

## ***Curriculum Vitae***

### **Dr. Wei-chen Chang**

Department of Chemistry  
North Carolina State University  
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#### Research Area

Through mechanistic investigation of novel biological transformations, my research focuses on elucidating reaction mechanisms and apply this knowledge to the (bio)synthesis of small molecules and potential inhibitors.

#### **EDUCATION**

2011 - 2014

##### **Postdoctoral Research**

Department of Chemistry, The Pennsylvania State University, University Park, PA, USA

Mentor: J. Martin Bollinger, Jr., Ph.D. and Carsten Krebs, Ph.D.

2005.09 - 2011.07

##### **Doctoral Research**

Division of Medicinal Chemistry, College of Pharmacy, The University of Texas at Austin, Austin, TX, USA

Mentor: Hung-wen Liu, Ph.D.

1999 - 2003

##### **Bachelor of Science (B.S)**

Department of Agricultural Chemistry, National Taiwan University, Taipei, Taiwan  
Undergraduate Research Training and Thesis (03. 2002-06.2003)

Mentor: Tien-Yau Luh, Ph.D.

#### **PRIMARY APPOINTMENTS**

2016 - present

##### **Assistant Professor**

Department of Chemistry, North Carolina State University, Raleigh, NC, USA

2014 - 2015

##### **Research Associate**

Department of Chemistry, The Pennsylvania State University, University Park, PA, USA

2011 - 2014

##### **Postdoctoral Fellow**

Department of Chemistry, The Pennsylvania State University, University Park, PA, USA

2007 - 2011

##### **Research Assistant**

Division of Medicinal Chemistry, College of Pharmacy, The University of Texas at Austin, Austin, TX, USA

2005 - 2007	<b>Teaching Assistant</b> Division of Medicinal Chemistry, College of Pharmacy. Department of Chemistry and Biochemistry, The University of Texas at Austin
2003 - 2005	<b>Sergeant (Obligatory Military Service)</b> Kinmen Defensive Center, Taiwanese Army, Kinmen, Taiwan
2002 - 2003	<b>Undergraduate Research Assistant</b> Institute of Chemistry, Academia Sinica, Taipei, Taiwan

## ACADEMIC AWARDS & HONORS

2020	ACS, 2020 Academic Young Investigator (Division of Organic Chemistry)
2019	Faculty Early Career Development Program (CAREER) Award: National Science Foundation
2016	Faculty Research and Professional Development Program Award, North Carolina State University
2015	Founders Award for the 2015 Enzyme Mechanisms Conference
2010 - 2011	Vice President of Pharmacy Graduate Student Association, College of Pharmacy, University of Texas at Austin
2009	Dr. Jerry and Joan Fineg Student Professional Development Endowment. Austin, TX.
2008 - 2010	Jaime N. Delgado Endowed Graduate Fellowship in Medicinal Chemistry (3 times), Austin, TX.
2003	National Science Council Undergraduate Fellowship, Taiwan
2000	Taiwan Petroleum Corporation Scholarship, Taiwan
1999 - 2003	President's Award in National Taiwan University (4 times), Taipei, Taiwan

## PUBLICATIONS

### Independent Career Publication:

#### Book Chapter and Review Article

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| 46 | Cha, L.; Tang, Y.; Guo, Y.; <u>*Chang, W.-c.</u> "Olefin, nitrile and isonitrile installation catalyzed by metalloenzymes" Comprehensive Natural Products III: Chemistry and Biology.                             |
| 45 | Zhang, J.; Fan, P.-C.; Lin, G.-M., <u>Chang, W.-c.</u> ; Liu, W.-w. "Recent Progress in Unusual Carbohydrate-Containing Natural Products Biosynthesis" Comprehensive Natural Products III: Chemistry and Biology. |
| 44 | Guo, Y.; <u>*Chang, W.-c.</u> ; Li, J.; Davidson, M. "Non-Heme Mono-Iron Enzymes: Co-Substrate Independent Dioxygen Activation" Chemistry for Comprehensive Coordination Chemistry III.                           |
| 43 | Guo, Y.; <u>*Chang, W.-c.</u> ; Li, J.; Davidson, M. "Non-Heme Mono-Iron Enzymes: Co-Substrate Dependent Dioxygen Activation" Chemistry for Comprehensive Coordination Chemistry III.                             |

(Peer-reviewed)

- 42 Cha, Lide; Milikisiyants, S.; Davidson, M.; Xue, S.; Smirnova, T. I.; Smirnov, A. I.; Guo, Y.; \*Chang, W.-c. "Alternative Reactivity of Leucine 5-Hydroxylase Using an Olefin-Containing Substrate to Construct a Substituted Piperidine Ring." *Biochemistry*, **2020**, 59, 1961-1965. (**selected as the journal cover**).
- 41 Li, J.; Liao, H.-J.; Tang, Y.; Cha, L.; Lin, T.-S.; Lee, J.-L.; Kurnikov, I.; Kurnikova, M.; \*Chang, W.-c.; Chan, N.-L.; Guo, Y. "Epoxidation Catalyzed by the Nonheme Iron(II)- and 2-Oxoglutarate-Dependent Oxygenase, AsqJ: Mechanistic Elucidation of Oxygen Atom Transfer by a Ferryl Intermediate" *J. Am. Chem. Soc.* **2020**, 142, 6268-6284. (**selected as the journal cover**)
- 40 Chen, T.-Y.; Chen, J.; Tang, Y.; Zhou, J; Guo, Y.; \*Chang, W.-c. "Pathway from N-alkylglycine to Alkylisonitrile Catalyzed by Iron(II) and 2-Oxoglutarate-Dependent Oxygenases" *Angew. Chem. Int. Ed.* **2020**, 59, 7367-7371.
- 39 Thibodeaux, C. J.; Chang, W.-c.; Liu, W.-w. "Unraveling flavoenzyme reaction mechanisms using flavin analogues and linear free energy relationships" *Methods Enzymol.* **2019**, 620, 167-188.
- 38 Davidson, M.; McNamee, M.; Fan, R.; Guo, Y.; \*Chang, W.-c. "Repurposing Nonheme Iron Hydroxylases to Enable Catalytic Nitrile Installation through an Azido Group Assistance" *J. Am. Chem. Soc.* **2019**, 141, 3419-3423.
- 37 \*Chang, W.-c.; Yang, Z.-J.; Tu, Y.-H.; Chein, T.-C. "Reaction Mechanism of a Nonheme Iron Enzyme Catalyzed Oxidative Cyclization via C-C Bond Formation" *Org. Lett.*, **2019**, 21, 228-232.
- 36 Yu, C.-P.; Tang, Y.; Cha, L.; Milikisiyants, S.; Smirnova, T. I.; Smirnov, A. I.; Guo, Y.; \*Chang, W.-c. "Elucidating the Reaction Pathway of Decarboxylation-Assisted Olefination Catalyzed by a Mononuclear Non-Heme Iron Enzyme" *J. Am. Chem. Soc.* **2018**, 140, 15190-15193.
- 35 \*Chang, W.-c.; Liu, P.; Guo, Y. "Mechanistic Elucidation of Two Catalytically Versatile Iron(II) and  $\alpha$ -Ketoglutarate Dependent Enzymes: Cases Beyond Hydroxylation" *Comments on Inorganic Chemistry* **2018**, 38, 127-165.
- 34 Huang, J.-L.; Tang, Y; Yu C.-P.; Sanyal, D.; Jia, X.; Liu, X.; Guo, Y.; \*Chang, W.-c. "Mechanistic Investigation of Oxidative Decarboxylation Catalyzed by Two Iron(II)- and 2-Oxoglutarate-Dependent Enzymes." *Biochemistry* **2018**, 57, 1838-1841.
- 33 Liao, H.-J.; Li, J.; Huang, J.-L.; Davidson, M.; Kurnikov, I.; Lin, T.-S.; Lee, L. L.; Kurnikova, M.; Guo, Y.; Chan, N.-L.; \*Chang, W.-c. "Insights into desaturation of cyclopeptin and its C3-epimer catalyzed by a non-heme iron enzyme: structural characterization and mechanism elucidation." *Angew. Chem. Int. Ed.* **2018**, 57, 1831-1835.
- 32 \*Chang, W.-c.; Sanyal, D.; Huang, J.-L.; Ittiamornkul, K.; Zhu, Q.; Liu, X. "In Vitro Stepwise Reconstitution of Amino Acid Derived Vinyl Isocyanide Biosynthesis: Detection of an Elusive Intermediate." *Org. Lett.* **2017**, 19, 1208-1211.
- 31 \*Chang, W.-c.; Li, J.; Lee, J. L.; Cronican, A. A.; Guo, Y. "Mechanistic Investigation of a Non-Heme Iron Enzyme Catalyzed Epoxidation in (-)-4'-Methoxycyclophenin Biosynthesis." *J. Am. Chem. Soc.* **2016**, 138, 10390-10393.

**Publication Prior to Independent Career:**

- 30 Rajakovich, L. J.; Pandelia, M., Mitchell A. J; Chang, W.-c.; Zhang, B.; Boal, A. K.; Krebs, C.; Bollinger, J. M., Jr. "A new microbial pathway for organophosphonate degradation catalyzed by two previously misannotated non-heme-iron oxygenases" *Biochemistry*, **2019**, 58, 1627-1647.

- 29 Ushimaru, R.; Ruzsyczky, M. W.; Chang, W.-c.; Yan, F.; Liu, Y.-n.; Liu, H.-w. "Substrate Conformation Correlates with the Outcome of Hyoscyamine 6 $\beta$ -Hydroxylase Catalyzed Oxidation Reactions" *J. Am. Chem. Soc.* **2018**, *140*, 7433-7436.
- 28 Dunham, N. P.; Chang, W.-c.; Mitchell A. J.; Martinie, R. J.; Zhang, B.; Bergman, J. A.; Rajakovich, L. J.; Wang, B.; Silakov, A.; Krebs, C.; Boal, A. K.; Bollinger, J. M., Jr. "Two Distinct Mechanisms for C–C Desaturation by Iron(II)- and 2-(Oxo)glutarate-Dependent Oxygenases: Importance of  $\alpha$ -Heteroatom Assistance" *J. Am. Chem. Soc.* **2018**, *140*, 7116-7126. (Dunham, N. P. and Chang, W.-c. contribute equally)
- 27 Rose, H.; Ghosh, M.; Maggiolo, A.; Pollock, C. J.; Blaesi, E. J.; Hajj, V.; Wei, Y.; Rajakovich, L. J.; Chang, W.-c.; Han, Y.; Hajj, M.; Keerbs, C.; Silakov, A.; Pandelia, M.; Bollinger, J. M., Jr.; Boal, A. K. "Structural Basis for Superoxide Activation of Flavobacterium johnsoniae Class I Ribonucleotide Reductase and for Radical Initiation by its Dimanganese Cofactor" *Biochemistry*, **2018**, *57*, 2679-2693
- 26 Pan, J.; Bhardwaj, M.; Zhang, B.; Chang, W.-c.; Schardl, C. L.; Krebs, C.; Grossman, R. B.; Bollinger, J. M., Jr. "Installation of the Ether Bridge of Lolines by the Iron- and 2-Oxoglutarate-Dependent Oxygenase, LolO: Regio- and Stereochemistry of Sequential Hydroxylation and Oxacyclization Reactions" *Biochemistry*, **2018**, *57*, 2074-2083.
- 25 Mitchell, A.J.; Dunham, N. P.; Bergman, J. A.; Wang, B.; Zhu, Q.; Chang, W.-c.; Liu, X.; Boal, A. K. "Structure-Guided Reprogramming of a Hydroxylase To Halogenate Its Small Molecule Substrate" *Biochemistry*, **2017**, *56*, 441-444.
- 24 Tamanaha, E.; Zhang, B.; Guo, Y.; Chang, W.-c.; Barr, E. W.; Xing, G.; Clair, J. St.; Ye, S.; Neese, F.; Bollinger, J. M., Jr.; Krebs, C. "Spectroscopic Evidence for the Two C–H-Cleaving Intermediates of Aspergillus nidulans Isopenicillin N Synthase." *J. Am. Chem. Soc.* **2016**, *138*, 8862-8874.
- 23 Boal, A. K.; Bollinger, J. M.; Chang, W.-c. "Assembly of the Unusual Oxacycles in the Orthosomycin Antibiotics." *Proc. Natl. Acad. Sci.* **2015**, *112*, 11989-11990.
- 22 Rajakovich, L.J.; Nørgaard, H.; Warui, D.M.; Chang, W.-c.; Li, N.; Booker, S.J.; Krebs, C.; Bollinger, J.M.; Pandelia, M.E. "Rapid Reduction of the Diferric-Peroxyhemiacetal Intermediate in Aldehyde-Deformylating Oxygenase by a Cyanobacterial Ferredoxin: Evidence for a Free-Radical Mechanism." *J. Am. Chem. Soc.* **2015**, *137*, 11695-11709.
- 21 Bollinger, J. M., Jr.; Chang, W.-c.; Matthews, M. L.; Martinie, R. J.; Boal, A. K.; Krebs, C. "Chapter 3 Mechanisms of 2-Oxoglutarate-Dependent Oxygenases: the Hydroxylation Paradigm and Beyond." *Royal Society of Chemistry*, **2015**, 95-122.
- 20 Martinie, R. J., Livada, J., Chang, W.-c.; Green, M. T., Krebs, C., Bollinger, J. M., Jr.; Silakov, A. "Experimental correlation of substrate position with reaction outcome in the aliphatic halogenase, SyrB2." *J. Am. Chem. Soc.* **2015**, *137*, 6912-6919.
- 19 \*Chang, W.-c.; Guo, Y.; Wang, C.; Butch, S. E.; Rosenzweig, A.C.; Boal, A. K.; Krebs, C.; Bollinger, J. M., Jr. "Mechanism of C5 Stereo-inversion Reaction in the Biosynthesis of Carbapenem Antibiotics." *Science*, **2014**, *343*, 1140-1114.
- 18 Huang, H.; Chang, W.-c.; Romo, A.; Pai, P.-j.; Russell, D. H.; Liu, H.-w. "Stereochemical Consequence of the Reaction of the Mononuclear Non-heme Iron Enzyme HppE with 2-Hydroxy-3-methylenecyclopropyl Radical Clock Substrates." *J. Am. Chem. Soc.* **2014**, *136*, 2944-2947. (Huang, H. and Chang, W.-c. contribute equally)
- 17 Matthews, M. L.; Chang, W.-c.; Layne, A. P.; Miles, L.A.; Krebs, C.; Bollinger, J. M., Jr. "Direct Nitration

- and Azidation of Aliphatic Carbons by an Iron-Dependent Halogenase." *Nat. Chem. Biol.* **2014**, *10*, 209-215.
- 16 Pandelia, M. E.; Li, N.; Nørgaard, H.; Warui, D. M.; Rajakovich, L. J.; Chang, W.-c.; Booker, S. J.; Krebs, C.; Bollinger, J. M., Jr. "Substrate-Triggered Addition of Dioxygen to the Diferrous Cofactor of Aldehyde-Deformylating Oxygenase to Form a Diferric-Peroxide Intermediate." *J. Am. Chem. Soc.* **2013**, *135*, 15801-15812.
- 15 Wang, C.; Chang, W.-c.; Guo, Y.; Huang, H.; Peck, S. C.; Pandelia, M. E.; Lin, G.-M.; Liu, H.-w.; Krebs, C.; Bollinger, J. M., Jr. "Evidence that the Fosfomycin-Producing Epoxidase, HppE, Is a Non-Heme-Iron Peroxidase." *Science*, **2013**, *342*, 991-995.
- 14 Chang, W.-c.; Song, H.; Liu, H.-w.; Liu, P. "Current Development in Isoprenoid Precursor Biosynthesis and Regulation." *Curr. Opin. Chem. Biol.* **2013**, *17*, 571-579.
- 13 Zhao, L.; Chang, W.-c.; Xiao, Y.; Liu, H.-w.; Liu, P. "Methylerythritol Phosphate Pathway: Mechanism, Regulation, and Metabolic Engineering." *Annu. Rev. Biochem.* **2013**, *82*, 497-530.
- 12 Chang, W.-c.; Manssorabadi, S. O.; Liu, H.-w. "Reaction of HppE with Substrate Analogues: Evidence for Carbon-Phosphorus Bond Cleavage by a Carbocation Rearrangement." *J. Am. Chem. Soc.* **2013**, *135*, 8153-8156.
- 11 Chang, W.-c.; Liu, P.; Dey, M.; Manssorabadi, S. O.; Moon, S.-J.; Zhao, Z.; Drennan, C. L.; Liu, H.-w. "Mechanistic Studies of an Unprecedented Enzyme-Catalyzed 1,2-Phosphono Migration Reaction." *Nature*, **2013**, *496*, 114-118.
- 10 Thibodeaux, C. J.; Chang, W.-c.; Liu, H.-w. "Determining the Role of the Reduced FMN Coenzyme in the Reaction Catalyzed by the Type II Isopentenyl Diphosphate:Dimethylallyl Diphosphate Isomerase (IDI-2)." *In Proceedings of the 17th International Symposium of Flavins and Flavoproteins*. Miller, S., Hille, R., Palfey, B., Cecchini, G. Eds.; Alan R. Liss: New York, **2013**, 21-32.
- 9 Li, N.; Chang, W.-c.; Warui, D. M.; Booker, S. J.; Krebs, C.; Bollinger, J. M., Jr. "Evidence for Only Oxygenated Cleavage of Aldehyde to Alk(a/e)nes and Formate by Cyanobacterial Aldehyde Decarbonylase." *Biochemistry*, **2012**, *51*, 7908-7916.
- 8 Huang, H.; Chang, W.-c.; Pai, P.-j.; Romo, A.; Manssorabadi, S. O.; Russell, D. H.; Liu, H.-w. "Evidence for Radical-Mediated Catalysis by HppE – A Study Using Cyclopropyl and Methylene-cyclopropyl Substrate Analogues." *J. Am. Chem. Soc.* **2012**, *134*, 16171-16174. (Huang, H. and Chang, W.-c. contribute equally)
- 7 Thibodeaux, C. J.; Chang, W.-c.; Liu, H.-w. "Enzymatic Chemistry of Cyclopropane, Epoxide, and Aziridine Biosynthesis." *Chem. Rev.* **2012**, *112*, 1681-1709.
- 6 Sun, H. G.; Ruzsyczky, M. W.; Chang, W.-c.; Thibodeaux, C. J.; Liu, H.-w. "Nucleophilic Participation of the Reduced Flavin Cofactor in the Mechanism of UDP-Galactopyranose Mutase." *J. Biol. Chem.* **2012**, *287*, 4602-4608.
- 5 Chang, W.-c.; Xiao, Y.; Liu, H.-w.; Liu, P. "Mechanistic Studies of IspH-catalyzed Reaction: Elucidation of the Mode of Substrate Binding and Protonation." *Angew. Chem. Int. Ed.* **2011**, *50*, 12304-12307.
- 4 Xiao, Y.; Chang, W.-c.; Liu, H.-w.; Liu, P. "An Examination of IspH, A Key Enzyme In the Deoxyxylulose Phosphate Pathway, with Fluorosubstituted Substrate Analogues: Insight into Substrate Binding and Catalysis." *Org. Lett.* **2011**, *13*, 5912-5915.

- 3 Thibodeaux, C. J.; Chang, W.-c.; Liu, H.-w. "Linear Free Energy Relationships Demonstrate a Catalytic Role for the Flavin Mononucleotide Coenzyme of the Type II Isopentenyl Diphosphate: Dimethylallyl Diphosphate Isomerase." *J. Am. Chem. Soc.* **2010**, *132*, 9994-9996.
- 2 Munos, J. W.; Moon, S.-J.; Mansoorabadi, S. O.; Chang, W.-c.; Hong, L.; Yan, F.; Liu, A.; Liu, H.-w. "Purification and Characterization of the Epoxidase Catalyzing the Formation of Fosfomycin from *Pseudomonas syringae*." *Biochemistry*, **2008**, *47*, 8726-35.
1. Thibodeaux, C. J.; Mansoorabadi, S. O.; Kittleman, W.; Chang, W.-c.; Liu, H.-w. "Evidence for the Involvement of Acid/Base Chemistry in the Reaction Catalyzed by the Type II Isopentenyl Diphosphate/Dimethylallyl Diphosphate Isomerase from *Staphylococcus aureus*" *Biochemistry*, **2008**, *47*, 2547-2558.

## RESEARCH PRESENTATIONS

### Conference

1. Chang, W.-c.; Liu, H.-w. Investigation of the HPP Epoxidase Mechanism Using Isotopically Labeled Substrates. Gordon Research Conference 2009. Enzyme, Coenzyme and Metabolic Pathway
2. Chang W.-c.; Liu P.; Moon S-J; Zhao Z.; Liu, H.-w. Mechanistic Study of An Usual Carbon-Phosphorus Bond Rearrangement Reaction Catalyzed by HPP Epoxidase. vi<sup>th</sup> Annual Louis C. Littlefield Celebrating Pharmacy Research Excellence Day 2010
3. Chang W.-c.; Liu P.; Moon S-J; Zhao Z.; Liu, H.-w. An Unusual Carbon-Phosphorus Bond Rearrangement Reaction Catalyzed by HPP Epoxidase. Texas Enzyme Conference 2010
4. Chang, W.-c.; Xiao, Y.; Liu, H.-w.; Liu, P. Elucidating IspH-catalyzed Reductive Deoxygenation Mechanisms. ix<sup>th</sup> Annual Louis C. Littlefield Celebrating Pharmacy Research Excellence Day 2011
5. Chang, W.-c.; Wang, C.; Krebs, C.; Bollinger, J. M., Jr. Involvement of Tyrosyl Radicals in the Sequential Epimerization and Dehydrogenation Reactions Catalyzed by Carbapenem Synthase. Gordon Research Conference 2012. Protein cofactors, Radicals and Quinones
6. Xiao, Y.; Chang, W.-c.; Freel Meyers C. L.; Liu, H.-w.; Liu, P. Mechanism Studies of Two Reductive Dehydration Reactions in the Deoxyxylose Phosphate Pathway with the Approach of Isotopic Labeled Mechanistic Probes. Gordon Research Conference 2012. Protein cofactors, Radicals and Quinones
7. Chang, W.-c.; Miles, L.A.; Layne, A. P.; Krebs, C.; Bollinger, J. M., Jr.; Matthews, M. L. Expanding the Repertoire of Ferryl-Initiated Radical Group Transfer Reactions in the Aliphatic Halogenase, SyrB2. Gordon Research Conference 2013. Metals in Biology
8. Chang, W.-c.; Non-Haem Iron Enzymes in the Biosynthesis of Bioactive Natural Products. International Conference on Bioinorganic Chemistry (ICBIC) 2013
9. Chang, W.-c.; The Essential Stereoinversion in Carbapenem Biosynthesis (2): Mechanistic Implications. Frontiers in Metallobiochemistry Summer Symposium 2014
10. Chang, W.-c.; Guo, Y.; Wang, C.; Butch, S. E.; Rosenzweig, A.C.; Boal, A. K.; Krebs, C.; Bollinger, J. M., Jr. Mechanism of the C5 Stereoinversion Reaction in the Biosynthesis of Carbapenem Antibiotics. Gordon Research Conference 2014. Enzymes, Coenzymes and Metabolic Pathways
11. American Chemical Society (ACS) Central Regional Meeting 2014, Invited Seminar, Stereoinversion Reaction Mechanism and Beyond in the Biosynthesis of Carbapenem Antibiotics.
12. 24<sup>th</sup> Enzyme Mechanisms Conference (EMC-24) 2015, The Founder's Travel Award Presentation,

- Demystifying the Chemical Magic of Non-heme-iron Enzymes in Natural Product Biosynthesis.
13. 10<sup>th</sup> ISCMC 2016, Invited Seminar, Reveal Stereoinversion Reaction Logic in the Biosynthesis of Carbapenem Antibiotics and Beyond.
  14. 14<sup>th</sup> ISCOG 2016, Invited Seminar, Elucidating Chemical Logic of Non-heme-iron Enzymes Catalyzed Non-canonical Oxidative Modification.
  15. SIMB 2017, Invited Seminar, Revealing the Chemical logic of Diverse Mononuclear Non-heme Iron Enzyme Catalysis in Natural Products Assembly.
  16. CCCE 2020, Invited Seminar, Demystify Chemical Logic of Fe/2OG Enzyme Catalyzed Reaction in Natural Product Biosynthesis.
  17. ACS 2020, Academic Young Investigator's Symposium (Division of Organic Chemistry), Demystify chemical logics of Fe/2OG enzyme catalyzed reactions in natural product biosynthesis and beyond.

#### **Invited Research Talk**

18. National Taiwan Normal University, Invited Seminar, Taipei, Taiwan, January 21, 2016
19. National Taiwan University, Invited Seminar, Taipei, Taiwan, January 22, 2016
20. Kaohsiung Medical University, Invited Seminar, Kaohsiung, Taiwan, May 24, 2016
21. National Chung Hsing University, Invited Seminar, Taichung, Taiwan, December 12, 2016
22. Department of Biochemistry, North Carolina State University, Invited Seminar, February, 17, 2017
23. Kaohsiung Medical University, Invited Seminar, Kaohsiung, Taiwan, March 7, 2018
24. East China Normal University, Invited Seminar, Shanghai, China, May 16, 2018
25. Fudan University, Shanghai, Invited Seminar, China, May 17, 2018
26. Jong Tong University, Shanghai, Invited Seminar, China, May 18, 2018
27. Shanghai Institute of Organic Chemistry, Chinese Academy of Sciences, Invited Seminar, Shanghai, China, May 21, 2018
28. Department of Molecular and Structural Biochemistry, North Carolina State University, Invited Seminar, October, 18, 2018
28. National Taiwan University, Invited Seminar, Taipei, Taiwan, May 13, 2019
29. National Taiwan Normal University, Invited Seminar, Taipei, Taiwan, May 14, 2019
30. National Chiayi University, Invited Seminar, Chiayi, Taiwan, May 16, 2019
31. Wake Forest University, North Carolina, October, 2019
32. Department of Plant and Microbial Biology, North Carolina State University, Invited Seminar, February, 2020
33. Eli Lilly, Invited Seminar, July, 2020

#### **TEACHING, MENTORING & PROFESSIONAL SERVICE**

##### **Teaching**

Organic Chemistry (CH223), Physical Methods in Organic Chemistry (CH725)

##### **Mentoring**

Mentored: 1 Ph.D., 3 Master, 5 undergraduate students, 1 Postdoctoral scholar and 2 exchange scholars.

- Dr. Madison Davidson, Ph. D. 2020, KBI Biopharma
- Chi-Ti Peng, exchange scholar 2020, Greenfiltec, Taiwan
- Meredith McNamee, undergraduate 2019, UNC Chapel Hill, Ph.D. program in Chemistry
- Dev Sanyal, M.S. 2018, Catalent Pharma Solutions
- Dominick Ali, M.S. 2017, Wake Technical Community College
- Justin Dicks, M.S. 2017, Pfizer
- Nicole Wagner, Undergraduate, 2017, Ohio State University, Ph.D. program in Biochemistry
- Dr. Jhih-Liang (Scott) Huang, Postdoc 2017, Industrial Technology Research Institute, Taiwan

Mentoring: 2 Ph.D. students and 2 Postdoctoral scholars.

#### **Professional service**

Society for Industrial Microbiology and Biotechnology, 2019 annual meeting, section chair (New Enzymology in Natural Product Biosynthesis)

Outreach activity, Science Express, SanLee Middle School, Lee County, NC (led ~ 100 students in a hands-on class to demonstrate concept of catalysis and its application)

#### **AD HOC REVIEWER**

ACS Chemical Biology, ACS Sustainable Chemistry & Engineering, Biochemistry, Bioorganic & Medicinal Chemistry, Journal of the American Chemical Society, Journal of Taibah University for Science, Nature Communications, Natural Product Reports, Organic Letters, Process Biochemistry, Proceedings of the National Academy of Sciences of the United States of America (PNAS), Plant Physiology.