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Standiford H. Cox Professor of Chemistry

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EDUCATION *Postdoctoral Research Associate, Department of Chemistry, The Scripps Research Institute, 1992-1994.* Research Advisor: Professor K. Barry Sharpless (Nobel Laureate 2001); Area of Research: The Osmium-Catalyzed Asymmetric Dihydroxylation Reaction.

Ph.D. (Organic Chemistry), Department of Chemistry, Indiana University, 1988-1992. Thesis Advisor: Professor William R. Roush; Dissertation Title: "Studies in Acyclic Stereoselection: I. The Exo-Anomeric Effect as a Novel Method for Asymmetric Induction. II. A Fragment Assembly Aldol Approach Toward the Synthesis of the Polypropionate Subunit of Rutamycin B. III. A Stereochemically General Synthesis of 2-Deoxyhexoses via the Asymmetric Allylboration of 2, 3-Epoxyaldehydes"

M.S. (Organic Chemistry), Department of Chemistry, Yale University, 1986-1988. Research Advisor: Professor Samuel J. Danishefsky; Area of Research: Degradation studies on the ionophore antibiotic zincophorin; Lewis acid-catalyzed diene-aldehyde condensation reactions.

B.A. (Chemistry), Department of Chemistry, Kalamazoo College, 1980-1984. Research Advisor: Professor Thomas J. Smith; Dissertation Title: "Synthesis and Characterization of Various Multidentate and Macrocyclic Complexes of Copper (II) and Oxovanadium (IV)"

PROFESSIONAL EXPERIENCE

2021 Editor, *Methods in Molecular Biology* (Springer); volume dedicated to peptidoglycan research, broadly described (due date 5/1/22).

2019- Director of Chemistry, Door Pharmaceuticals, LLC

2018- Standiford H. Cox Professor of Chemistry, Department of Chemistry, Indiana University

2016- Professor, Department of Chemistry, Indiana University

2015 Visiting Fellow, Institute for Advanced Study, University of Warwick (UK)

2015 Visiting Fellow, Centre for Bacterial Cell Biology, Newcastle University (UK)

2013 Associate Professor *with tenure*, Department of Chemistry, Indiana University, Bloomington, IN

2013- Adjunct Professor of Molecular and Cellular Biochemistry, Indiana University

2013- Affiliate, Department of Biology, Microbiology Group, Indiana University

2007-2013 Associate Professor, Department of Chemistry, Indiana University, Bloomington, IN

2004-2007 Assistant Professor IV, Department of Chemistry and Biochemistry, University of California, San Diego, La Jolla, CA

2003-2013 Core Director (Core F (b): Novel Lipid Synthesis and Synthetic Design), Lipid MAPS Consortium (www.lipidmaps.org)

2002-2004 Assistant Professor III, Department of Chemistry and Biochemistry, University of California, San Diego, La Jolla, CA

2000-2002 Research Scientist, Discovery Chemistry Research, Lilly Research Laboratories, A Division of Eli Lilly and Company, Indianapolis, IN.

1998 Lecturer, Department of Chemistry, Indiana University/Purdue University at Indianapolis, Indianapolis, IN.

1994-2000 Senior Organic Chemist, Discovery Chemistry Research, Lilly Research Laboratories, A Division of Eli Lilly and Company, Indianapolis, IN

1984-1986 Research Assistant, Parke-Davis Pharmaceutical Division of Warner-Lambert, Inc., Ann Arbor, MI.

HONORS AND AWARDS

- Fellow of the American Academy of Microbiology (2022-)
- Fellow of the Royal Chemical Society (2021-)
- Fellow, American Association for the Advancement of Science, Elected in Biology and Chemistry Divisions (2019-)
- Visiting Fellow, Institute for Advanced Study, University of Warwick, UK (2015)
- University Research Committee Visiting Professor, Centre for Bacterial Cell Biology, University of Newcastle, UK (2015)
- Indiana University Outstanding Faculty Collaborative Research Award (2014)
- Eli Lilly and Company New Faculty Award (2004)
- Hellman Foundation Fellow, University of California, San Diego (2003-2004)
- Lilly Research Laboratories, Presidents Recognition Award (1999)
- National Institutes of Health Postdoctoral Fellowship (1992-1994)
- Amoco Foundation Fellowship, Indiana University (1991-1992)
- Heyl Foundation Fellowship, Yale University (1986-1988)
- Honors Scholarship, Kalamazoo College (1980-1984)

REFEREED PUBLICATIONS

99. Nyongessa, S.; Weber, P. M.; Bernet, E.; Pullido, F.; Nieckarz, M.; Delaby, M.; Nieves, C.; Viehboeck, T.; Krause, N.; Rivera-Millot, A.; Nakamura, A.; Vischer, N.; VanNieuwenhze, M.; Brun, Y. V.; Cava, F.; Bulgheresi, S.; Veyrier, F. “Evolution of multicellular longitudinally dividing oral cavity symbionts (Neisseriaceae),” manuscript under revision for *Nature Communications*.
98. Hirt, H.; Greenwood-Quaintance, K.; Barnes, A.; Karau, M.; Till, L.; Northrup, E.; Guan, W.; VanNieuwenhze, M.; Kashyap, P.; Patel, R.; Dunny, G. “Dynamics of Plasmid-mediated Niche Invasion, Immunity to Invasion, and Pheromone-inducible Murine Conjugation in the Murine Intestinal Tract,” manuscript under revision for *Nature Communications*.
97. Weaver, A.; Alvarez, L.; Rosch, K.; Ahmed, A.; Wang, G.; Shin, J.-H.; VanNieuwenhze, M.; Cava, F.; Dörr, T. “Lytic transglycosylases mitigate periplasmic crowding by degrading soluble cell wall turnover products,” *eLife* **2022**, DOI: 10.7554/elife.73178.
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95. Papadopoulos, A. O.; Ealand, C.; Gordhan, B. V.; VanNieuwenhze, M.; Kana, B. D., “Characterization of a putative M23 domain-containing protein in *Mycobacterium tuberculosis*,” *PLoS One* **2021**, DOI: 10.1371/journal.pone.0259181.
94. Nakamoto, R.; Kwan, J. M. C.; Chin, J. F. L.; Ong, H. T.; Flores Kim, J.; Midonet, C.; VanNieuwenhze, M. S.; Guan, X. L.; Sham, L.-T., “The bacterial tyrosine kinase system CpsBCD governs the length of capsule polymers,” *Proc. Natl. Acad. Sci. U. S. A.* **2021**, DOI: 10.1073/pnas.2103377118.
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91. Caccamo, P. D.; Jacq, M.; VanNieuwenhze, M. S.; Brun, Y. V. “A division of labor in the recruitment and topological organization of a bacterial morphogenic complex,” *Curr. Biol.* **2020**, *30*, 3908-3922. DOI: 10.1016/j.cub.2020.07.063.
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- Research Highlight: Thanbichler, M., “Cell Division: “Symbiotic Bacteria Turn It Upside Down,” *Curr. Biol.* **2017**, 28, R306.
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 - Research Highlight: “Shameless Bacterial Predator Remodels Its Own Prey,” *Scientific American*, March 29, 2018. URL: <https://blogs.scientificamerican.com/artful-amoeba/shameless-bacterial-predator-remodels-its-own-prey/>
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 - Research Highlight: “Treadmilling runs bacterial division,” *Nat. Rev. Microbiol.* **2017**, 15, 193. DOI: 10.1038/nrmicro.2017.24.
 - Indiana University News Release: “IU researchers help add greater precision to fight against antibiotic-resistant bacteria,” February 16, 2017. URL: <http://archive.news.indiana.edu/releases/iu/2017/02/superbug-cellular-division.shtml>
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5. VanNieuwenhze, M. S.; Brun, Y. V.; Kuru, E.; Hall, E. "Molecular Rotor-based D-Amino Acids as Tools for Imaging Peptidoglycan Biosynthesis," United States Provisional Patent Application No. 62/627,728, filed February 7, 2018.
6. Brun, Y. V.; Kuru, E.; VanNieuwenhze, M. S. "D-Ala-D-Ala-based Dipeptides as Tools for Imaging Peptidoglycan Biosynthesis," United States Provisional Patent Application No. 15/021,599, filed March 11, 2016. (Abandoned)
7. Brown, P. B.; Brun, Y. V.; Hall, E. A.; Hughes, V.; Kuru, E.; Tekkam, S.; VanNieuwenhze, M. S. "Compositions for In Situ Labeling of Bacterial Cell Walls with Fluorophores and Methods of Use Thereof," United States Patent Application No. 14/395,815, filed October 20, 2014. (Abandoned)
8. Brun, Y. V.; Kuru, E.; VanNieuwenhze, M. S. "D-Ala-D-Ala-based Dipeptides as Tools for Imaging Peptidoglycan Biosynthesis," International Patent Application No. PCT/US2014/055177 filed September 11, 2014.
9. Zlotnick, A.; VanNieuwenhze, M. S.; Turner, W. W.; Li, L. "Fluorescent HAP: A Diagnostic Stain for HBV Cores in Cells," International Patent Application No. PCT/US2014/031326; filed March 20, 2014.
10. Zlotnick, A.; VanNieuwenhze, M. S.; Turner, W. W.; Li, L. "Small Molecule Assembly Effectors with Antiviral Properties," United States Provisional Patent Application No. 61/952, 467 filed March 13, 2014.
11. Brun, Y. V.; Kuru, E.; VanNieuwenhze, M. S. "D-Ala-D-Ala-based Dipeptides as Tools for Imaging Peptidoglycan Biosynthesis," United States Provisional Patent Application No. 61/876,710, filed September 11, 2013.
12. VanNieuwenhze, M. S.; Turner, W. W.; Witztum, J. L.; Hartvigsen, K. "Peptide Conjugates of Phospholipid Analogs," United States Patent Application No. 13/983,435, filed September 10, 2013.
13. Brown, P. B.; Brun, Y. V.; Hall, E. A.; Hughes, V.; Kuru, E.; Tekkam, S.; VanNieuwenhze, M. S. "Compositions for In Situ Labeling of Bacterial Cell Walls with Fluorophores and Methods of Use Thereof," PCT Patent Application No. PCT/US2013/035704, filed April 21, 2013.
14. Zlotnick, A.; Li, L.; VanNieuwenhze, M.; Turner, W. "Fluorescent-HAP: A Diagnostic Stain for HBV Cores in Cells," United States Provisional Patent Application No. 61/803,554, filed March 20, 2013.
15. VanNieuwenhze, M. S.; Brun, Y. V.; Kuru, E. "D-Amino Acid-based Antibacterial Agents and Methods of Use Thereof," United States Provisional Patent Application No. 61/783,863, filed March 14, 2013.
16. Zlotnick, A.; Li, L.; VanNieuwenhze, M. S.; Turner, W. W. "Small Molecule Assembly Effectors with Antiviral Properties," United States Provisional Patent Application No. 61/779,655 filed March 13, 2013.
17. Brown, P. B.; Brun, Y. V.; Hall, E. A.; Hughes, V.; Kuru, E.; Tekkam, S.; VanNieuwenhze, M. S. "Compositions for In Situ Labeling of Bacterial Cell Walls with Fluorophores and Methods of Use Thereof," United States Provisional Patent Application No. 61/718,048, filed October 24, 2012.

18. Brown, P. B.; Brun, Y. V.; Hall, E. A.; Hughes, V.; Kuru, E.; Tekkam, S.; VanNieuwenhze, M. S. "Compositions for Covalently Labeling Bacterial Cell Walls with Fluorophores and Methods of Use," United States Provisional Patent Application No. 61/636,640, filed April 21, 2012.
19. VanNieuwenhze, M. S.; Turner, W. W.; Witztum, J. L.; Hartvigsen, K. "Peptide-Phospholipid Conjugates," PCT Patent Application No. PCT/US2012/021819, filed January 19, 2012.
20. VanNieuwenhze, M. S.; Turner, W. W.; Witztum, J. L.; Hartvigsen, K. "Peptide Conjugates of Phospholipid Analogs," United States Provisional Patent Application No. 61/440,231, filed February 7, 2011.
21. Alborn, Jr., W. E.; Blaszcak, L. C.; Mauldin, S. C.; Skatrud, P. L.; VanNieuwenhze, M. S.; Zia-Ebrahimi, M. S. "Process for Preparing Dansylated Glycopeptide Lipid II Derivatives as Substrates for the Transglycosylase Enzymes," PCT Intl. Appl. (2002), WO 085929 (A1), Eli Lilly and Company, October 31, 2002
22. Blaszcak, L. C.; Dingess-Hammond, E. A.; Hornback, W. J.; VanNieuwenhze, M. S. "Preparation of Glucosaminyl- β -[1, 4]-N-Acetylmuramic Acid Derivatives," PCT Int. Appl. (2002), WO 079268 (A2), Eli Lilly and Company, October 25, 2001.
23. Blaszcak, L. C.; Dingess-Hammond, E. A.; Hornback, W. J.; VanNieuwenhze, M. S. "Preparation of Glucosaminyl- β -[1, 4]-N-Acetylmuramic Acid Derivatives," PCT Int. Appl. (2001), WO 079267 (A2), Eli Lilly and Company, October 25, 2001.
24. Alborn, Jr., W. E.; Blaszcak, L. C.; Mauldin, S. C.; Skatrud, P. L.; VanNieuwenhze, M. S.; Zia-Ebrahimi, M. S. "Process for Preparing Dansylated Glycopeptide Lipid II Derivatives as Substrates for the Transglycosylase Enzymes," PCT Intl. Appl. (2001), WO 079267 (A2), Eli Lilly and Company, October 25, 2001
25. Ambler, S. J.; Baker, S. R.; Clark, B. P.; Goldsworthy, J.; Johnson, K.; Kingston, A. E.; Owton, W. M.; Coleman, D. S.; Fogelson, R. J.; Jagdmann, Jr. G. E.; Schoepp, D. D.; Hong, J. E.; Schkeryantz, J. M.; VanNieuwenhze, M. S.; Zia-Ebrahimi, M. S. "Preparation of Heterocycles Containing a 4-Substituted Pyrimidine Subunit for Pharmaceutical Use as mGluR1 Antagonists" PCT Int. Appl. (2001), WO 032632 (A2), Eli Lilly and Company, May 5, 2001.

ISSUED PATENTS

1. VanNieuwenhze, M.; Brun, Y.; Kuru, E.; Hall, E., "Molecular Rotor-based D-Amino Acids as Tools for Imaging Peptidoglycan Biosynthesis," United States Patent No. 11,168,077, Indiana University research and Technology Corporation, November 9, 2021.
2. VanNieuwenhze, M. S.; Hall, E.; Kuru, E.; Brown, P.; Tekkam, S.; Hughes, V.; Brun, Y., "Compositions for In Situ Labeling of Bacterial Cell Walls with Fluorophores and Methods of Use Thereof," United States Patent No. 10,544,444, Indiana University Research and Technology Corporation, January 28, 2020.
3. Zlotnick, A.; Li, L.; VanNieuwenhze, M. S.; Turner, W. W., "Fluorescent-HAP: A Diagnostic Stain for HBV Cores in Cells," United States Patent No. 10,006,913; Indiana University Research and Technology Corporation, June 26, 2018.

4. VanNieuwenhze, M. S.; Turner, W. W.; Witztum, J. L.; Hartvigsen, K. "Peptide-Phospholipid Conjugates," United States Patent No. 9,518,088; Indiana University Research and Technology Corporation, December 13, 2016.
5. Blaszcak, L. C.; Dingess-Hammond, E. A.; Hornback, W. J.; VanNieuwenhze, M. S., "Glycopeptide and Preparation Thereof" United States Patent No. 7,173,107; Eli Lilly and Company, February 6, 2007.
6. Alborn, Jr., W. E.; Blaszcak, L. C.; Mauldin, S. C.; Skatrud, P. L.; VanNieuwenhze, M. S.; Zia-Ebrahimi, M. S., "Process for Preparing Lipid II," United States Patent No. 7,169,919; Eli Lilly and Company, January 30, 2007.
7. VanNieuwenhze, M. S.; Spitzer, W. A.; Schladetzky, K. D., "Preparation of Pyridoimidazoles as Antiviral Agents" United States Patent No. 6,087,374; Eli Lilly and Company, July 11, 2000.

EDITORIAL/REVIEW BOARDS

2022	Member, NSF Panel on Biomolecules, February 7-8, 2022.
2021-	Editor, <i>Methods in Molecular Biology</i> , volume dedicated to peptidoglycan research
2015-2019	Standing Member, NIH Study Section, Synthetic and Biological Chemistry (Section A)
2014	<i>Ad-hoc</i> Member, NIH Study Section, Synthetic and Biological Chemistry (Section A)
2014	<i>Ad hoc</i> Member, NIH BCMB-W Review Panel
2013	<i>Ad-hoc</i> Member, NIH Study Section, Synthetic and Biological Chemistry (Section A)
2011	<i>Ad hoc</i> Member, NIH Peer Review for Shared Instrumentation
2011	<i>Ad hoc</i> Member, NIH Partnership for Biodefense
2011	<i>Ad hoc</i> Member, NIH Chemical Approaches to Target Validation for Resistant Pathogens Initiative
2010	<i>Ad-hoc</i> Member, NIH Study Section, Synthetic and Biological Chemistry (Section A)
2010	<i>Ad-hoc</i> Member, NIH Study Section, Synthetic and Biological Chemistry (Section B)
2009	<i>Ad hoc</i> Member, NIH Drug Discovery and Small Business Review Panel (SBIR/STTR)
2008-2009	<i>Ad hoc</i> Member, Review Panel, Preclinical Product Development Team, Indiana CTSI
2006	Grant Reviewer, Research Corporation, Cottrell College Science Award Program
2005	Grant Reviewer, Petroleum Research Fund, American Chemical Society
2005	<i>Ad Hoc</i> Member, NIH Study Section, BCMB
2005	NSF SBIR Review Panel
2005	NSF CHE Review Panel
2005	<i>Ad-hoc</i> Member, NIH Study Section, Synthetic and Biological Chemistry (Section A)
2004	<i>Ad-hoc</i> Member, NIH Study Section, Bioorganic and Natural Products Chemistry
2002	<i>Ad-hoc</i> Member, NIH Study Section, Bioorganic and Natural Products Chemistry

CONSULTING

2015-	Williams and Connolly, LLP
2008	Rigel Pharmaceuticals, Inc., South San Francisco, CA
2003-2007	ChemBridge Research Laboratories, Rancho Bernardo, CA
2002-2004	Embiosis (formerly Microgenomics), Carlsbad, CA

MEMBERSHIPS AND PROFESSIONAL SOCIETIES

- Member, American Chemical Society
- Senior Distinguished Advisor to the Board, Medicinal and Bioorganic Chemistry Foundation
- Member, American Association for the Advancement of Science
- Member, American Society for Microbiology

ADMINISTRATIVE SERVICE

- Associate Director, NIH T32 Training Grant, “Quantitative and Chemical Biology” (2021-)
- Steering Committee Member, Indiana University Precision Health Initiative (March 1, 2019-)
- Indiana University Precision Health Initiative, Center for Chemical Biology and Biotherapeutics (C2B2, March 1, 2019-)
- Member, Molecular Therapeutics Program, Indiana Clinical and Translational Sciences Institute (2013-present)

OTHER PROFESSIONAL SERVICE

- Organizer, 14th Winter Conference on Medicinal and Bioorganic Chemistry, January 27-31, 2019, Steamboat Springs, CO.
- Organizer, 13th Winter Conference on Medicinal and Bioorganic Chemistry, January 22-26, 2017, Steamboat Springs, CO.
- Organizer, 12th Winter Conference on Medicinal and Bioorganic Chemistry, January 25-29, 2015, Steamboat Springs, CO.
- Organizer, 11th Winter Conference on Medicinal and Bioorganic Chemistry, January 20-25, 2013, Steamboat Springs, CO.
- Chair, 2012 Gordon Research Conference on Natural Products
- Alternate Academic Councilor, ACS Division of Medicinal Chemistry (MEDI) 2012-2014
- Vice Chair, 2011 Gordon Research Conference on Natural Products
- Organizer, “Young Investigators Symposium,” Division of Organic Chemistry, Central Regional Meeting of the American Chemical Society, June 8-10, 2011, Indianapolis, IN
- Organizer, 10th Winter Conference on Medicinal and Bioorganic Chemistry, January 23-28, 2011, Steamboat Springs, CO.
- Organizer, 9th Winter Conference on Medicinal and Bioorganic Chemistry, January 25-29, 2009, Steamboat Springs, CO
- Organizer, 7th Winter Conference on Medicinal and Bioorganic Chemistry, February 26-March 2, 2006, Clearwater Beach, FL
- Member, Division of Medicinal Chemistry (ACS), Long-Term Planning Committee, 2006-2008.
- Organizer, 6th Winter Conference on Medicinal and Bioorganic Chemistry, January 23-29, 2005, Steamboat Springs, CO.
- Educational Policy and Academic Oversight Committee, UCSD School of Pharmacy, 2003-2006.
- Chair, Organic Chemistry Academic Contacts Committee, Eli Lilly and Company, 1997-1999.

INVITED PRESENTATIONS AND LECTURESHIPS

- Oregon Health Sciences University, Department of Chemical Physiology and Biochemistry, Portland, Ore: May 25, 2021.
- Plenary Lecture, 2019 Great Wall Symposium “The Dynamics of Peptidoglycan Structure and Function: New Insights into the Great Wall”, Pasteur Institute, Paris, France; September 25, 2019.
- Vanderbilt Institute of Chemical Biology/Vanderbilt Institute for Infection, Immunology, and Inflammation, Vanderbilt University, Nashville, TN; January 15, 2019.
- Department of Chemistry, The Scripps Research Institute, La Jolla, CA; November 16, 2018.
- Professor H. Alex Brown Memorial Symposium, Vanderbilt Institute of Chemical Biology, Vanderbilt University, Nashville, TN; November 5, 2018.
- Plenary Lecture, The Gordon Research Conference on Bacterial Cell Surfaces, Mt. Snow, VT; June 25, 2018.
- Department of Chemistry, Michigan State University, East Lansing, MI; April 25, 2018.

- Plenary Speaker, Aldrich Excellence in Chemistry Symposium, University of Texas Southwestern Medical Center, Dallas, TX; March 29, 2018.
- Department of Chemistry, Wayne State University, Detroit, MI; February 7, 2018.
- 8th Annual August M. Watanabe Symposium on Chemical Biotechnology, Indiana University, Bloomington, IN; September 30, 2017.
- Department of Chemistry, The University of Utah, Salt Lake City, UT; September 21, 2017.
- Department of Chemistry, Ball State University, Muncie, IN; April 27, 2017.
- American Chemical Society National Meeting, Division of Biological Chemistry, "Chemical Probes for Bacterial Imaging," San Francisco, CA; April 5, 2017.
- Department of Chemistry, University of Utah, Salt Lake City, UT; November 21, 2016.
- Department of Chemistry and Biochemistry, University of Oregon, Eugene, OR; November 11, 2016.
- Department of Chemistry, Oregon State University, Corvallis, OR; November 10, 2016.
- Discovery Chemistry Research and Technologies, Eli Lilly and Company, Indianapolis, IN; October 18, 2016.
- Philadelphia Organic Chemists Club, University of Pennsylvania, Philadelphia, PA; September 22, 2016.
- Plenary Speaker, 2015 Great Wall Symposium "The Dynamics of Peptidoglycan Structure and Function: New Insights into the Great Wall", Florence, Italy; September 21, 2015.
- Indiana University, Department of Chemistry; September 10, 2015.
- The Ohio State University, Department of Chemistry/Medicinal Chemistry and Pharmacognosy; September 8, 2015.
- University of Warwick, School of Life Sciences, Coventry, UK; July 1, 2015.
- The University of Sheffield, Department of Molecular Biology and Biotechnology, Sheffield, UK; June 10, 2015.
- Purdue University, Department of Medicinal Chemistry and Molecular Pharmacology, West Lafayette, IN; June 2, 2015.
- Newcastle University, Centre for Bacterial Cell Biology, Newcastle, UK; May 1, 2015.
- BACELL 2015, European Bacillus Meeting, Amsterdam, Netherlands; April 15, 2015.
- Newcastle University, School of Chemistry, Newcastle, UK; April 10, 2015.
- Trinity College/Dublin, School of Genetics and Microbiology, Dublin, Ireland; March 26, 2015.
- Newcastle University, Institute of Cellular and Molecular Biology, Newcastle, UK; March 20, 2015.
- Yale University, Chemical Biology Institute Lecture Series, New Haven, CT; February 3, 2015.
- University of Michigan, Department of Medicinal Chemistry, Ann Arbor, MI; January 2015.
- Winter Conference on Medicinal and Bioorganic Chemistry, Steamboat Springs, CO; January 26, 2015.
- Indiana University, Outstanding Faculty Collaborative Research Award Symposium; December 12, 2014.
- The Scripps Research Institute, Department of Chemistry, Jupiter, FL; December 4, 2014.
- University of Warwick, Departments of Chemistry/Chemical Biology, Coventry, UK; May 27, 2014.
- Centre for Bacterial Cell Biology, University of Newcastle, Newcastle, UK; May 22, 2014.
- Imperial College/London, Department of Chemistry, London, UK; May 20, 2014.
- MRC Laboratory of Molecular Biology, Cambridge, UK; May 19, 2014.
- Southern Research Institute, Birmingham, AL; September 9, 2013.
- Baylor University, Department of Chemistry, Waco, TX; April 26, 2013.
- Department of Chemistry/Vanderbilt Institute of Chemical Biology, Nashville, TN; February 20, 2013.
- University of Louisville, Department of Chemistry, Louisville, KY; October 24, 2012.
- The Scripps Research Institute, Department of Chemistry, Jupiter, FL; May 5, 2012.
- University of Pittsburgh, Department of Chemistry, Pittsburgh, PA; April 26, 2012.

- University of California at Los Angeles, Department of Chemistry, Los Angeles, CA; December 15, 2011.
- University of California at Irvine, Department of Chemistry, Irvine, CA; December 14, 2011.
- University of California at San Diego, Department of Chemistry, La Jolla, CA; December 12, 2011.
- 2nd Annual August M. Watanabe Symposium on Chemical Biotechnology, Indiana University, Bloomington, IN; October 15, 2011.
- St. Jude Children's Research Hospital, Memphis; TN, October 6, 2011.
- University of Illinois, Department of Chemistry; Urbana/Champaign, IL, April 21, 2011
- Indiana Medicinal Chemistry Symposium, IUPUI; October 2, 2010.
- Indiana University/Purdue University at Indianapolis; Department of Chemistry, April 28, 2010.
- The Scripps Research Institute, Department of Chemistry; December 10, 2009.
- University of Colorado, Department of Chemistry; October 19, 2009.
- 49th Interscience Conference on Antimicrobial Agents and Chemotherapy, San Francisco, CA; September 12, 2009.
- Gordon Research Conference on Natural Products, Tilton, NH; July 30, 2009.
- 21st American Peptide Symposium, Bloomington, IN; June 11, 2009.
- Creighton University, Department of Chemistry; February 12, 2009.
- Rigel Pharmaceuticals, Inc., San Francisco, CA, Cooper Symposium; October 23, 2008
- "Novel Antibiotics, Old and New Targets," The University of Notre Dame, Notre Dame, IN; June 28-29, 2008.
- Indiana University, Microbiology Working Group, Department of Biology; March 18, 2008.
- University of Louisville, Department of Chemistry; February 8, 2008.
- Rigel Pharmaceuticals, Inc., San Francisco, CA, Division of Medicinal Chemistry; January 11, 2008.
- University of Alberta, Department of Chemistry; November 19, 2007.
- Michigan Technological University, Department of Chemistry; September 27, 2007.
- Eli Lilly and Company, Lilly Research Laboratories; August 21, 2007.
- Indiana University, Department of Chemistry; May 10, 2007.
- University of Kansas, Department of Medicinal Chemistry, School of Pharmacy; February 15, 2007.
- 10th Annual San Diego Glycobiology Symposium, San Diego; January 19, 2007.
- University of North Carolina, Department of Medicinal Chemistry, School of Pharmacy; March 2, 2006.
- 7th Winter Conference on Medicinal and Bioorganic Chemistry, Clearwater Beach, FL; March 1, 2006.
- Northwestern University, Department of Chemistry; January 9, 2006.
- The Scripps Research Institute, Department of Medicinal Chemistry, Jupiter, FL; September 15, 2005.
- 46th Annual Meeting of the American Society of Pharmacognosy, Corvallis, OR; July 23-27, 2005.
- 7th Annual San Diego Combichem/Medchem Symposium, San Diego, CA, July 16, 2004.
- University of Regensburg, Departments of Chemistry and Pharmacy; July 11, 2003.
- University of Regensburg, Department of Chemistry (INNOVATEC Lectures); July 7, 2003.
- University of Regensburg, Department of Chemistry; July 2, 2003.
- University of Regensburg, Department of Chemistry (INNOVATEC Lectures); June 30, 2003.
- Triad Therapeutics, Division of Medicinal Chemistry, La Jolla, CA; August 28, 2002.
- University of California, Los Angeles, Department of Chemistry; January 17, 2002.
- Northwestern University, Department of Chemistry; December 5, 2001.
- State University of New York at Buffalo, Department of Chemistry; November 2001.
- University of Oregon, Department of Chemistry; November 2001.
- University of Alabama, Department of Chemistry; November 2001.
- University of Kansas, Department of Medicinal Chemistry; November 2001.
- University of California at San Diego, Department of Chemistry and Biochemistry; October 29, 2001.

- Yale University, Department of Chemistry; October 17, 2001.
- Wayne State University, Department of Chemistry; September 5, 2001.
- 221st National Meeting of the American Chemical Society, San Diego, CA, April 2001.
- 4th Winter Conference on Bioorganic and Medicinal Chemistry, Steamboat Springs, CO, February 2001.
- The Scripps Research Institute, Department of Chemistry, La Jolla, CA; Jan. 19, 2001.
- Pacificchem 2000, Honolulu, HI, Dec. 15, 2000.
- Indiana University, Department of Chemistry; Nov. 20, 2000.
- University of Notre Dame, Department of Chemistry; Nov. 15, 2000.
- University of California at San Diego, Department of Chemistry and Biochemistry; Nov. 8, 2000.
- Montana State University, Department of Chemistry; Sept. 29, 2000.
- Lilly Research Laboratories, Chemistry Seminar Series, Indianapolis, IN, August 22, 2000.
- Gordon Research Conference on Stereochemistry, Newport, RI, June 12, 2000.
- Hamburg Laboratories of Eli Lilly and Company, Hamburg Germany, Feb. 23, 2000.
- Tippecanoe Laboratories of Eli Lilly and Company, Lafayette, IN, Nov. 5, 1999.
- Pacific Conference on Chemistry and Spectroscopy, Pasadena, CA, October 1993.

RESEARCH SUPPORT

Active Grant Support

Indiana University Grand Challenges
Indiana University
 Role: Co-Investigator

12/1/2018-11/30/2023
(\$70,878/annual)

“Developing a Better Naloxone”

This application was submitted in response to the Indiana University Grand Challenges initiative entitled, “Responding to the Addictions Crisis” and will seek to determine whether novel derivatives of cannabidiol and salvinorin will act as negative allosteric modulators of the μ -opioid receptor for the treatment of opioid overdose.

R35 GM136365
National Institutes of Health
 Role: PI

4/1/2020 – 3/31/2025
(\$1,250,000/1,727,631 total)

“Chemical Biology Studies of the Dynamics and Inhibition of Peptidoglycan Biosynthesis”

This R35 (MIRA) application combines the activities described under GM111537 and GM113172. The longer- term goals of this application are to: 1) Continue study of the post-septational phase of bacterial cell division in *Bacillus subtilis*, 2) develop improved probes that enable real-time imaging of peptidoglycan biosynthesis and dynamics without washing, 3) continued detailed study of the mechanism of action of cyclic depsipeptides such as plusbacin A₃, lysobactin, and empedopeptin 4) elucidation of the lipid recycling pathway that is central to peptidoglycan biosynthesis and evaluating its potential to provide novel antibacterial targets.

Standiford H. Cox Endowed Chair

(Current Balance: \$330,648)

This is an unrestricted endowed research fund associated with the Cox Chair in Chemistry.

Indiana University Precision Health Initiative (PHI)

Role: PI

8/4/21 – 12/31/22**(\$159,119, total)**

This funding provided by the Indiana University Precision Health Initiative is to provide chemistry resources for the development of a kinase platform in support of the Triple Negative Breast Cancer and Pediatric Sarcoma Disease State Teams.

Pending Application(s)**R01 AI118933-06 (A. Zlotnick, PI)****National Institutes of Health**

Role: Co-Investigator

3/22 Submission**(\$1,954,063/\$2,911,369 total)**

“Multimode Observation of Virus Capsid Assembly”

The Hepatitis B Virus (HBV) capsid protein self assembles and packages viral RNA while also serving as a compartment for DNA synthesis. Assembly and disassembly of the viral capsid have become targets for antiviral agents. The goal of this application is to develop methods for targeting cargo to a capsid by linking it to a small molecule that binds the capsid in high affinity and, as a result, using the capsid as a delivery device. Release of the cargo will be accomplished via chemical, redox, or light activated capsid disassembly providing the means for development of a programmable drug delivery system.

Completed Research Support**R01 GM113172 (MPI Application)****National Institutes of Health (NIGMS)**

Role: Contact PI

2/5/2015– 11/30/2018

NCE until 11/30/2019

“Dynamics of Bacterial Peptidoglycan Biosynthesis”

The long-term goal of this application is to elucidate the mechanism(s) of peptidoglycan (PG) synthesis dynamics. This will be achieved through the development of improved fluorescent D-amino acids (FDAAs) with improved photophysical properties and to use nanochannel and microfluidic devices to determine the dynamics of PG synthesis in ovoid and rod-shaped bacteria. At the conclusion of these studies, we will have synthesized a new set of fluorescent probes that will greatly facilitate the study of PG synthesis at high spatiotemporal resolution, we will have developed microfluidic devices with precise liquid handling that will enhance our ability to use the FDAA probes to study PG synthesis with cutting-edge microscopy in time-lapse and real time studies, and we will identify new genes that control the dynamics of PG synthesis.

1 R01 GM111537**National Institutes of Health (NIGMS)**

Role: PI

9/1/2014 – 8/31/2018

NCE until 8/31/2019

“Novel Inhibitors of Peptidoglycan Synthesis Targeting Gram-positive Pathogens”

The focus of this grant application is to leverage our developing expertise in depsipeptide antibiotics that inhibit bacterial cell wall biosynthesis, in order to gain insight into how these agents manifest their biological activity, and how the cell wall biosynthetic machinery responds to antibiotic challenge(s).

R01 AI067417-07 (A. Zlotnick, PI)
National Institutes of Health (NIAID)
Role: Co-Investigator

7/1/2011-6/30/2016

“Molecular Modulation of Hepatitis B Virus Assembly”

The major goal of this grant is to study compounds that interfere with normal HBV capsid assembly. In collaboration with the Zlotnick laboratory, we are preparing compounds and fluorescent probes that are being used to accelerate capsid assembly and enable more detailed study of the kinetics of capsid assembly.

Faculty Research Support Program (FRSP)
Indiana University
Role: PI

12/1/13-11/30/14

“Elucidation of the Pathways for Incorporation of Fluorescently Modified D-Amino Acids into Sites of Active Peptidoglycan Synthesis”

The major goal of this research is to advance our understanding of the mechanism(s) by which fluorescently modified D-amino acids are incorporated into peptidoglycan.

1 U54 GM069338-09
NIH/NIGMS
Role: Core Director

8/1/2008-7/31/2013

“Lipid Metabolomics and Proteomics Strategy”

This consortium developed a system capable of characterizing changes in lipid metabolites of murine macrophage cell lines. My laboratory provided chemistry support to assist lipid identification and characterization efforts of the other core groups within the consortium.

1 RO1 HL086559 (J. Witztum, PI)
NIH/NIGMS
Role: Collaborator

3/1/2007-2/29/2012

“Development of a Vaccine Approach to Inhibit Atherosclerosis”

The major goal of my laboratory was the synthesis and characterization of synthetic haptens for use in the generation of antibodies that may be components for the development of a vaccine approach for treatment of atherosclerosis.

Johnson and Johnson Research Grant
Role: PI

8/2009-8/2010

“Mechanism of Action and SAR (Structure-Activity Relationships) of New Cell Wall Antibiotics”
(with Malcolm Winkler, Department of Biology, Indiana University)

The focus of this project was the synthesis and evaluation of depsipeptide antibiotics that inhibited peptidoglycan biosynthesis.

1 R01 AI059327

12/01/2004 – 11/31/2009

National Institutes of Health (NIGMS)

Role: PI

“Synthesis and Mechanistic Studies of Peptide Antibiotics”

The major goals of this project were the synthesis and mechanistic study of peptide antibiotics that function via inhibition of late-stage enzymes involved in peptidoglycan biosynthesis.

University of California

7/01/2003 – 6/30/2004

Cancer Research Coordinating Committee (CRCC)

Role: PI

“Construction of the (C) DEF-Benzoxocin Ring System of Nogalamycin via a Reductive Heck Cyclization”

The major goal of this project was the development of a synthetic route to access a key subunit of the anthracycline core present in members of the nogalamycin family of antitumor antibiotics.

Hellman Foundation Fellowship

7/01/2003 – 6/30/2004

University of California

Role: PI

“Peptidoglycan Biosynthesis: Inhibition and Chemical Mimicry”

The major goal of this project was to initiate efforts toward the chemical synthesis of polymerized and cross-linked glycan strands.

1 R21 AI059327-01

4/1/2004 – 11/30/2004

NIH/NIAID

Role: PI

“Synthesis and Mechanistic Studies of Peptide Antibiotics”

The major goals of this project are the synthesis and mechanistic study of peptide antibiotics that function via inhibition of late-stage enzymes involved in peptidoglycan biosynthesis. Converted to R01 AI059327 effective 12/01/04.

RESEARCH GROUP COMPOSITION/HISTORY

Current Graduate Students Lily Klapper (2017-), Jessie Gudorf (2018-), Zach Taylor (2018-), Jo Lohman (2019-), Basia Walenkiewicz (2019-), Emily Claeboe (2019-), James Lyu (2020-), Bo Leszczynski (2020-), Jamie Lin (2020-), Nolan Norman (2021-), Rohan Bhardwaj (2022-)

Current Undergraduate Students Nicole Kilzer (2021-), Grant Newman (IFLE, 2022-)

Former Graduate Students Cheryl Billstrom (MS, 2004, UCSD); Jeff Gaulin (MS, 2004, UCSD); Luis Rivera-Rios (MS, 2004, UCSD); Kimberly Schwarz (MS, 2004, UCSD); Ryan Lamer (MS, 2006, UCSD); Rebecca Harbach (MS, 2006, UCSD); Emily Rolfes (MS, 2007, UCSD); Audrey Kelleman; (PhD, 2007, UCSD); Aikomari Guzman-Martinez (PhD 2007, UCSD); Aaron Wohlrab (PhD, 2007, UCSD); Pablo Garcia-Reynaga (PhD, 2010, IU); Kevin Olivier (PhD, 2010, IU); John Tipping (MS, 2011, IU); Seth Carmody (PhD, 2011, IU); Dan Meyers (MAT, 2011, IU), Angela Carrillo (PhD, 2012, IU), Randall Binder (PhD, 2013, IU), Ruogu Peng (PhD, 2013, IU); Edward Hall (PhD, 2014, IU); Srinivas Tekkam (PhD, 2014, IU); Erkin Kuru (PhD, 2015, IU); Jonathan Rittichier (PhD 2016,

IU); Jacob Yablonowski (MS, 2017, IU), Yen-Pang Hsu (PhD, 2018, IU), Wyatt Paulishak (MS, 2020, IU), Michael MacKnight (MS, 2020, IU), Ziran Li (PhD, 2020, IU), Brennan Murphy (PhD, 2020, IU), Garrett Booher (PhD, 2020, IU).

Former Postdoctoral Associates Radha Narayan (2004-06); Jesse More (2004-05); Michael Kruppa (2005-06); Bingfeng Shi (2006-07); Chunping Xu (2007); Chun-li Cao (2008-10) Alvin Kalinda (2009-11); Erick Pasciak (2015-16); Ramakrishna De (2015-2017), Atanas Radkov (2015-2017), Yen-Pang Hsu (2018-19).

Former Undergraduate Students Felix Lin (2002); Doan T. Bui (2002-03); Mingyu Ngai (2003); Linda Le (2003); Sanaz Farhadian (2003); Karla Arias (2003-04); Jeff Bird (2004); Eliana Bukofzer (2004); Michelle Tetalman (2004-05); Tristan Beaudette (2004-05); Joseph Kubicki (2004); Christine Ta (2005); Andrew Weeks (2005); Neil Hadaegh (2005-06); Phison Pham (2006); Minas Melidonian (2006); Tyger Saltman (2006-07); Peter Yu (2006); James Jung (2006); Amit Pithadia (2008-10), Stephen Mendenhall (2008-10); Sophia Kang (STARS, 2009-11); Julie Neel (2009-11); George Venious (2009-11); Greg Lasker (2010-11); Parth Patel (2010-11); Matthew Johnson (2010-2011); Sara Rasamimari (2011-12); Jordan Jewett (STARS, 2012); Jacob Shinn (2013-14); Christian McGill (2013-14); Kevin Lettelier (STARS, 2014); Zachary Wakefield (2014-2016); Robert Lennex (2016), Alex West (2013-2017), Lucas Howell (2016-2018), Praise Kim (2016-2018), Alex Mabry (2016-2018), Zach Gentry (2016-2019), Caitlin Mulcahey (IFLE/STARS, 2016-2019), Bella Lee (2017), Emily Langella (2017), Adam Mitrevski (2017-19), Jonathan Dietrich (2017-2019), Annika Tharp (2018), Jisu Kim (2018-2020), Glara Baek (2018), Jun Young (2018), Dillon Gardner (2019-20), Malinda Jack (2019-20), Joshua Jun (2019), Wynne Milhouse (2019-20), Sophia Schneider (2019)

CONTRIBUTIONS TO THE DEPARTMENT AND THE UNIVERSITY

PhD Committee Memberships (Indiana University): Martin Walsh, PhD, 2009; Cullen Klein, PhD, 2009; Micheal Fultz, PhD, 2009; James Patterson, PhD, 2011; Elizabeth Opsitnick, PhD, 2011; Ramakrishna De, PhD, 2012; Wenjun Liu, PhD, 2012; Joseph Pinchman, PhD, 2012; Benjamin Wicker, PhD, 2012; Bruce Atwater, PhD, 2013; Johnathon Hutt, PhD, 2013; Pucheng Ke, PhD, 2013; Fese Mokube, PhD, 2013; Prolay Monday, PhD, 2013; Partha Nag, PhD, 2013; Paul Gladen, PhD, 2014; Kevin McDonald, PhD, 2014; Akshay Shah, PhD, 2014; Latisha Jefferies, PhD, 2015; Fangzhou Wu, PhD, 2016; Michael Conner, PhD, 2017; Yao Zhu, PhD, 2017; Alison Vickman, PhD, 2018; Tianyuan Peng, PhD, 2018; Keevan Marion, PhD, 2019; Seth Bawel, PhD, 2019; Paul Marcyk, PhD, 2019; Daisy Vargas, PhD, 2019; Victoria Kohout, PhD, 2019; Rush Scaggs, PhD, 2019; Chelsea Rintelman, PhD, 2020; Stephen Sardini, PhD, 2020; Erin Hancock, PhD, 2020; Chao Yang, PhD, 2020; Luke Hutchings-Goetz, PhD, 2021.

Courses Taught

2002-2003	Chemistry 254/154, Mechanisms of Organic Reactions; SPPS 221, Advanced Organic Chemistry (School of Pharmacy)
2003-2004	Chemistry 254/154, Mechanisms of Organic Reactions; SPPS 221, Advanced Organic Chemistry (School of Pharmacy); Chemistry 140B, Organic Chemistry
2004-2005	SPPS 221, Advanced Organic Chemistry (School of Pharmacy); Chemistry 140B, Organic Chemistry
2005-2006	SPPS 221, Advanced Organic Chemistry (School of Pharmacy); Chemistry 140B, Organic Chemistry
2006-2007	Chemistry 140B, Organic Chemistry

2007-2008	Chemistry 540, Advanced Organic Chemistry; Chemistry 648, Special Topics (Heterocycles)
2008-2009	Chemistry 540, Advanced Organic Chemistry
2009-2010	Chemistry 540, Advanced Organic Chemistry; Chemistry 644, Physical Organic Chemistry
2010-2011	Chemistry 540, Advanced Organic Chemistry; Chemistry 687/Biology 680, Fundamentals of Chemical Biology.
2011-2012	Chemistry 687/Biology 680, Fundamentals of Chemical Biology, R800 Organic Chemistry Research Seminar
2012-2013	Chemistry S342, Honors Organic Chemistry II; Chemistry 687/Biology 680, Fundamentals of Chemical Biology.
2013-2014	Chemistry S342, Honors Organic Chemistry II; Chemistry C342, Organic Chemistry II
2014-2015	Chemistry C540, Advanced Organic Chemistry
2015-2016	Chemistry C342, Organic Chemistry II (Fall and Spring semesters)
2016-2017	Chemistry S342, Honors Organic Chemistry II; Chemistry C342, Organic Chemistry II
2017-2018	Chemistry S342, Honors Organic Chemistry II; Chemistry C681/682, Introduction to Chemical Biology
2018-2019	Chemistry C681, Introduction to Chemical Biology I; Chemistry C682, Introduction to Chemical Biology II.
2019-2020	Chemistry C681, Introduction to Chemical Biology I; Chemistry C682, Introduction to Chemical Biology II; Chemistry C342, Organic Chemistry II
2020-2021	Chemistry C681, Introduction to Chemical Biology I; Chemistry C682, Introduction to Chemical Biology II; Chemistry C342, Organic Chemistry II
2021-2022	Chemistry C681, Introduction to Chemical Biology I; Chemistry C682, Introduction to Chemical Biology II; Chemistry C342, Organic Chemistry II

Department, Faculty and University Service/Committees

2002-2003	Graduate Admissions; Graduate Student Recruiting; Industrial Advisory Committee, NMR Committee
2003-2004	Admissions; Small Molecule NMR; Industrial Advisory Committee; Space Committee; Inorganic Search Committee; Medicinal Chem. Search Comm. (SPPS); Educational Policy and Academic Oversight Committee (SPPS)
2004-2005	Industrial Advisory Committee; Space Committee; Small Molecule NMR; Organic Chemistry Search Committee; Medicinal Chem. Search Comm. (SPPS);

	Chem/Biochem COO Search Committee; Educational Policy and Academic Oversight Committee (SPPS)
2005-2006	Space Committee; Industrial Advisory Committee; Medical Sciences Training Program Admissions Committee (UCSD School of Medicine)
2006-2007	Industrial Advisory Committee; Facilities Committee (Stockroom Subcommittee); Medical Sciences Training Program Admissions Committee (UCSD School of Medicine)
2007-2008	Graduate Admissions; Graduate Standards and Affairs; Organic Chemistry Faculty Search Committee
2008-2009	Facilities Committee (NMR); Graduate Standards & Affairs; Graduate Admissions; Organic Chemistry Faculty Search Committee
2009-2010	Facilities Committee (NMR); Graduate Standards & Affairs; Graduate Admissions; Organic Chemistry Faculty Search Committee
2010-2011	Facilities Committee (NMR); Graduate Standards & Affairs; Graduate Admissions; Organic Chemistry Faculty Search Committee; Organic Chemistry Lecturer Search Committee; Organic Chemistry Curriculum Committee
2011-2012	Facilities Committee (NMR); Graduate Standards and Affairs; Graduate Admissions
2012-2013	Facilities Committee (NMR); Graduate Standards and Affairs
2013-2014	Facilities Committee (NMR); Graduate Standards and Affairs; Diversity Affairs Committee; Hutton Honors College Faculty Fellow; Chemical Biology Faculty Recruiting (Chair)
2014-2015	Facilities Committee (NMR); Graduate Standards and Affairs; Diversity Affairs Committee; Chemical Biology Faculty Recruiting Committee
2015-2016	Facilities Committee (NMR); Graduate Standards and Affairs; Diversity Affairs Committee; Awards Committee; Chemical Biology Faculty Recruiting Committee
2016-2017	Facilities Committee (NMR); Graduate Standards and Affairs; Awards Committee; NMR Recruiting Committee
2017-2018	Facilities Committee (NMR); Graduate Standards and Affairs; Colloquium Committee
2018-2019	Facilities Committee (NMR); Colloquium Committee; Safety Committee; College of Arts and Sciences Executive Dean Search Committee; Chair, Chemistry/Molecular and Cellular Biochemistry Faculty Search Committee; Steering Committee Member Indiana University Precision Health Initiative
2019-2020	Facilities Committee (NMR); Safety Committee; Chair, Faculty Search (Precision Health Initiative) Committee; Steering Committee Member, Indiana University Precision Health Initiative
2020-2021	Colloquium Committee (Chair), Steering Committee Member, Indiana University Precision Health Initiative

2021-2022 Colloquium Committee, Graduate Standards and Affairs, Steering Committee
Member, Indiana University Precision Health Initiative, Quantitative and
Chemical Biology Training Grant (Steering Committee)