Jimmy Wu, Ph.D.

Associate Professor
Department of Chemistry • Dartmouth College
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Education:

2001 – 2005 Ph.D. in Organic Chemistry with Prof. David A. Evans
Harvard University, Cambridge, MA

1994 – 1998 A.B. in Chemistry
Princeton University, Princeton, NJ

Professional Experience:

2013 – present **Associate Professor**
Dartmouth College, Department of Chemistry, Hanover, NH

- *Phosphorothioate Esters as Useful Synthetic Intermediates*
- *Novel Annulation and Alkylation Reactions of Indole and Related Heterocycles*
- *Studies of the Nuphar Alkaloids - Potent Apoptosis-Inducing Compounds*

2007 – 2013 **Assistant Professor**
Dartmouth College, Department of Chemistry, Hanover, NH

2005 – 2007 **Postdoctoral Fellow with Professor Barry M. Trost**
Stanford University, Stanford, CA

- *Studies Towards the Total Synthesis of Communesin B*

2001 – 2005 **Graduate Research Assistant with Professor David A. Evans**
Harvard University, Cambridge, MA

- *C_2-Symmetric Sc(III)–Complexes as Chiral Lewis Acids; Catalytic Enantioselective Aldol Additions to Glyoxylate Esters*
- *A General Method for the Enantioselective Synthesis of Pantolactone Derivatives*
- *Enantioselective Rare-Earth Catalyzed Quinone Diels–Alder Reactions*
- *Asymmetric Syn-Selective Scandium-Catalyzed Ene Reactions*

1999 – 2001 **Associate Chemist**
Merck Process Research, Rahway, NJ

1997 – 1998 **Undergraduate Research with Professor Martin F. Semmelhack**
Princeton University, Princeton, NJ

Professional Appointments and Memberships:

2012 – present Molecular Therapeutics Research Program (member)
Dartmouth-Hitchcock Norris Cotton Cancer Center, Lebanon, NH

Awards and Honors:

- Douglas C. Floren Fellowship 2013
- Thieme Chemistry Journal Award 2013
- American Cancer Society – Research Scholar Grant (Jan 2013 – Dec 2016)
- NSF Career Award (Feb 2011 – Jan 2016)
- Dartmouth Junior Faculty Fellowship (Fall 2011)
- Ruth L. Kirschstein National Research Service Award for Postdoctoral Fellows (2005 – 2007)
- American Chemical Society Division of Organic Chemistry Graduate Fellowship (2004 – 2005)
- Department of Defense NDSEG Predoctoral Fellowship (2001 – 2004)
- Certificate of Distinction in Teaching, Harvard University (Fall 2003, 2004, Spring 2005)

Research Grant Activity

1. Dartmouth Chemistry Innovation Fund "In Vivo Testing of Small Molecule PCSK9 Inhibitors in Guinea Pigs" $44,813 direct (January 2016 – October 2017); PI: Jimmy Wu; (Co-Investigator: Sergio Fazio – Oregon Health and Science University)

2. NIH NIGMS – R01 (1R01GM111638-01) "Synthesis and Target Identification of Potent GLP1 Secretagogues" $1,520,000 total (April 2014 – March 2019); PI: Jimmy Wu; (Collaborator: George Holz – SUNY Upstate Medical University)

3. American Cancer Society – Research Scholar Grant (RSG-13-011-01-CDD)
   "Studies of the Nuphar Alkaloids - Potent Apoptosis-Inducing Compounds"
   $720,000 total (Jan 2013 – Dec 2016); PI: Jimmy Wu; (Collaborator: Alan R. Eastman – Geisel School of Medicine)

4. National Science Foundation – CAREER (CHE -1052824)
   "Versatility of Phosphorothioate Esters in the Synthesis of Sulfur-Containing Molecules"
   $550,000 total (Feb 2011 – Jan 2016); PI: Jimmy Wu

5. National Institutes of Health – Lung Biology COBRE
   "Optimization of a Novel Compound with Activity against MRSA and *P. Aeruginosa*"
   $50,000 total (Sept 2013 – July 2015): PI: Ambrose Cheung; OSC: Jimmy Wu

6. Burke Research Initiation Award
   "Enantioselective S_N1 Reactions"
   $25,000 total (July 2007 – June 2013); PI: Jimmy Wu

Invited Lectures:

Institutional and Companies

1. University of Nottingham – *scheduled May 5, 2017*

2. Oxford University – *scheduled May 4, 2017*

3. École Polytechnique Fédérale de Lausanne (EPFL) (March 29, 2017) – "*Synthesis and Biological Evaluation of the Nuphar Alkaloids"*

4. ETH Zürich (March 27, 2017 – "*Synthesis and Biological Evaluation of the Nuphar Alkaloids"*

5. Hunter College (Dec 2, 2016) "*Synthesis and Biological Evaluation of the Nuphar Alkaloids"*

6. Eisai Co., Ltd. (June 24, 2016) "*Synthesis and Biological Evaluation of the Nuphar Alkaloids*"

7. Holy Cross College (April 8, 2016) "*New Reactions with Indole: Targeting Type 2 Diabetes Mellitus with GLP-1 Secretagogues*"

8. SUNY Cortland (Dec 7, 2015) "*New Reactions with Indole: Targeting Type 2 Diabetes Mellitus with GLP-1 Secretagogues*"

9. University of Houston (Dec 1, 2015) "*Synthesis and Biological Evaluation of the Nuphar Alkaloids*"

10. Rice University (Nov 30, 2015) "*Synthesis and Biological Evaluation of the Nuphar Alkaloids*"

11. Bowdoin College (Sept 11, 2015) "*Synthesis and Biological Evaluation of the Nuphar Alkaloids*"

12. University of Nevada, Reno (Feb 6, 2015) "*New Reactions with Indole: Targeting Type 2 Diabetes Mellitus with GLP-1 Secretagogues*"

13. Amgen (Sept 11, 2013) "*New Annulation and Alkylation Strategies for Indole: Application to a Type 2 Diabetes Therapeutics"*

14. Hope College (Sept 6, 2013) "*New Annulation and Alkylation Strategies for Indole: Application to a Type 2 Diabetes Therapeutics"*

15. Calvin College (Sept 5, 2013) "*New Annulation and Alkylation Strategies for Indole: Application to a Type 2 Diabetes Therapeutics"*

16. University of Pittsburgh (May 30, 2013) *"Sulfur and Indole: Old Friends, New Methods"*

17. SUNY Potsdam (April 9, 2013) *"Sulfur and Indole: Old Friends, New Methods"*

18. University of Wisconsin-Madison School of Pharmacy (Mar 22, 2013) *"Sulfur and Indole: Old Friends, New Methods"*

19. UC Riverside (Mar 15, 2013) *"Sulfur and Indole: Old Friends, New Methods"*

20. University of Southern California (Mar 13, 2013) *"Sulfur and Indole: Old Friends, New Methods"*

21. Dartmouth College (Nov 8, 2012) *"Sulfur and Indole: Old Friends, New Methods"*

22. UT Austin (Oct 26, 2012) *"Sulfur and Indole: Old Friends, New Methods"*

23. UT Southwestern (Oct 25, 2012) *"Sulfur and Indole: Old Friends, New Methods"*

24. UC Davis (Oct 9, 2012) *"Sulfur and Indole: Old Friends, New Methods"*

25. UC Irvine (Oct 8, 2012) *"Sulfur and Indole: Old Friends, New Methods"*

26. Colorado State University (Aug 28, 2012) *"Sulfur and Indole: Old Friends, New Methods"*

27. Eli Lilly, Indianapolis, IN (10 July 2012) *"Sulfur and Indole: Old Friends, New Methods"*

28. Bristol-Myers Squibb: Process Research, New Brunswick, NJ (13 June 2012) *"Sulfur and Indole: Old Friends, New Methods"*

29. Bristol-Myers Squibb: Discovery Chemistry, Lawrenceville/Hopewell, NJ (12 June 2012) *"Sulfur and Indole: Old Friends, New Methods"*

30. Emory University (Mar 21, 2012) *"New Methodologies in Sulfur Chemistry"*

31. Georgia Institute of Technology (Mar 20, 2012) *"New Methodologies in Sulfur Chemistry"*

32. University of Florida (Mar 1, 2012) *"New Methodologies in Sulfur Chemistry"*

33. Florida State University (Feb 28, 2012) *"New Methodologies in Sulfur Chemistry"*

34. Wesleyan University (Feb 24, 2012) *"New Methodologies in Sulfur Chemistry"*

35. Northwestern University (Feb 9, 2012) *"New Methodologies in Sulfur Chemistry"*

36. University of Michigan (Feb 7, 2012) *"New Methodologies in Sulfur Chemistry"*

37. University of New Hampshire (Jan 24, 2012) *"New Methodologies in Sulfur Chemistry"*

38. University of Pennsylvania (Nov 21, 2011) *"New Methodologies in Sulfur Chemistry"*

39. Rutgers University (Nov 18, 2011) *"New Methodologies in Sulfur Chemistry"*

40. Boston University (Nov 7, 2011) *"New Methodologies in Sulfur Chemistry"*

41. Ohio State University (Oct 27, 2011) *"New Methodologies in Sulfur Chemistry"*

42. West Virginia University (Oct 26, 2011) *"New Methodologies in Sulfur Chemistry"*

43. Middlebury College (Oct 7, 2011) *"New Methodologies in Sulfur Chemistry"*

44. University at Albany – SUNY (Sept 20, 2011) *"New Methodologies in Sulfur Chemistry"*

45. University of Massachusetts – Boston (Sept 14, 2011) *"New Methodologies in Sulfur Chemistry"*

46. Boston College (Sept 13, 2011) *"New Methodologies in Sulfur Chemistry"*

47. Notre Dame University (May 5, 2011) *"New Methods for the Synthesis of Carbon–Sulfur Bonds"*

48. University of Vermont (March 24, 2011) *"New Methods for the Synthesis of Carbon–Sulfur Bonds"*

<u>Conferences and Symposia</u>

1. National Medicinal Chemistry Symposium, Chicago, IL, (July 29, 2016) "*Integrating OIDD into an Academic Research Program"*

2. Medicinal & Bioorganic Chemistry Foundation, Steamboat, CO, (Jan 26, 2015) "*Targeting Type 2 Diabetes with TRPA1 Agonists that are GLP-1 Secretagogues*"

3. American Association of Pharmaceutical Scientists Annual Meeting & Exposition, San Diego, CA, (November 2–6, 2014) *"Integrating OIDD into an Academic Research Program: Application to a Type 2 Diabetes Target"*

4. Gordon Research Conference in Organic Reactions and Processes, Smithfield, RI, (July 14–19, 2013) *"New Annulation and Alkylation Strategies for Indole: Application to Diabetes Therapeutics"*

5. Young Investigators Symposium (244th American Chemical Society National Meeting), Philadelphia, PA, (August 21, 2012) *"Sulfur and Indole: Old Friends, New Methods"*

6. Martin F. Semmelhack Symposium, Princeton, NJ (Nov 19, 2011) *"New Methodologies in Sulfur Chemistry"*

7. Gordon Research Conference in Heterocyclic Compounds, Newport, RI, (June 26–30, 2011) *"Exploring the Chemistry of Phosphorothioate Esters"*

8. Florida Heterocyclic and Synthetic, Gainesville, FL, (March 6–9, 2011) *"New Methods for the Synthesis of Carbon–Sulfur Bonds"*

9. Session on Synthetic Organic Methods Across the Border (SOMAB). American Chemical Society Northeast Regional Meeting, Hartford, CT (October 7–10, 2009) *"Allylic Alkylation of Alkenes and Allylic Ethers via Phosphorothioate Esters"*

10. Session on Arthur C. Cope Scholar Award Symposium. American Chemical Society Northeast Regional Meeting, Burlington, VT (June 29 – July 2, 2008) *"Recent Advances in Asymmetric Brønsted-Acid Catalysis"*

Publications (22 Dartmouth; 40 total):

Dartmouth Publications *(underlined name denotes undergraduate researcher)*

1. *"Transition Metal-Free C3 Arylation of Indoles with Aryl Halides"* Chen, J.; Wu, J. *Angew. Chem. Int. Ed.* **2017**, *56*, Early View.

2. *"Stereoselective Synthesis and Biological Evaluation of C1-Epimeric and Desmethyl Monomeric Nuphar Analogues"* Li, H.; Cooke, T. J.; Korotkov, A.; Chapman, C. W.; Eastman, A.; Wu, J. *J. Org. Chem.* **2017**, *82, ASAP.*

3. *"Synthetic Small Molecule GLP-1 Secretagogues Prepared by Means of a Three-Component Indole Annulation Strategy"* Chepurny, O. G.; Leech, C. A.; Tomanik, M.; DiPoto, M. C.; Li, H.; Han, X.; Meng, Q.; Cooney, R. N.; Wu, J.; Holz, G. G. *Sci. Rep.* **2016**, 28934.

4. *"Enantioselective Formal Syntheses of 11 Nuphar Alkaloids and Discovery of Potent Apoptotic Monomeric Analogues.* Li, H.; Korotkov, A.; Chapman, C. W.; Eastman, A.; Wu, J. *Angew. Chem. Int. Ed.* **2016**, *55*, 3509–3513.

5. *"Dearomative Indole (3+2) Reactions with Azaoxyallyl Cations – New Method for the Synthesis of Pyrroloindolines"* DiPoto, M. C.; Hughes, R. P.; Wu, J. *J. Am. Chem. Soc.* **2015**, *137*, 14861–14864.

6. *"Vinylogous Mukaiyama–Michael Reactions of Dihydropyridinones"* Li, H.; Wu, J. *Org. Lett.* **2015**, *17*, 5424–5427.

7. *"Total Syntheses and Biological Evaluation of Both Enantiomers of Several Hydroxylated Dimeric Nuphar Alkaloids"* Korotkov, A.; Li, H.; Chapman, C. W.; Xue, H.; MacMillan, J. B.; Eastman, A.; Wu, J. *Angew. Chem. Int. Ed.* **2015**, *54*, 10604–10607.

8. *"Regioselective Formal Hydroamination of Styrenes with 1-Phenyl-1H-tetrazole-5-thiol"* Savolainen, M. A.; Han, X.; Wu, J. *Org. Lett.* **2014**, *16*, 4349–4351.

9. *"Dearomative Indole (3+2) Cycloaddition Reactions"* Li, H.; Hughes, R. P.; Wu, J. *J. Am. Chem. Soc.* **2014**, *136*, 6288–6296.

10. *"Markovnikov-Selective Hydrothiolation of Styrenes: Application to the Synthesis of Stereodefined Trisubstituted Olefins"* Savolainen, M. A.; Wu, J. *Org. Lett.* **2013**, *15*, 3802–3804.

11. *"Redox Chain Reaction — Indole and Pyrrole Alkylation with Unactivated 2° Alcohols"* Han, X.; Wu, J. *Angew. Chem. Int. Ed.* **2013**, *52*, 4637–4640.

12. *"Pd-Catalyzed Allylic Fluorination of Cinnamyl Phosphorothioate Esters"* Lauer, A. M.; Wu, J. *Org. Lett.* **2012**, *14*, 5138–5141.

13. *"Ga(III)-Catalyzed Three-Component (4+3) Cycloaddition Reactions"* Han, X.; Li, H.; Hughes, R. P.; Wu, J. *Angew. Chem., Int. Ed.* **2012**, *51*, 10390–10393.

14. *"Phosphorothioic Acids and Related Compounds as Surrogates for H_2S – Synthesis of Chiral Tetrahydrothiophenes"* Robertson, F. J.; Wu, J. *J. Am. Chem. Soc.* **2012**, *134*, 2775–2780.

15. *"Cu(I)-Catalyzed, α-Selective, Allylic Alkylation Reactions between Phosphorothioate Esters and Organomagnesium Reagents"* Lauer, A. M.; Mahmud, F.; Wu, J. *J. Am. Chem. Soc.* **2011**, *133*, 9119–9123. (Highlighted in *Synfacts* **2011**, *9*, 1009)

16. *"Direct Annulation and Alkylation of Indoles with 2-Aminobenzyl Alcohols Catalyzed by TFA"* Robertson, F. J.; Kenimer, B. D.; Wu, J. *Tetrahedron* **2011**, *67*, 4327–4332 (Invited Contribution – Symposium in Print: Tetrahedron Young Investigators Award for Prof. Dean Toste)

17. *"$Ga(OTf)_3$-Catalyzed Direct Substitution of Alcohols with Sulfur Nucleophiles"* Han, X.; Wu, J. *Org. Lett.* **2010**, *12*, 5780–5782.

18. *"Convenient Synthesis of Allylic Thioethers from Phosphorothioate Esters and Alcohols"* Robertson, F.; Wu, J. *Org. Lett.* **2010**, *12*, 2668–2671.

19. *"Mild Two-Step Process for the Transition Metal-Free Synthesis of Carbon–Carbon Bonds from Allylic Alcohols/Ethers and Grignard Reagents"* Han, X.; Zhang, Y.; Wu, J. *J. Am. Chem. Soc.* **2010**, *132*, 4104–4106. (Highlighted in *Synfacts* **2010**, *6*, 700)

Reviews

20. "(3+2)-Cycloaddition Reactions of Oxyallyl Cations" Li, H.; Wu, J. *Synthesis* **2015**, *47*, 22–23.

21. "Review of Recent Advances in Nucleophilic C–F Bond-forming Reactions" Wu, J. *Tetrahedron Lett.* **2014**, *55*, 4289–4294.

22. "Diethylphosphorothioic Acid" Wu, J. *Encyclopedia of Reagents for Organic Synthesis*, **2014**, DOI: 10.1002/047084289X.rn01667

Prior Publications

23. "Stereoselective Preparation of a Cyclopentane-Based NK1 Receptor Antagonist Bearing an Unsymmetrically Substituted Sec-Sec Ether" Kuethe, J. T.; Marcoux, J.-F.; Wong, A.; **Wu, J.**; Hillier, M. C.; Dormer, P. G.; Davies, I. W.; Hughes, D. L. *J. Org. Chem.* **2006**, *71*, 7378–7390.

24. *"Asymmetric, anti-Selective Scandium-Catalyzed Sakurai Additions to Glyoxamide. Applications to the Syntheses of N-Boc d-Alloisoleucine and d-Isoleucine"* Evans, D. A.; Aye, Y.; **Wu, J**. *Org. Lett*. **2006**, *8*, 2071–2073.

25. *"Enantioselective Syn-Selective Scandium-Catalyzed Ene Reactions"* Evans, D. A.; **Wu, J**. *J. Am. Chem. Soc.* **2005**, *127*, 8006–8007.

26. *"Enantioselective Rare-Earth Catalyzed Quinone Diels–Alder Reactions"* Evans, D. A.; **Wu, J**. *J. Am. Chem. Soc.* **2003**, *125*, 10162–10163.

27. *"Enantioselective Indole Friedel–Crafts Alkylations Catalyzed by Bis(oxazolinyl)pyridine-Scandium(III) Triflate Complexes"* Evans, D. A.; Scheidt, K. A.; Fandrick, K. R.; Lam, H. W.; **Wu, J**. *J. Am. Chem. Soc.* **2003**, *125*, 10780–10781.

28. *"Unfunctionalized, α-Epimerizable Nonracemic Ketones and Aldehydes Can Be Accessed by Crystallization-Induced Dynamic Resolution of Imines"* Kosmrlj, J.; Weigel, L. O.; Evans, D. A.; Downey, W. C.; **Wu, J**. *J. Am. Chem. Soc.* **2003**, *125*, 3208–3209.

29. *"A General Method for the Enantioselective Synthesis of Pantolactone Derivatives"* Evans, D. A.; **Wu, J**.; Masse, C. E.; MacMillan, D. W. C. *Org. Lett.* **2002**, *4*, 3379–3382.

30. *"C_2-Symmetric Sc(III)–Complexes as Chiral Lewis Acids. Catalytic Enantioselective Aldol Additions to Glyoxylate Esters"* Evans, D. A.; Masse, C. E.; **Wu, J**. *Org. Lett.* **2002**, *4*, 3375–3378.

31. *"Asymmetric Synthesis of 1,2,3-Trisubstituted Cyclopentanes and Cyclohexanes as Key Components of Substance P Antagonists"* Kuethe, J. T.; Wong, A.; **Wu, J**.; Davies, I. W.; Dormer, P. G.; Welch, C. J.; Hillier, M. C.; Hughes, D. L.; Reider, P. J. *J. Org. Chem.* **2002**, *67*, 5993–6000.

32. *"β-Regioselective Intermolecular Heck Arylation of N,N-Disubstituted Allylamines"* **Wu, J**.; Marcoux, J.-F.; Davies, I. W.; Reider, P. J. *Tetrahedron Lett.* **2001**, *42*, 159–162.

33. *"Experimental and Theoretical Studies on the Oxidative Addition of Palladium (0) to β-Chlorovinamidium Salts"* Davies, I. W.; **Wu, J**.; Marcoux, J.-F.; Taylor, M.; Hughes, D.; Reider, P. J.; Deeth, R. J. *Tetrahedron* **2001**, *57*, 5061–5066.

34. *"A General Preparation of Pyridines and Pyridones Via the Annulation of Ketones and Esters"* Marcoux, J.-F.; Marcotte, F.-A.; **Wu, J**.; Dormer, P. G.; Davies, I. W.; Hughes, I. W.; Reider, P. J. *J. Org. Chem.* **2001**, *66*, 4194–4199.

35. *"Preparation and Novel Reduction Reactions of Vinamidinium Salts"* Davies, I. W.; Taylor, M.; Marcoux, J.-F.; **Wu, J**.; Dormer, P. G.; Hughes, D.; Reider, P. J. *J. Org. Chem.* **2001**, *66*, 251–255.

36. *"Stereoselective Hydrogen Bromide-Promoted Hydrogenation of an α-Hydroxy Oxime"* Davies, I. W.; Taylor, M.; Marcoux, J.-F.; Matty, L.; **Wu, J**.; Hughes, D.; Reider, P. J. *Tetrahedron Lett.* **2000**, *41*, 8021–8025.

37. *"A Practical Synthesis of a COX-2-Specific Inhibitor"* Davies, I. W.; Marcoux, J.-F.; Corley, E. G.; Journet, M.; Cai, D.-W.; Palucki, M.; **Wu, J**.; Larsen, R. D.; Rossen, K.; Pye, P. J.; DiMichele, L.; Dormer, P.; Reider, P. J. *J. Org. Chem.* **2000**, *65*, 8415–8420.

38. *"Annulation of Ketones with Vinamidinium Hexafluorophosphate Salts: An Efficient Preparation of Trisubstituted Pyridines"* Marcoux, J.-F.; Corley, E. G.; Rossen, K.; Pye, P.; **Wu, J**.; Robbins, M. A.; Davies, I. W.; Larsen, R. D.; Reider, P. J. *Org. Lett.* **2000**, *2*, 2339–2341.

39. *"An Efficient Preparation of Vinamidinium Hexafluorophosphate Salts"* Davies, I. W.; Marcoux, J.-F.; **Wu, J**.; Palucki, M.; Corley, E. G.; Robbins, M. A.; Tsou, N.; Ball, R. G.; Dormer, P.; Larsen, R. D.; Reider, P. J. *J. Org. Chem.* **2000**, *65*, 4571–4574.

40. *"Carboranophanes"* Barnett-Thammattoor, L.; **Wu, J**.; Ho, D. M.; Jones, M., Jr. *Tetrahedron Lett.* **1996**, *37*, 7221–7224.

Poster Presentations:

1. Gordon Research Conference in Heterocyclic Compounds, Newport, RI (June 19 – 24, 2016) Wu, J.; Li, H.; Korotkov, A.; Chapman, C. W.; Eastman, A. *"First Apoptotically Active Nuphar Alkaloids"*

2. Gordon Research Conference in Medicinal Chemistry, New London, NH, (Aug 2 – 7, 2015) Wu, J.; Chepurny, O. G.; Leech, C.; Tomanik, M.; DiPoto, M. C.; Holz, G. G. *"Targeting Type 2 Diabetes with GLP-1 Secretagogues"*

3. Gordon Research Conference in Organic Reactions and Processes, Lewiston, ME, (July 19 – 24, 2015) Wu, J.; Korotkov, A.; Li, H.; Chapman, C. W.; Xue, H.; MacMillan, J. B.; Eastman, A. *"Total Synthesis of Dimeric Nuphar Alkaloids"*

4. Gordon Research Conference in Organic Reactions and Processes, Smithfield, RI, (July 13–17, 2014) Wu, J.; Li, H.; Hughes, R. P. *"Dearomative (3+2) Indole Annulation Reactions"*

5. Gordon Research Conference in Organic Reactions and Processes, Smithfield, RI (June 15 – 20, 2012) Wu, J.; Han, X.; Lauer, A. M.; Robertson, F. J.; Li, H.; Hughes, R. P. *"Sulfur and Indole: Old Friends, New Methods"*

6. Gordon Research Conference in Heterocyclic Compounds, Newport, RI (June 26 – 30, 2011) Wu, J.; Lauer, A. M.; Robertson, F. J.; Han, X. *"Exploring the Chemistry of Phosphorothioate Esters"*

7. Gordon Research Conference Natural Products, Tilton, NH (July 25 – July 30, 2010) Wu, J.; Robertson, F.; Han, X.; Savolainen, M.; Lauer, A. *"Phosphorothioate Esters in Synthesis"*

8. Gordon Research Conference in Heterocyclic Compounds, Newport, RI (June 28 – July 3, 2009) Wu, J.; Zhang, Y.; Han, X. *"Uncatalyzed Synthesis of C–C Bonds from Allylic Ethers/Alcohols"*

Patents

1) *U.S. Provisional Patent Filing* – Methods of Inhibiting PCSK9. U.S. Provisional Patent Application 62/442,196; January 04, 2017.

2) *Patent Granted* (March 21, 2017): Method for Synthesizing Cycloalkanyl[*b*]indoles, Cycloalkanyl[*b*]benzofurans, Cycloalkanyl[*b*]benzothiophenes, Compounds and Methods of Use. Application number: 14/537,154.

3) *U.S. Provisional and PCT* – Antibiotic Compositions. U.S. Provisional Patent Application number: 62/291,843; filed February 05, 2016. PCT Patent Filing number: PCT/US2017/016378.

4) *EPO Patent Filing* - Method for Synthesizing Cycloalkanyl[b]indoles, Cycloalkanyl[b]benzofurans, Cycloalkanyl[b]benzothiophenes, Compounds and Methods of Use. EPO Patent Application 13794752.9, Dec 22, 2014.

5) *Japanese Patent Filing* - Method for Synthesizing Cycloalkanyl[b]indoles, Cycloa kanyl[b]benzofurans, Cycloalkanyl[b]benzothiophenes, Compounds and Methods of Use. Japanese Patent Application 2015-514140, Nov 21, 2014.

6) U.S. Provisional - Compounds, Compositions and Methods for Treating Bacterial Infections. U.S. Provisional Patent Application No. 61/917,000; Dec 17, 2013.

7) *Patent Granted:* Hydrothiolation of Unactivated Alkenes. Patent Application Number. 61/389,804; October 5, 2010. PCT Application Number. PCT/US2011/053571; September 28, 2011.