

BIOGRAPHICAL SKETCH

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NAME Schoenfisch, Mark H.	POSITION TITLE Associate Professor, Chemistry		
eRA COMMONS USER NAME SCHOENFI			
EDUCATION/TRAINING <i>(Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)</i>			
INSTITUTION AND LOCATION	DEGREE <i>(if applicable)</i>	YEAR(s)	FIELD OF STUDY
University of Kansas (Lawrence, KS)	BA, BA	1992	Chemistry, German
University of Arizona (Tucson, AZ)	PhD	1997	Chemistry
University of Michigan (Ann Arbor, MI)		1997-1999	Chemistry

Please refer to the application instructions in order to complete sections A, B, and C of the Biographical Sketch.

A. POSITIONS AND HONORS.

Positions

1997-1999 NIH Postdoctoral Fellow, Department of Chemistry, University of Michigan
2000-2005 Assistant Professor, Department of Chemistry, University of North Carolina at Chapel Hill
2005-present Associate Professor, Department of Chemistry, University of North Carolina at Chapel Hill

Other Experience and Professional Memberships

1992-present American Chemical Society
1997-present Society of Biomaterials
2000-present UNC-Chapel Hill Program in Molecular and Cellular Biophysics
2003-present Materials Research Society

Honors

1998-1999 National Institutes of Health Postdoctoral Fellowship
2001 Society of Analytical Chemists of Pittsburgh Young Investigator Award
2002 Eli Lilly and Company Young Investigator Award
2004 National Science Foundation CAREER Award
2005 International Union of Pure and Applied Chemistry Young Observer Award
2007 John L. Sanders Award for Excellence in Undergraduate Teaching and Service

B. PEER-REVIEWED PUBLICATIONS.

1. M.H. Schoenfisch, J.E. Pemberton, M. Ovadia, and M. Levy, "In Situ Electrochemistry of $\text{Ru}(\text{NH}_3)_6^{3+}$ in a Perfused Living Rat Heart," *Electroanalysis* 1997, 9, 135-140.
2. M.H. Schoenfisch and J.E. Pemberton, "Air Stability of Alkanethiol Self-Assembled Monolayers on Ag and Au Surfaces," *J. Am. Chem. Soc.* 1998, 120, 4502-4513.
3. M.H. Schoenfisch and J.E. Pemberton, "Effects of Electrolyte and Applied Potential on the In Situ Structure of Self-Assembled Monolayers on Silver Surfaces," *Langmuir* 1999, 15, 509-517.
4. C.E. Taylor, J.E. Pemberton, G.G. Goodman, and M.H. Schoenfisch, "Surface Enhancement Factors for Ag and Au Surfaces Relative to Pt Surfaces for Monolayers of Thiophenol," *Appl. Spectrosc.* 1999, 53, 1212-1221.
5. K.A. Mowery, M.H. Schoenfisch, J.E. Saavedra, L.K. Keefer, and M.E. Meyerhoff, "Preparation and Characterization of Hydrophobic Polymeric Films that are Thromboresistant via Nitric Oxide Release," *Biomaterials* 2000, 21, 9-21.

6. K.A. Mowery, M.H. Schoenfisch, N. Baliga, J.A. Wahr, and, M.E. Meyerhoff, "More Biocompatible Electrochemical Sensors using Nitric Oxide Release Polymers," *Electroanalysis* 1999, 11, 681-686.
7. M.H. Schoenfisch, A.M. Ross, and, J.E. Pemberton, "Electrochemical Cleaning of Surface-Confined Carbon Contamination in SAMs on Ag," *Langmuir* 2000, 16, 2907-2914.
8. C.E. Taylor, M.H. Schoenfisch, and J.E. Pemberton, "Evidence for Carbonaceous Contamination Trapped within Alkanethiol Self-Assembled Monolayers at Mechanically-Polished Ag Surfaces by Raman Spectroscopy," *Langmuir* 2000, 16, 2902-2906.
9. M.H. Schoenfisch, K.A. Mowery, M.V. Rader, N. Baliga, J.A. Wahr, and, M.E. Meyerhoff, "Improving the Thromboresistivity of Chemical Sensors via Nitric Oxide Release: Fabrication and In Vivo Evaluation of NO Releasing Amperometric Oxygen Sensing Catheter," *Anal. Chem.* 2000, 6, 1119-1126.
10. M.H. Schoenfisch, J.E. Pemberton, and M. Ovadia, "Covalent Surface Organochemical Modification of Noble Metal Electrodes for Cardiac Biomaterial Applications," *J. Biomed. Mater. Res.* 2000, 51, 209-215.
11. J.E. Saavedra, D.L. Mooradian, K.A. Mowery, M.H. Schoenfisch, M.L. Citro, K.M. Davies, M.E. Meyerhoff, and L.K. Keefer, "Conversion of a Polysaccharide to Nitric Oxide-Releasing Form," *Bioorg. Med. Chem. Lett.* 2000, 10, 751-753.
12. B.J. Nablo, T.-Y. Chen, and M.H. Schoenfisch, "Sol-Gel Derived Nitric Oxide Releasing Materials that Reduce Bacterial Adhesion," *J. Am. Chem. Soc.* 2001, 123, 9712-9713.
13. M.H. Schoenfisch, H. Zhang, M.C. Frost, and M.E. Meyerhoff, "Nitric Oxide-Releasing Fluorescence-Based Oxygen Sensing Polymeric Films," *Anal. Chem.* 2002, 74, 5937-5941.
14. S.M. Marxer, A.R. Rothrock, B.J. Nablo, M.E. Robbins, and M.H. Schoenfisch, "Preparation of Nitric Oxide (NO)-Releasing Sol-Gels for Biomaterial Applications," *Chem. Mater.*, 2003, 15, 4193-4199.
15. K.L. Brogan, K.N. Wolfe, P.A. Jones, M.H. Schoenfisch, "Direct Oriented Immobilization of F(ab') Antibody Fragments on Gold," *Anal. Chim. Acta* 2003, 496, 73-80.
16. B.J. Nablo and M.H. Schoenfisch, "Antibacterial Properties of Nitric Oxide Releasing Sol-Gels," *J. Biomed. Mater. Res.*, 2003, 67A, 1276-1283.
17. M.E. Robbins and M.H. Schoenfisch, "Surface-Localized Release of Nitric Oxide via Sol-Gel Chemistry," *J. Am. Chem. Soc.* 2003, 125, 6068-6069.
18. J.H. Shin, S.M. Marxer, and M.H. Schoenfisch, "Nitric Oxide-Releasing Sol-Gel Particle/Polyurethane Glucose Biosensors," *Anal. Chem.* 2004, 76, 4543-4549.
19. B.J. Nablo and M.H. Schoenfisch, "Poly(vinyl chloride)-Coated Sol-Gels for Studying the Effects of Nitric Oxide Release on Bacterial Adhesion," *Biomacromolecules* 2004, 5, 2034-2041.
20. M.E. Robbins, E.D. Hopper, and M.H. Schoenfisch, "Synthesis and Characterization of Nitric Oxide-Releasing Sol-Gel Microarrays," *Langmuir* 2004, 20, 10296-10302.
21. T.H. Fischer, M.E. Robbins, A.P. Bode, D.E. Bellinger, T.C. Nichols, and M.H. Schoenfisch, "Evidence that Rehydrated, Lyophilized Red Blood Cells are Sufficiently Deformable for Normal Microcirculation Transit," *Microscopy Research and Technique* 2004, 65(1-2), 62-71.
22. K.P. Dobmeier and M.H. Schoenfisch, "Antibacterial Properties of Nitric Oxide-Releasing Sol-Gel Microarrays," *Biomacromolecules* 2004, 5, 2493-2495.
23. K.L. Brogan, J.H. Shin, and M.H. Schoenfisch, "Reducing Non-Specific Protein Interactions with Surfactants for Molecular Recognition Surface Force Measurements," *Langmuir* 2004, 20, 9729-9735.
24. B.J. Nablo, A.R. Rothrock, and M.H. Schoenfisch, "Nitric Oxide-Releasing Sol-Gels as Antibacterial Coatings for Orthopedic Implants," *Biomaterials* 2005, 26, 917-924.
25. S.M. Marxer and M.H. Schoenfisch, "Ionophore-Free Sol-Gel Potentiometric pH Sensors," *Anal. Chem.* 2005, 77, 848-853.
26. S.M. Marxer, M.E. Robbins, and M.H. Schoenfisch, "Nitric Oxide-Releasing Sol-Gel Oxygen Sensors," *Analyst* 2005, 130, 206-212.
27. B.J. Nablo and M.H. Schoenfisch, "In Vitro Cytotoxicity of Nitric Oxide-Releasing Sol-Gel-Derived Materials," *Biomaterials* 2005, 26, 4405-4415.
28. K.L. Brogan and M.H. Schoenfisch, "Influence of Antibody Immobilization Strategy on Molecular Recognition Force Microscopy Measurements," *Langmuir* 2005, 21, 3054-3060.
29. M.E. Robbins and M.H. Schoenfisch, "An Interactive Analytical Chemistry Summer Camp for Middle School Girls," *J. Chem. Educ.* 2005, 82, 1486-1487.
30. K.M. Evans-Nguyen and M.H. Schoenfisch, "Effects of Surface Properties on Fibrin Formation at Model Surfaces," *Langmuir* 2005, 21, 1691-1694.
31. J.H. Shin, S.W. Weinman, and M.H. Schoenfisch, "Sol-Gel Derived Amperometric Nitric Oxide Microsensor," *Anal. Chem.* 2005, 77, 3494-3501.

32. B.K. Oh, M.E. Robbins, B.J. Nablo, and M.H. Schoenfish, "Miniaturized Glucose Biosensor Modified with a Nitric Oxide-Releasing Sol-Gel Microarray," *Biosens. & Bioelectron.* 2005, 21, 749-757.
33. M.E. Robbins, B.K. Oh, E.D. Hopper, and M.H. Schoenfish, "Nitric Oxide-Releasing Xerogel Microarrays Prepared with Surface Tailored Poly(dimethylsiloxane) Templates," *Chem. Mater.* 2005, 17, 3288-3296.
34. B.J. Nablo, H. Prichard, R. Butler, B. Klitzman, and M.H. Schoenfish, "Inhibition of Implant-Associated Infections via Nitric Oxide Release," *Biomaterials* 2005, 26, 6984-6990.
35. K.M. Evans-Nguyen, L.R. Tolles, O.V. Gorkun, S.T. Lord, and M.H. Schoenfish, "Thrombin Interactions with Fibrinogen Adsorbed on Methyl-, Hydroxyl-, Amine-, and Carboxyl-Terminated Self-Assembled Monolayers," *Biochemistry* 2005, 44, 15561-15568.
36. A.R. Rothrock, R.L. Donkers, and M.H. Schoenfish, "Synthesis of Nitric Oxide-Releasing Gold Nanoparticles," *J. Am. Chem. Soc.* 2005, 127, 9362-9363.
37. B.K. Oh, M.E. Robbins, and M.H. Schoenfish, "Planar Nitric Oxide (NO)-Selective Ultramicroelectrode Sensor for Measuring Localized NO Surface Concentrations at Xerogel Microarrays," *Analyst* 2006, 131, 48-54.
38. M.H. Schoenfish, A.R. Rothrock, J.H. Shin, M.A. Polizzi, M.F. Brinkley, and K.P. Dobmeier, "Poly(vinylpyrrolidone)-doped Nitric Oxide-Releasing Xerogels as Glucose Biosensor Membranes," *Biosensors and Bioelectronics* 2006, 21, 749-757.
39. K.M. Evans-Nguyen, R.R. Fuierer, B.D. Fitchett, L.R. Tolles, J.C. Conboy, and M.H. Schoenfish, "Changes in Adsorbed Fibrinogen Layers upon Conversion to Fibrin," *Langmuir* 2006, 22, 5115-5121.
40. J.H. Shin and M.H. Schoenfish, "Improving the Biocompatibility of In Vivo Sensors via Nitric Oxide Release," *Analyst* 2006, 131, 609-615.
41. E.M. Hetrick and M.H. Schoenfish, "Reducing Implant-Related Infections: Active Release Strategies," *Chemical Society Reviews* 2006, 35, 780-789.
42. N.A. Stasko and M.H. Schoenfish, "Dendrimers as a Scaffold for Nitric Oxide Release," *J. Am. Chem. Soc.* 2006, 128, 8265-8271.
43. K.P. Dobmeier, G.W. Charville, and M.H. Schoenfish, "Nitric Oxide-Releasing Xerogel-Based Fiber-Optic pH Sensors," *Anal. Chem.* 2006, 78, 7461-7466.
44. E.M. Hetrick and M.H. Schoenfish, "Antibacterial Nitric Oxide-Releasing Xerogels: *Pseudomonas Aeruginosa* Adhesion and Viability Studies in a Parallel Plate Flow Cell," *Biomaterials* 2007, 28, 1948-1956.
45. J.H. Shin and M.H. Schoenfish, "Synthesis of Nitric Oxide-Releasing Silica Nanoparticles," *J. Am. Chem. Soc.* 2007, 129, 4612-4619.
46. M. Polizzi, N.A. Stasko, and M.H. Schoenfish, "Water Soluble Nitric Oxide-Releasing Gold Nanoparticles," *Langmuir* 2007, 23, 4938-4943.
47. C.B. Greer, I.A. Rus, S.T. Lord, and M.H. Schoenfish, "Surface-Dependent Fibrinopeptide A Accessibility to Thrombin," *Acta Biomaterialia* 2007, 3, 663-668.
48. N.A. Stasko, C.B. Johnson, M.H. Schoenfish, T.A. Johnson, E. Holmuhamedov, "Cytotoxicity of Multifunctional Dendrimers in Cultured Endothelial Cells," *Biomacromolecules* 2007, 8, 3853-3859.
49. E.M. Hetrick, H. Prichard, B. Klitzman, and M.H. Schoenfish, "Reduced foreign body response at nitric oxide-releasing subcutaneous implants," *Biomaterials* 2007, 28, 4571-4580.
50. C.B. Geer, A. Tripathy, M.H. Schoenfish, S.T. Lord, O.V. Gorkun, "Role of 'B-b' knob-hole interactions in fibrin binding to adsorbed fibrinogen," *J. Thromb. Haemost.* 2007, 5, 2344-2351.
51. J.H. Shin and M.H. Schoenfish, "Inorganic/Organic Hybrid Silica Nanoparticles as a Nitric Oxide Delivery Scaffold," *Chem. Mater.* 2008, 20, 239-249.
52. K.P. Dobmeier, D.A. Riccio, M.H. Schoenfish, "Xerogel Optical Sensor Films for Quantitative Detection of Nitroxyl," *Anal. Chem.* 2008, 80, 1247-1254.
53. E.M. Hetrick, J.H. Shin, N.A. Stasko, C.B. Johnson, D.W. Wespe, E. Holmuhamedov, and M.H. Schoenfish, "Bactericidal efficacy of nitric oxide-releasing silica nanoparticles," *ACS Nano* 2008, 2, 235-246.
54. N.A. Stasko, T.H. Fischer, and M.H. Schoenfish, "S-Nitrosothiol Modified Dendrimers as Nitric Oxide Delivery Vehicles," *Biomacromolecules* 2008, in press (available online).
55. L.E. Averett, C.B. Geer, R.R. Fuierer, B.B. Akhremitchev, O.V. Gorkun, and M.H. Schoenfish, "Complexity of 'A-a' knob-hole interaction revealed by biochemical force spectroscopy," *Langmuir* 2008, in press.
56. S.M. Deupree and M.H. Schoenfish, "Quantitative Method for Determining the Strength of Bacterial Adhesion and Application for Characterizing Adhesion Kinetics," *Langmuir* 2008, in press.
57. J.H. Shin, B.J. Privett, J.M. Kita, R.M. Wightman, and M.H. Schoenfish, "Fluorinated Xerogel-Derived Ultramicroelectrodes for Amperometric Nitric Oxide Sensing," submitted.

58. C.B. Geer, N.A. Stasko, I.A. Rus, S.T. Lord, and M.H. Schoenfisch, "Influence of Glutathione and its Derivatives on Fibrin Polymerization," submitted.

59. G.W. Charville, E.M. Hetrick, C.B. Geer, and M.H. Schoenfisch, "Reduction of Bacterial Adhesion to Fibrinogen-coated Substrates via Nitric Oxide Release," submitted.

60. J.H. Shin, E.V. Stevens, C.J. Der, and M.H. Schoenfisch, "Enhancing the Killing of Ovarian Epithelial Cancer Cells via Nitric Oxide-Releasing Nanoparticles: Targeting Nitric Oxide," in preparation.

C. RESEARCH SUPPORT

ACTIVE

National Institutes of Health (NIBIB R01 EB000708) Schoenfisch (PI) 09/24/02-08/31/08

Nitric Oxide-Releasing Glucose Biosensors

The goal of this project is to study the effects of nitric oxide on bacteria biofilms and combine the chemistry of nitric oxide release with the chemistry necessary to detect glucose in an effort to improve the in vivo biocompatibility of such devices.

Role: PI

North Carolina Biotechnology Center Johnson (PI) 08/01/06-07/30/08

Reduced Myocardial Cell Injury Using Engineered Dendrimers for the Targeted Delivery of NO During Reperfusion of Regionally Ischemic Hearts

The goal of this project is to develop multifunctional dendrimer conjugates for delivering nitric oxide to ischemic heart tissue.

Role: co-PI

National Science Foundation (CHE 0349091) Schoenfisch (PI) 02/01/04-01/31/09

CAREER: Molecular Imaging of Protein Adsorption with Immunoassay-Atomic Force Microscopy

The goal of this project is to immobilize antibodies onto AFM tips to make imaging of blood plasma protein adsorption via AFM more selective so that conformation may be studied.

Role: PI

Carolina Center of Cancer Nanotechnology Excellence Schoenfisch (PI) 02/01/07-01/31/09

Pilot Project

Targeted Delivery of Nitric Oxide-Releasing Silica Particles: Advanced Anti-Tumor Therapeutics via Nanotechnology

This is a one year pilot project with the aims to evaluate the utility of NO-releasing nanoparticles against ovarian cancer cell as a function of NO flux and cancer cell line, and assess the effect of particle size on cellular uptake in cancerous versus healthy cells.

PENDING

National Institutes of Health (NIBIB R01 EB000708) Schoenfisch (PI) 04/01/08-03/30/12

Nitric Oxide-Releasing Glucose Biosensors (Renewal)

The goal of this project is to study the effects of nitric oxide on bacteria biofilms and combine the chemistry of nitric oxide release with the chemistry necessary to detect glucose in an effort to improve the in vivo biocompatibility of such devices.

Role: PI