they transition from being students to *bona fide* scientists. Graduate students from my group pursue a broad range of careers including research scientists at large chemical, biomedical and pharmaceutical companies as well as regional start-ups, public policy advisors, and faculty. Beyond my own students, I have served as a dissertation committee member for more than 55 other chemistry graduate students at UNC-Chapel Hill and 4 biomedical engineering doctoral students at Duke University. I consider myself approachable and always ready to help or advise.

I regularly teach small (~10-30 students) and large (>220 students) lecture format undergraduate and graduate courses in Analytical Methods, Biomaterials & Implants, Bioanalytical Chemistry, Nanomedicine, and Surface Analysis. That said, I have interest in developing new courses as well. During the summer of 2016, I helped launch UNC's inaugural Science in Scandinavia program at the University of Lund, traveling with, teaching and mentoring 20 undergraduates interested in biomedical science and entrepreneurship. I have received the John L. Sanders Award for Distinguished Undergraduate Teaching and Service (2007) and Chapman Family Teaching Award for Distinguished Teaching of Undergraduates (2015)—both of which attest to my dedication to undergraduate education and mentoring.