

2020世界青年科学家峰会 绿色化学国际研讨会

2020 WORLD YOUNG SCIENTIST SUMMIT
INTERNATIONAL FORUM ON GREEN CHEMISTRY

会议手册

Conference Manual



WYSS 2020



温州大学
WENZHOU UNIVERSITY

WYSS 20

2020世界青年科学家峰会
绿色化学国际研讨会

2020 WORLD YOUNG SCIENTIST SUMMIT
INTERNATIONAL FORUM ON GREEN CHEMISTRY



2020 CATALOG

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CONFERENCE GUIDE

参会指南

◎ 简要日程

10月16日全天：报到（无注册费）

17日、18日全天：绿色化学国际研讨会学术报告、交流

19日：代表离会

◎ 住宿安排

云天楼·米兰国际大酒店（温州鹿城区南浦路157号）

◎ 会议地点

温州大学岩松堂（温州大学茶山南校区）

◎ 报告形式

通过大会报告、特邀报告、邀请报告等方式进行学术交流，时间分别为45分钟、30分钟、20分钟（含交流讨论时间）。

◎ 在线直播

直播网址：<https://wx.vzan.com/live/tvchat-400137971#/>

◎ 联系方式

会务组联系人：

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Program/报告日程

Oct. 17, Session 1 (温州大学岩松堂雁山厅)

Time/时间	Opening Ceremony/开幕式	Chair/主持人
8:20-8:50	Opening address by leader of Wenzhou University/温州大学校领导致辞	Yuanzhi Xia (Wenzhou University) 夏远志 (温州大学)
	On-line speech by Prof. Yadong Li/李亚栋院士在线致辞	
	On-line speech by Prof. Weihai Fang/方维海院士在线致辞	
	Introduction of CCME by Prof. Shun Wang/王舜院长介绍学院情况	

Oct. 17, Session 2 (温州大学岩松堂雁山厅)

Time/时间	Speaker/报告人	Lecture Title/报告题目	Chair/主持人
8:50-9:35	Qi-Lin Zhou (Nankai University) 周其林 院士 (南开大学)	Catalytic Asymmetric Hydrogenation of Ketones	He Tian (East China University of Science and Technology) 田禾 院士 (华东理工大学)
9:35-10:20	Yun-Dong Wu (Peking University) 吴云东 院士 (北京大学)	Discovery of New Reactions of Ruthenium Catalyzed Addition Reactions to Alkynes based on Mechanistic Understanding	
10:20-10:40	Taking Photo and Tea Break/合影、茶歇		

Oct. 17, Session 3 (温州大学岩松堂雁山厅)

Time/时间	Speaker/报告人	Lecture Title/报告题目	Chair/主持人
10:40-11:10	Zhi-Xiang Yu (Peking University) 余志祥（北京大学）	Development and Application of Ring Formation Reactions	Feihe Huang (Zhejiang University) 黄飞鹤 (浙江大学)
11:10-11:40	Wen-Jing Xiao (Central China Normal University) 肖文精（华中师范大学）	Visible Light Photocatalysis in the Construction of Diverse Heterocyclic Skeletons	
11:40-12:10	Haiping Xia (Southern University of Science and Technology) 夏海平（南方科技大学）	Carbolong Chemistry: Chelation Chemistry of Carbon Chains with Transition Metals	
12:10-13:10	Lunch/午餐（温州大学怡口乐餐厅）		

Oct. 17, Session 4 (温州大学岩松堂雁山厅)

Time/时间	Speaker/报告人	Lecture Title/报告题目	Chair/主持人
13:10-13:40	Feihe Huang (Zhejiang University) 黄飞鹤（浙江大学）	Nonporous Adaptive Crystals (NACs) for Separation and Adsorption	Wen-Jing Xiao (Central China Normal University) 肖文精 (华中师范大学)
13:40-14:10	Yong-Gui Zhou (Dalian Institute of Chemical Physics, CAS) 周永贵 (中科院大连化学物理研究所)	Biomimetic Asymmetric Reduction Based on NAD(P)H	
14:10-14:40	Bo Liu (Sichuan University) 刘波（四川大学）	Synthetic Studies on Natural Diterpenoids Trigoxyphin K and Crotophorbolone	
14:40-15:10	Hanmin Huang (University of Science and Technology of China) 黄汉民（中国科学技术大学）	Catalytic Transformation of C-N Bonds: From C-N Bond Activation to C-N Bond Metathesis	
15:10-15:20	Linjie Ma (Shanghai Titan Scientific Co., Ltd.) 马琳杰（上海泰坦科技公司）	中国科学服务业如何化解“卡脖子”风险	
15:20-15:30	Tea Break/茶歇		

Oct. 17, Session 5 (温州大学岩松堂雁山厅)

Time/时间	Speaker/报告人	Lecture Title/报告题目	Chair/主持人
15:30-16:00	Zhenyang Lin (The Hong Kong University of Science and Technology) 林振阳（香港科技大学）	Boryls, Their Compounds and Catalysis-Theoretical and Computational Insights	Yong Cui (Shanghai Jiao Tong University) 崔勇 (上海交通大学)
16:00-16:20	Mengchun Ye (Nankai University) 叶萌春（南开大学）	Ligand-Substrate Anchoring Catalysis	
16:20-16:40	Long-Wu Ye (Xiamen University) 叶龙武（厦门大学）	Ynamides in Divergent N-Heterocycle Synthesis--A Journey of Development of Its Asymmetric Catalysis	
16:40-17:10	Yan Yu (University of Science and Technology of China) 余彦（中国科学技术大学）	Advanced Sodium-ion Batteries	
17:10-17:55	Jun Chen (Nankai University) 陈军 院士（南开大学）	New Nano-Function Structures and Solid-State Li Battery Application	
18:30-21:00	Banquet/晚宴（阿外楼度假酒店）		

Oct. 18, Session 1 (温州大学岩松堂雁山厅)

Time/时间	Speaker/报告人	Lecture Title/报告题目	Chair/主持人
8:10-8:55	Phil S. Baran (Scripps Research)	Simplicity and Ideality in Synthesis	Zhi-Xiang Yu (Peking University) 余志祥 (北京大学)
8:55-9:40	Dongyuan Zhao (Fudan University) 赵东元 院士（复旦大学）	Oriented Assembly of Functional Mesoporous Materials on Interface	
9:40-10:10	Yong Cui (Shanghai Jiao Tong University) 崔勇（上海交通大学）	Multi-Chirality in Porous Metal-Organic Complexes	
10:10-10:20	Tea Break/茶歇		

Oct. 18, Session 2A (温州大学岩松堂白鹿厅)

Time/时间	Speaker/报告人	Lecture Title/报告题目	Chair/主持人
10:20-10:40	Huan Cong (Technical Institute of Physics and Chemistry, CAS) 丛欢（中国科学院理化技术研究所）	Synthesis and Assembly of Conjugated Macrocycles	Xing-Guo Zhang (Wenzhou University) 张兴国 (温州大学)
10:40-11:00	Xiaoming Zeng (Sichuan University) 曾小明（四川大学）	Cyclic (Monoamino)carbene Ligands and Chromium Catalysis	
11:00-11:20	Qi-Qiang Wang (Institute of Chemistry, CAS) 王其强（中国科学院化学研究所）	Recognition-Directed Macrocyclic Supramolecular Catalysis	
11:20-11:40	Xiao-Song Xue (Nankai University) 薛小松（南开大学）	Mechanistic Insights into Hypervalent Iodine Mediated/Catalyzed Fluorination and Dearomatization Reactions	
11:40-12:00	Yang Li (Xi' an Jiaotong University) 李洋（西安交通大学）	Research around Hydrogen Release and Beyond	
12:00-13:10	Lunch/午餐（温州大学怡口乐餐厅）		

Oct. 18, Session 2B (温州大学岩松堂叶适厅)

Time/时间	Speaker/报告人	Lecture Title/报告题目	Chair/主持人
10:20-10:40	Zhenhua Gu (University of Science and Technology of China) 顾振华（中国科学技术大学）	Catalytic Asymmetric Ring-Opening Reaction	Jun Jiang (Wenzhou University) 蒋俊 (温州大学)
10:40-11:00	Guoyin Yin (Wuhan University) 阴国印（武汉大学）	When Metal Migration Meets “Boron”	
11:00-11:20	Genping Huang (Tianjin University) 黄跟平（天津大学）	Computational Studies of Transition Metal-Catalyzed Organic Reactions: Mechanisms and Selectivities	
11:20-11:40	Dawen Niu (Sichuan University) 钮大文（四川大学）	Synthesis of Carbohydrate Derivatives	
11:40-12:00	Yao Wang (Shandong University) 王瑶（山东大学）	Noncovalent Chalcogen-Bonding Catalysis	
12:00-13:10	Lunch/午餐（温州大学怡口乐餐厅）		

Oct. 18, Session 3 (温州大学岩松堂雁山厅)

Time/时间	Speaker/报告人	Lecture Title/报告题目	Chair/主持人
13:10-13:40	Congyang Wang (Institute of Chemistry, Chinese Academy of Sciences) 王从洋 (中国科学院化学研究所)	Manganese-catalyzed Grignard-type C-H Addition Reactions	Guan-Wu Wang (University of Science and Technology of China) 王官武 (中国科学技术大学)
13:40-14:10	Zhuangzhi Shi (Nanjing University) 史壮志 (南京大学)	Green and Selective C-H Functionalization of Indoles	
14:10-14:30	Lingling Chu (Donghua University) 储玲玲 (东华大学)	Selective, Three-component Dicarbofunctionalization of Unactivated Alkenes via Nickel Catalysis	
14:30-14:50	Jun Zhu (Xiamen University) 朱军 (厦门大学)	Metal-Free Dinitrogen Activation by Frustrated Lewis Pair: A Theoretical Study	
14:50-15:00	Tea Break/茶歇		

Oct. 18, Session 4 (温州大学岩松堂雁山厅)

Time/时间	Speaker/报告人	Lecture Title/报告题目	Chair/主持人
15:00-15:30	Fahmi Himo (Stockholm University)	Modeling of Reactions in Confined Spaces	Congyang Wang (Institute of Chemistry, Chinese Academy of Sciences) 王从洋 (中国科学院化学研究所)
15:30-16:00	Xin-Yuan Liu (Southern University of Science and Technology) 刘心元 (南方科技大学)	Cooperative Copper(I)-Catalyzed Radical-Involved Asymmetric Reactions	
16:00-16:30	Xingwei Li (Shaanxi Normal University) 李兴伟 (陕西师范大学)	Rhodium-Catalyzed Enantioselective Activation of C-H Bonds	
16:30-17:00	Guan-Wu Wang (University of Science and Technology of China) 王官武 (中国科学技术大学)	Recent Advances in Mechanochemical Organic Synthesis	
17:00-17:10	Closing Speech by Prof. Zhi-Xiang Yu 余志祥教授闭幕式讲话		Yuanzhi Xia (Wenzhou University) 夏远志 (温州大学)

Qi-Lin Zhou

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➤ Educational Background

1978–1982	B.Sc., Lanzhou University
1982–1987	Ph.D., Shanghai Institute of Organic Chemistry

➤ Professional Career

1988–1990	East China University of Science and Technology, postdoctor
1990–1992	Max-Planck-Institute of Polymer Science, postdoctor
1992–1994	Basel University, postdoctor
1994–1996	Trinity University, postdoctor
1996–1999	East China University of Science and Technology, associate, full professor
1999–present	Nankai University, full professor

➤ Research Interests

Organic synthetic methodology; Organometallic chemistry; asymmetric catalysis.

➤ Awards

- 1997 Award for Outstanding Young Scientists (NSFC)
- 1999 Cheung Kong Scholar (Ministry of Education of China)
- 2005 Prize for Creation in Organic Synthesis (Division of Organic Chemistry, CCS)
- 2006 Yao-Zeng Huang Prize of Organometallic Chemistry (CCS)
- 2007 JSPS Fellowship Award (JSPS)
- 2007 The First Prize of Tianjin Natural Science Award
- 2009 Member of CAS
- 2012 Prize of Chiral Chemistry (CCS)
- 2013 Fellow of RSC
- 2014 The First Prize of Tianjin Natural Science Award
- 2014 Novartis Lecturer at the Scripps Research Institute
- 2014 National Outstanding Scientist (CAST)
- 2017 Boehringer-Ingelheim Lecturer at California Institute of Technology
- 2017 Chemistry Contribution Prize (CCS & Sinopec)
- 2018 Future Science Prize---The Physical Science Prize
- 2019 The first Prize of the National Natural Science Award

Catalytic Asymmetric Hydrogenation of Ketones

Qi-Lin Zhou (周其林)

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Transition-metal-catalyzed asymmetric hydrogenation is one of the most important asymmetric reactions, which received continuing attention from both academia and industry. Many chiral catalysts have been synthesized and applied in asymmetric hydrogenation reaction over the past few decades. However, for the most of reported chiral catalysts, the enantioselectivity is substrate-dependent, and the efficiency is far from the requirements for industrial productions. Therefore, the search for efficient chiral catalysts in terms of high enantioselectivity and high activity has long been an important goal in the area of asymmetric hydrogenation. We developed a new class of chiral ligands with a spirobiindane framework, including monodentate phosphines, diphosphines, phosphine-oxazolines and aminophosphines. The chiral spiro ligands showed high efficiency and high enantioselectivity in the catalytic asymmetric hydrogenations of various ketones. The synthesis and structures of chiral spiro catalysts, as well as the reactivity and enantioselectivity of the asymmetric hydrogenations of ketones will be discussed in the presentation.

References:

1. F.-H. Zhang, F.-J. Zhang, M.-L. Li, J.-H. Xie, Q.-L. Zhou, Enantioselective hydrogenation of dialkyl ketones, *Nat. Catal.* **2020**, 3, 621-627.
2. Y.-Y. Hua, H.-Y. Bin, T. Wei, H.-A. Cheng, Z.-P. Lin, X.-F. Fu, Y.-Q. Li, J.-H. Xie, P.-C. Yan, Q.-L. Zhou, Iridium-catalyzed asymmetric hydrogenation of γ - and δ -ketoacids for enantioselective synthesis of γ - and δ -lactones. *Org. Lett.* **2020**, 22, 818-822.
3. X.-H. Yang, H.-T. Yue, N. Yu, Y.-P. Li, J.-H. Xie, Q.-L. Zhou, Iridium-catalyzed asymmetric hydrogenation of racemic α -substituted lactones to chiral diols, *Chem. Sci.* **2017**, 8, 1811-1814.
4. J.-H. Xie, X.-Y. Liu, X.-H. Yang, J.-B. Xie, L.-X. Wang, Q.-L. Zhou, Chiral iridium catalysts bearing spiroPAP ligands enable highly efficient asymmetric hydrogenation of β -aryl β -ketoesters, *Angew. Chem. Int. Ed.* **2012**, 51, 201-203.
5. J.-H. Xie, X.-Y. Liu, J.-B. Xie, L.-X. Wang, Q.-L. Zhou, Additional coordination group leads to extremely efficient chiral iridium catalysts for asymmetric hydrogenation of simple ketones, *Angew. Chem. Int. Ed.* **2011**, 50, 7329-7332.

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➤ Educational Background

1978–1981	B.Sc., Lanzhou University
1982–1986	Ph.D., University of Pittsburgh, USA

➤ Professional Career

1987–1992	Postdoctoral Fellow, Senior Research Associate University of California, Los Angeles
1992–2010	Assistant Professor, Associate Professor, Professor, Chair Professor The Hong Kong University of Science and Technology
2010–present	Chair Professor Peking University Peking University Shenzhen Graduate School

➤ Research Interests

Theoretical understanding of catalysis; force field development for the simulations of biomolecules; function of WD40 proteins.

➤ Awards

- 1999 Scientific Board member, World Association of Theoretical and Computational Chemists (WATOC)
- 2012 Vice-President, Asian Pacific Association of Theoretical and Computational Chemistry (APATCC)
- 2005 Member, the Chinese Academy of Science
- 2011 Fellow, Hong Kong Institute of Science
- 1998 Wong Kuen Shing Education Foundation Exchange Scholar Award
- 1999 National Natural Science Award of China
- 2013 National Natural Science Award of China
- 2000 Croucher Senior Research Fellowship Award (Croucher Award)
- 2000 Outstanding Young Investigator Award, National Natural Science Foundation of China
- 2008 Thomson-Reuters Research Fronts Award
- 2009 School of Science Teaching Award, HKUST
- 2012 Anhui Province Science Award of China
- 2013 Robert S. Mulliken Lecture at University of Georgia
- 2014 Fukui Medal, The Asia-Pacific Association of Theoretical & Computational Chemists (APATCC)
- 2015 Achievement Award for Physical Organic Chemistry, The Chinese Chemical Society

Discovery of New Reactions of Ruthenium Catalyzed Addition Reactions to Alkynes based on Mechanistic Understanding

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Transition metal Catalyzed addition reactions to alkynes are widely applied reactions in synthesis. It possesses both regio- and stereo-selectivities. In 2003, we reported a novel mechanism to understand the unusual Markovnikov regiochemistry and completely anti-stereochemistry for $[\text{CpRu}(\text{MeCN})_3]\text{PF}_6$ and $[\text{Cp}^*\text{Ru}(\text{MeCN})_3]\text{PF}_6$ catalyzed hydrosilylation of alkynes.^[1] The mechanism involves a rate-determining oxidative hydrometallation, in which the transferring hydrogen behaves as proton-like (thus Markovnikov regiochemistry). This leads to the formation of Ru(IV)-cyclopropene intermediate (thus anti-stereochemistry). Activation energy calculations predict that the same mechanism may be applied to anti-specific hydrogenation, hydroboration, hydrostannation, and hydrogenation reactions of alkynes. All these reactions have been realized in recent years.^[2]

When internal silyl alkynes subject to $[\text{CpRu}(\text{MeCN})_3]\text{PF}_6$ catalyzed hydrogenation, an unprecedented geminal-hydrogenation occurs. Theoretical calculations reveal that the formation of the gem- H_2 Ru-carbene might be the key intermediate. Mechanistic insight predicts that highly selective anti-hydrogenation can be achieved by applying a strongly-coordinating but bulky ligand, which is realized by experiment.^[3] Further studies discover that gem-hydroboration can also be achieved with internal silyl alkynes.^[4]

References:

1. Chung, L-W et al. *J. Am. Chem. Soc.*, **2003**, *125*, 11578.
2. (a) Matsuda, T. et. al. *Org. Lett.*, **2010**, *12*, 1056; (b) Rummelt, S.-M. et al. *Angew. Chem. Int. Ed.*, **2014**, *53*, 3626; (c) Sundararaju, B. et. al. *Angew. Chem. Int. Ed.*, **2013**, *52*, 14050; (d) Radkowski, K.; Sundararaju, B.; Fürstner, A. *Angew. Chem. Int. Ed.*, **2013**, *52*, 355; (e) Song, L.-J. et. al. *ACS catal.*, **2017**, *7*, 1361; (f) Ding, S.-T. et al. *J. Am. Chem. Soc.*, **2013**, *135*, 13835.
3. Song, L.-J. et. al. *J. Am. Chem. Soc.*, **2019**, *141*, 17441.
4. Fang, Q. et. al. *J. Am. Chem. Soc.*, **2020**, *142*, 13867.

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➤ **Educational Background**

1985–1989	B.Sc., Nankai University
1989–1992	M.Sc., Nankai University
1996–1999	Ph.D., University of Wollongong (Australia)

➤ **Professional Career**

1992–1994	Research Intern, Department of Chemistry, Nankai University
1994–1996	Assistant Research Fellow, Department of Chemistry, Nankai University
1999–2002	National Institute of AIST Kansai Center, NEDO Researcher, Japan
2002–present	Professor, College of Chemistry, Nankai University, China
2009–present	The Director of Key Laboratory of Advanced Energy Materials Chemistry (Ministry of Education)
2013–2016	The Associate Dean of College of Chemistry
2016–2019	The Dean of College of Chemistry
2019–present	The Vice President of Nankai University

➤ **Research Interests**

Energy materials chemistry; Nanomaterials and advanced batteries.

➤ **Awards**

- 2003 National Science Fund for Distinguished Young Scholars
- 2005 Cheung Kong Scholar (Ministry of Education of China)
- 2006 The First Prize of Tianjin Natural Science Award
- 2007 Chinese Electrochemistry Young Prize
- 2008 Liu Dagang Young Prize
- 2009 General Motors (China) Investment Award
- 2010 Innovation Team Leader of Ministry of Education
- 2010 Chief Expert of 973 Program
- 2011 The Second Prize of the National Natural Science Award
- 2012 Tianjin Outstanding Scientific and Technical Workers
- 2012 Australia China Alumni Award for Research and Innovation
- 2013 Chinese Electrochemistry Contribution Award
- 2014 The Million Plan Innovation Talents
- 2014 Fellow of the Royal Society of Chemistry
- 2015 Chairman of Chinese Society of Electrochemistry
- 2016 The First Outstanding Talents of Tianjin
- 2016 The First Prize of Tianjin Natural Science Award
- 2017 Academician of the Chinese Academy of Sciences
- 2018 National Labor Medal
- 2020 The Second National Innovation Ahead Award

New Nano-Function Structures and Solid-State Li Battery Application

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Solid-state lithium batteries (SSLBs) based on a solid electrolyte have emerged as higher safety and higher energy density devices compared with conventional lithium-ion batteries. However, inadequate ionic conductivity and high interfacial resistance of solid-state electrolyte severely limit the development of SSLBs. Thus, it is very important to accelerate ionic transport in solid-state electrolyte and construct the compatible interface between electrolyte and electrode. Herein, we present new nano-function structures composed of nanoporous cathode, solid-state electrolyte with nanofillers, and composite metal anode impregnated into nano-scaffold. Nanomaterials and nanostructures have significant effects on enhancing the reaction activity and kinetics of electrode materials, therefore improving their output capacity and rate performance. In addition, solid-state electrolyte combined with nanofillers and nanopores can effectively stabilize the electrolyte/electrode interface and promote ionic transport. The composite metal anode has an important influence on the stripping/deposition behavior of lithium ions. Our studies provide a novel tactic to regulate the charge/discharge platforms, reversible capacity, rate capability, and cyclic life of SSLBs, which would shed light on the future opportunities for SSLBs.

References:

1. Y. Lu, J. Chen, Prospects of organic electrode materials for practical lithium batteries, *Nat. Rev. Chem.* **2020**, *4*, 127-142.
2. K. Zhang, Z.-H. Yan, J. Chen, Electrodeposition accelerates metal-based batteries, *Joule* **2020**, *4*, 10-11.
3. Y. Lu, X. Hou, L.-C. Miao, L. Li, R.-J. Shi, L.-J. Liu, J. Chen, Cyclohexanone with ultrahigh capacity as cathode materials for lithium-ion batteries, *Angew. Chem. Int. Ed.* **2019**, *58*, 7020-7024.
4. Y. Lu, L. Li, Q. Zhang, Z.-Q. Niu, J. Chen, Electrolyte and interface engineering for solid-state sodium batteries, *Joule* **2018**, *2*, 1747-1770.
5. Q. Zhao, Z.-H. Yan, C.-C. Chen, J. Chen, Spinel: controlled preparation, oxygen reduction/evolution reaction application, and beyond, *Chem. Rev.* **2017**, *117*, 10121-10211.
6. Z.-Q. Zhu, M.-L. Hong, D.-S. Guo, J.-F. Shi, Z.-L. Tao, J. Chen, All-solid-state lithium organic battery with composite polymer electrolyte and pillar[5]quinone cathode, *J. Am. Chem. Soc.* **2014**, *136*, 16461-16464.

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➤ Educational Background

1995–1997	B.Sc., New York University
1997–2001	Ph.D., Scripps Research Institute
2001–2003	Postdoctoral Associate, Harvard University

➤ Professional Career

2003.06–2006.07	Scripps Research Institute, Assistant Professor
2006.07–2008.06	Scripps Research Institute, Assistant Professor (with Tenure)
2008.06 – present	Scripps Research Institute, Professor

➤ Research Interests

Total synthesis of bioactive natural products

➤ Awards

- Inhoffen Medal, 2019
- Manchot Research Professorship, 2017
- Member, The National Academy of Sciences, 2017
- Emanuel Merck Lectureship, 2017
- Blavatnik National Laureate in Chemistry, 2016
- ACS Elias J. Corey Award, 2016
- Member, American Academy of Arts and Sciences, 2015
- College of Arts and Science Alumni Distinguished Service Award, New York University, 2015
- Reagent of the Year Award (EROS), 2015
- Mukaiyama Award, 2014
- MacArthur Fellowship, 2013
- Royal Society of Chemistry Synthetic Organic Chemistry Award, 2013
- Fellow, Royal Society of Chemistry, 2013
- Fellow, AAAS, 2012–Present
- ACS San Diego Section Distinguished Scientist Award, 2012
- ISHC Katritzky Heterocyclic Chemistry Award, 2011
- Thieme-IUPAC Prize in Synthetic Organic Chemistry, 2010
- ACS Award in Pure Chemistry, 2010

Simplicity and Ideality in Synthesis

Phil S. Baran

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Organic synthesis is one of the great branches of Chemistry that has had a profound impact on the betterment and advancement of civilization. In its most modern manifestations, it renders the dream of alchemy (turning something worthless into something valuable) a reality. It places the practitioner into the role of artist, engineer, and astronaut. Thus, advances in this field are inherently of interest to a broad audience. Predicting the specific developments that will alter the course of this field is difficult. This talk will use case-studies from our lab to demonstrate how the community is progressing by aiming for simple, ideal solutions to longstanding challenges.

Dongyuan Zhao

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➤ **Educational Background**

1980–1984	B.S., Department of Chemistry, Jilin University, China.
1984–1987	M.S., Department of Chemistry, Jilin University, China.
1987–1990	Ph. D., Dalian Institute of Chemical Physics, Chinese Academy of Science and Department of Chemistry, Jilin University, China.

➤ **Professional Career**

1990–1991	Lecturer, Shenyang Institute of Chemical Technology.
1991–1993	Associate Professor, Shenyang Institute of Chemical Technology.
1993.3–1993.12	Visiting Scholar, University of Regina, Canada.
1996.1–1997.1	Post-Doctoral Fellow, University of Houston, USA.
1997.1–1998.12	Post-Doctoral Fellow and Research Associate, University of California at Santa Barbara, USA.
1998.12–Now	Professor, Fudan University.
2006.6–Now	Fragment Professor, Monash University, Clayton, Australia.

➤ **Research Interests**

Designed synthesis, assembly, structure and application of ordered mesoporous materials.

➤ **Awards**

- 2019 Khwarizmi International Award (KIA)
- 2018 JCIS Darsh Wasan Award
- 2018 Chemistry Contribution Award, Chinese Chemical Society
- 2017 Natural Science of the Ministry of Education of China (First Grade Prize)
- 2017 Achievement Award, Chinese Zeolite Association
- 2016 TWAS-Lenovo Science Prize
- 2013 CNR Rao Award, Indian Chemical Research Society
- 2012 Muettetries Memorial Lecturer Award, UC Berkeley
- 2010 Hao Qing Professorship, Fudan University
- 2009 The Ho Leung Ho Lee Foundation Award for Scientific and Technological Progress
- 2008 TWAS Prize in Chemistry (The World Academy of Sciences)
- 2008 IMMA Achievement Award (International Mesoporous Materials Association)

Oriented Assembly of Functional Mesoporous Materials on Interface

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Mesoporous materials possess several fascinating properties, including uniform pore size ranging from 2.0 to 50 nm, high surface areas, large pore volumes, tunable mesostructures, morphologies and framework compositions, showing advantageous for applications in various areas such as energy conversion and storage, environment remediation, and biomedical science. Particularly, creating high-performance mesoporous materials with precisely controllable “multifunctional entities” are highly desired for the development of material science and practical applications. Here we present the development and progress for the synthesis of the spherical functional mesoporous nanoparticles from novel “oriented assembly” strategy by interfacial control. A series of new synthesis approaches have been developed based on the oriented assembly strategy in my group, including the confined micro-emulsion self-assembly, liquid-liquid bi-phase synthesis, evaporation-driven oriented/aggregation assembly, anisotropic growth of mesoporous, and interface driven orientation arrangement, *etc.* Novel mesoporous nanospheres with one-level and multi-level architectures can be well synthesized, such as core-shell, yolk-shell, multi-shell, film structures for silica, TiO₂, carbon spheres, 3D mesoporous bouquet-posy-like TiO₂ multi-level superstructures and asymmetric Janus, single-hole hollow, nano-thermometer, hemispheres structures *etc.* The obtained functional mesoporous nanospheres with regularly multi-level architectures possess uniform and controllable mesopore channels, high surface area, large pore volume and open frameworks, showing great potential applications on catalysis, adsorption & separation, biomedicines and energy conversion & storage.

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1. Y. Deng, *et al.*, *J. Am. Chem. Soc.* **2008**, *130*, 28; Y. Fang, *et al.*, *Angew. Chem. Int. Ed.* **2010**, *49*, 7987; W. Li, *et al.*, *J. Am. Chem. Soc.* **2012**, *134*, 1186; W. Li, *et al.*, *Adv. Mater.* **2013**, *25*, 5129; Y. Fang, *et al.*, *Angew. Chem. Int. Ed.* **2014**, *53*, 5366. X. Li, *et al.*, *J. Am. Chem. Soc.* **2014**, *136*, 15086; D. Shen, *et al.*, *Nano Lett.* **2014**, *14*, 923; Y. Fang, *et al.*, *J. Am. Chem. Soc.* **2015**, *137*, 2803; W. Li, *et al.*, *Nano Lett.* **2015**, *15*, 2186. Y. Liu, *et al.*, *Science Adv.* **2015**, *1*, e1500166; X. Li, *et al.*, *J. Am. Chem. Soc.* **2015**, *137*, 5903; Y. Liu, *et al.*, *ACS Central Science* **2015**, *1*, 400; B. Kong, *et al.*, *Nature Chem.* **2016**, *8*, 171; X. Li, *et al.*, *Adv. Mater.* **2017**, *29*, 1701652; Y. Liu, *et al.*, *J. Am. Chem. Soc.* **2017**, *139*, 517; K. Lan, *et al.*, *J. Am. Chem. Soc.* **2018**, *140*, 4135; T. Zhao, *et al.*, *J. Am. Chem. Soc.* **2018**, *140*, 10009; Peng L, *et al.*, *J. Am. Chem. Soc.* **2019**, *141*, 7073-7080; Y. Ren, *et al.* *Nature Mater.* **2020**, *19*, 203-206.

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➤ Educational Background

1987–1991	B.Sc., Wuhan University
1994–1997	M.Sc., Peking University
1997–2001	Ph.D., Hong Kong University of Science & Technology

➤ Professional Career

2001.08–2004.05	UCLA, Postdoctoral Associate
2004.06–present	Peking University, Associate, full professor

➤ Research Interests

Computational and Synthetic Organic Chemistry: Joining Forces of Computation and Organic Synthesis to
1) Study Reaction Mechanisms; 2) Discover, Design and Develop New Reactions and Catalysts; 3)
Synthesize Natural and Non-Natural Products.

➤ Awards

- Wuxi Pharma Life Science Research Scholar Award, 2018.
- Bayer Investigator Award at PKU, 2018.
- Fellow of the Royal Society of Chemistry, 2016.
- Chang-Jiang Professorship, Ministry of Education, China, 2015.
- Nankai University Lectureship on Organic Chemistry, 2014.
- Advisor of the Best 100 Ph.D Theses in China, 2012, Ministry of Education, China
- The Asian Core Program Lectureship Award (Singapore), the Asian Cutting-Edge Organic Chemistry programs, 2012.
- “Chinese Chemical Society-Sci Finder Award for Creative Work in Synthetic Organic Chemistry”, 2011.
- “Chinese Chemical Society-Physical Organic Chemistry Award”, 2011.
- “Chinese Chemical Society-BASF Award”, 2011.
- “Distinguished Lectureship Award”, the Asian Symposium of Annual Meeting of Chemical Society of Japan, 2010.
- The Asian Core Program Lectureship Award (Japan), the Asian Cutting-Edge Organic Chemistry programs, 2008.
- The National Science Fund for Distinguished Young Scholars of China, 2008.
- The Young Chemist Award, the Chinese Chemical Society & the Royal Society of Chemistry, 2008.
- Thieme Synlett/Synthesis Journal Award, 2008.

Development and Application of Ring Formation Reactions

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One of the research interests in Yu group at Peking University is developing ring formation reactions and applying these reactions to the synthesis of natural products and pharmaceuticals. Some of these ring formation reactions catalyzed by Rh complexes discovered in the Yu group have been shown in the scheme below.^[1-3] In this talk, recent progresses will be presented.

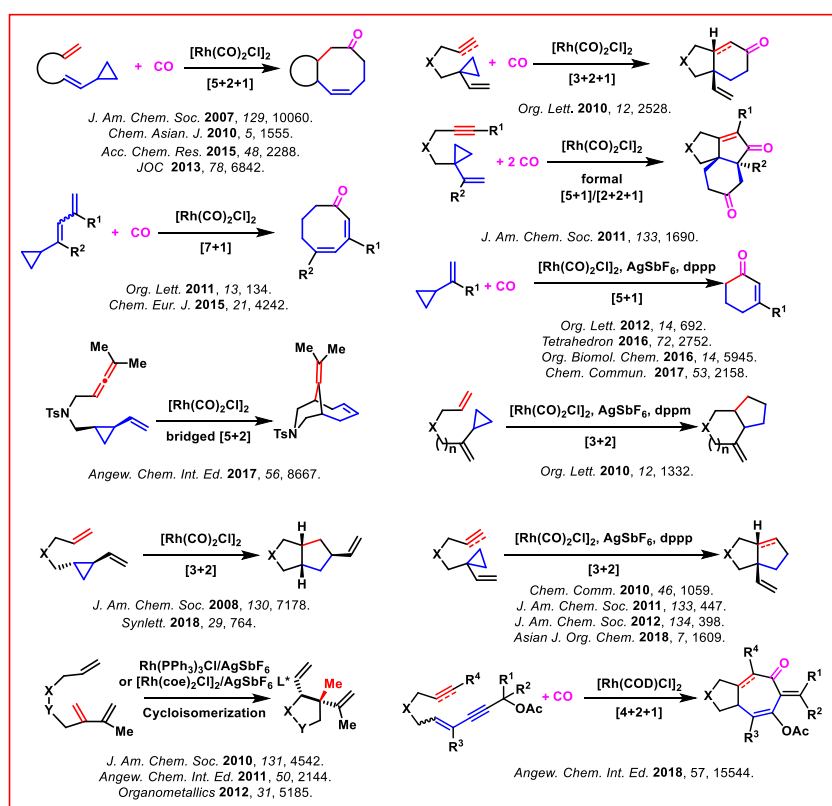


Fig. 1 Ring Formation Reactions Discovered in the Zhi-Xiang Yu Group

References:

1. "Vinylcyclopropane Derivatives in Transition-Metal-Catalyzed Cycloadditions for the Synthesis of Carbocyclic Compounds", L. Jiao, Z.-X. Yu, *J. Org. Chem.* **2013**, 78, 6842.
2. "Rhodium-Catalyzed [5+2+1] Cycloaddition of Ene-Vinylcyclopropanes and CO: Reaction Design, Development, Application in Natural Product Synthesis, and Inspiration for Developing New Reactions for Synthesis of Eight-Membered Carbocycles", Y. Wang, Z.-X. Yu, *Acc. Chem. Res.* **2015**, 48, 2288.
3. "Asymmetric Total Synthesis of (–)-Clovian-2,9-dione Using Rhodium(I)-Catalyzed [3+2+1] Cycloaddition of 1-Yne-vinylcyclopropane and CO", J. Yang, W. Xu, Q. Cui, X. Fan, L.-N. Wang, Z.-X. Yu, *Org. Lett.* **2017**, 19, 6040.

Wen-Jing Xiao

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➤ Educational Background

1980–1984	B.Sc., Central China Normal University
1987–1990	M.Sc., Central China Normal University
1996–2000	Ph.D., University of Ottawa

➤ Professional Career

2001.01–2002.02	Caltech, Postdoctoral Associate
2003.09–present	Central China Normal University, full professor

➤ Research Interests

Development of New Reagents, Ligands and Reactions for Green Chemical Synthesis. Research Activities Including 1) Visible Light Photocatalysis; 2) Asymmetric Catalysis, and 3) Radical Chemistry.

➤ Awards

- Asymchem Laboratories Life Science Research Scholar Award, 2019.
- Second Prize of National Teaching Achievements, 2018.
- First Prize of Natural Science Award of Hubei Province, 2017.
- Young and middle-aged experts with outstanding national contributions, 2014.
- Asian Core Program Lectureship Award, Singapore, 2014
- Wuxi Pharma Life Science Research Scholar Award, 2013.
- First Prize of Natural Science Award of Hubei Province, 2013.
- Instructor of 100 Excellent Doctoral Dissertations in China, 2013.
- Most Cited Paper 2006-2009 Award, Tetrahedron Letter, 2009.
- NESEC Visiting Scholar Fellowship, National Research Council, Canada, 2000
- Research Excellence Award, University of Ottawa, Canada, 1999.
- The Young Chemist Award, the Chinese Chemical Society, 1992.

Visible Light Photocatalysis in the Construction of Diverse Heterocyclic Skeletons

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Visible-light photocatalysis has recently received increasing attention from chemists because of its wide application in organic synthesis and its significance for sustainable chemistry. This catalytic strategy enables generation of various reactive species frequently without stoichiometric activation reagents under mild reaction conditions. Manipulation of these reactive intermediates can result in numerous synthetically useful bond formations in a controllable manner.

I will mainly introduce our recent advances in visible light induced controlled radical reactions and relative transformations. Our main research efforts toward this goal can be classified into four categories: formal cycloaddition and cyclization reactions, radical-mediated olefin functionalization/cyclization cascades, photocatalytic generation and cyclization of N-centered radicals, and photocatalytic functionalization of heterocycles by visible-light-induced dual catalysis.

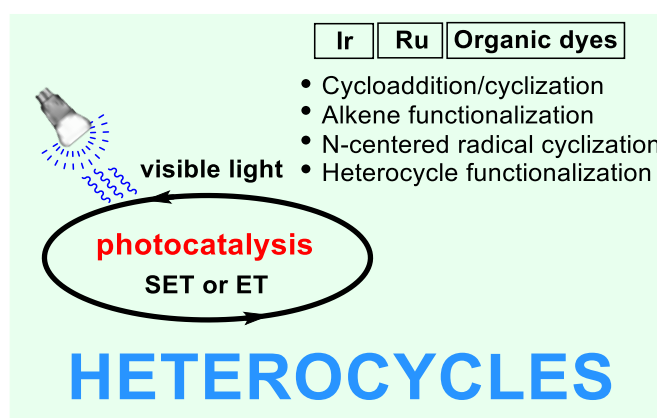


Fig. 1 Photocatalytical Synthesis of Heterocycles

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1. “Exploitation of the New Reactivity of Vinylcyclopropanes for Palladium-Catalyzed, Asymmetric [5+2] Dipolar Cycloadditions”, M.-M. Li, Q. Xiong, B.-L. Qu, Y.-Q. Xiao, Y. Lan, L.-Q. Lu, and W.-J. Xiao, *Angew. Chem. Int. Ed.* **2020**, DOI: 10.1002/anie.202006366.
2. “When Light Meets Nitrogen-Centered Radicals: From Reagents to Catalysts”, X.-Y. Yu, Q.-Q. Zhao, J. Chen, W.-J. Xiao, J.-R. Chen, *Acc. Chem. Res.* **2020**, DOI: 10.1021/acs.accounts.0c00090.
3. “Exploration of Visible-Light Photocatalysis in Heterocycle Synthesis and Functionalization: Reaction Design and Beyond”, J.-R. Chen, X.-Q. Hu, L.-Q. Lu, W.-J. Xiao, W.-J., *Acc. Chem. Res.* **2016**, *49*, 1911-1923.

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➤ Educational Background

In 1983	B.Sc., Xiamen University
In 1986	M.Sc., Xiamen University
In 2002	Ph.D., Xiamen University

➤ Professional Career

1999–2018	Professor, Department of Chemistry, Xiamen University
2018–present	Chair Professor, Department of Chemistry, Southern University of Science and Technology

➤ Research Interests

Organometallic Chemistry and Polymer Chemistry

➤ Awards

- The First Prize of the “Natural Science Award of Fujian Province”, 2018.
- “Chinese Chemical Society Huang Yao-Zeng Award in Organometallic Chemistry”, 2016.
- “Ten Major Scientific and Technological Progress of China’s Colleges and Universities”, 2013.
- The National Science Fund for Distinguished Young Scholars of China, 2009.
- “New Century Talent Support Program of the Ministry of Education”, 2004.
- The Second Prize of the “Science and Technology Progress Award of Fujian Province”, 2004.
- The First Prize of the “Science and Technology Progress Award of Xiamen”, 2004.
- “Youth Science and Technology Award of Fujian Province”, 2004.
- “Yunsheng Young Science and Technology Award of Fujian Province”, 2004.
- “Science and Technology Progress Award in Construction System of Fujian Province”, 2001.
- “Outstanding Young Chemist Award” in the 60th Anniversary of the Chinese Chemical Society, 1992.

Carbolog Chemistry: Chelation Chemistry of Carbon Chains with Transition Metals

Haiping Xia (夏海平)

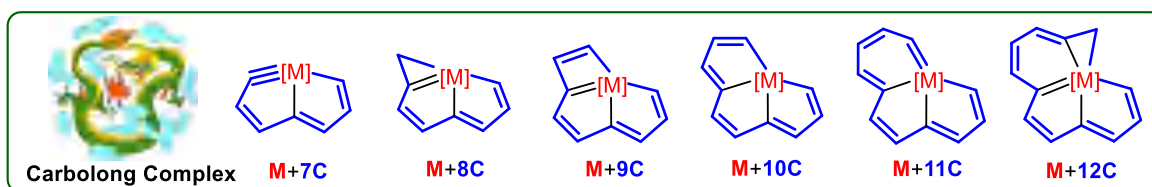
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In 2013, we reported a novel kind of aromatic complexes, metallapentalynes, for the first time. After three years of efforts, the unique “carbolog chemistry” has been gradually established. The backbones of this new type of molecules are subversive, containing a carbon-only chain with 7-12 carbon atoms (carbolog ligands) coordinated to a transition metal.

Carbolog complexes belong to organometallics, so they have the properties of diverse metal types, adjustable valence states, long excited state lifetime and strong designability of functional ligands. Besides, carbolog complexes are still aromatics, thus, they have many of the properties of the traditional organic aromatic compounds. On the other hand, due to the existence of d_{π} - p_{π} conjugation resulted from the intercalation of a transition metal in the π -conjugated systems, carbolog complexes show many special characteristics, for instance, long fluorescence lifetime, large Stokes shift and enhanced aggregation luminescence. In addition, carbolog complexes normally exhibit broad and strong light absorption properties, and are often very stable and can be easily modified, therefore, they have a great potential in the areas of solar energy utilization, photoelectric materials, small molecule activation and biomedicines. Carbolog complexes have dual characteristics of “organometallics” and “aromatics”, which are expected to bring new opportunities to the development of related disciplines!



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1. C. Zhu, S. Li, M. Luo, X. Zhou, Y. Niu, M. Lin, J. Zhu, Z. Cao, X. Lu, T. Wen, Z. Xie, P. v. R. Schleyer, H. Xia. *Nat. Chem.* **2013**, 6, 698.
2. C. Zhu, C. Yang, Y. Wang, G. Lin, Y. Yang, X. Wang, J. Zhu, X. Chen, X. Lu, G. Liu, H. Xia. *Sci. Adv.* **2016**, 2, 1601031.
3. M. Luo, L. Long, H. Zhang, Y. Yang, Y. Hua, G. Liu, Z. Lin, H. Xia. *J. Am. Chem. Soc.* **2017**, 139, 1822.
4. R. Li, Z. Lu, Y. Cai, F. Jiang, C. Tang, Z. Chen, J. Zheng, J. Pi, R. Zhang, J. Liu, Z. Chen, Y. Yang, J. Shi, W. Hong, H. Xia. *J. Am. Chem. Soc.* **2017**, 139, 14344.
5. S. Chen, L. Liu, X. Gao, Y. Hua, L. Peng, L. Yang, Y. Tan, F. He, H. Xia, *Nat. Commun.* **2020**, 11, 4651.
6. Z. Lu, Q. Zhu, Y. Cai, Z. Chen, K. Zhuo, J. Zhu, H. Zhang, H. Xia, *Sci. Adv.*, 2020, 6, 2535.
7. C. Zhu, H. Xia. *Acc. Chem. Res.*, **2018**, 51, 1691.

Feihe Huang

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<http://www.researcherid.com/rid/A-1020-2012>



➤ Educational Background

1992–1996	B.Sc., Hefei University of Technology
1996–1999	M.Sc., University of Science and Technology of China
2000–2005	Ph.D., Virginia Polytechnic Institute & State University

➤ Professional Career

2005.03–2006.02	University of Utah, Postdoctoral Fellow
2005.12–2008.03	Zhejiang University, Professor
2008.03–present	Zhejiang University, Qiusi Scholar Chair Professor

➤ Research Interests

Supramolecular polymers, supramolecular amphiphiles, pillararene supramolecular chemistry, and nonporous adaptive crystals.

➤ Awards

- “Outstanding Achievement Award” from Li Foundation in USA, 2007
- Elected as one of the ten best young employees of Zhejiang University, 2008
- The Thieme Chemistry Journals Award, 2009
- The Outstanding Recent Graduate Alumnus Award from VT, 2010
- National Science Fund for Distinguished Young Scholars, 2011
- Humboldt Fellowship for Experienced Researchers, 2011
- Fellow of the Royal Society of Chemistry, FRSC, 2012
- Asian Chemical Congress Asian Rising Stars Award, 2013
- Chinese Chemical Society AkzoNobel Chemical Sciences Award, 2014
- Cram Lehn Pedersen Prize in Supramolecular Chemistry, 2015
- Royal Society of Chemistry Polymer Chemistry Lectureship Award, 2016
- Changjiang Scholar, 2017
- The Royal Society Newton Advanced Fellowship award, 2018
- University of Duisburg-Essen Bruno-Werdelmann-Lecture Award, Germany, 2019

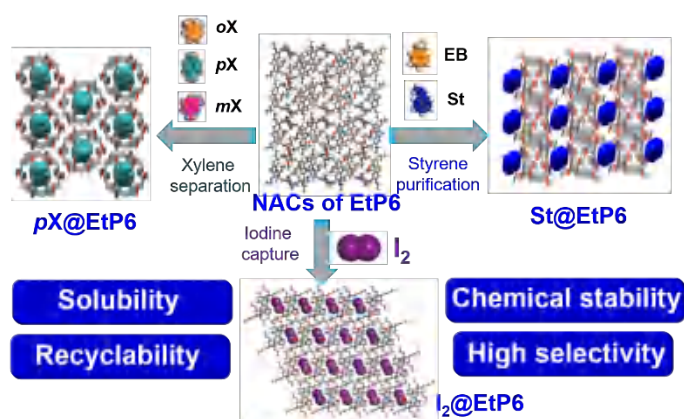
Nonporous Adaptive Crystals (NACs) for Separation and Adsorption

Feihe Huang(黄飞鹤)

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In this talk, I will introduce a novel kind of solid materials for adsorption and separation, nonporous adaptive crystals (NACs), which function at the supramolecular level. They are nonporous in the initial crystalline state, but the intrinsic or extrinsic porosity of the crystals along with a crystal structure transformation is induced by preferable guest molecules. Unlike solvent-induced crystal polymorphism phenomena of common organic crystals that occur at the solid-liquid phase, NACs capture vaporized guests at the solid-gas phase. Upon removal of guest molecules, the crystal structure transforms back to the original nonporous structure. I will focus on the discussion of pillararene-based NACs for adsorption and separation and the crystal structure transformations from the initial nonporous crystalline state to new guest-loaded structures during the adsorption and separation processes. Compared with traditional porous materials, NACs of pillararenes have several advantages. First, their preparation is simple and cheap and they can be synthesized in large-scale to meet practical demands. Second, pillararenes have better chemical, humid and thermal stability than crystalline MOFs, COFs and POCs, which are usually constructed based on reversible chemical bonds. Third, pillararenes are soluble in many common organic solvents, which means that they can be easily processed in solution. Fourth, their regeneration is simple and they can be reused many times with no decrease in performance. It is expected that this kind of materials will not only exert significant influence on scientific research, but also show practical applications in the chemical industry.



References:

1. "Nonporous Adaptive Crystals of Pillararenes", K. Jie, Y. Zhou, E. Li, F. Huang, *Acc. Chem. Res.* **2018**, *51*, 2064-2072.
2. "Applications of pillararene NACs in adsorption and separation", Y. Zhou, K. Jie, E. Li, F. Huang, *Sci. Sin. Chim.* **2019**, *49*, 832-843.

Yong-Gui Zhou

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➤ Educational Background

1989–1993	B.Sc., Huaibei University
1993–1996	M.Sc., Shanghai Institute of Organic Chemistry, CAS
1996–1999	Ph.D., Shanghai Institute of Organic Chemistry, CAS

➤ Professional Career

1999.07–2002.06	Pennsylvania State University, Postdoctoral Associate
2002.08–present	Dalian Institute of Chemical Physics, Associate, full professor

➤ Research Interests

Asymmetric catalysis and synthesis: 1) Asymmetric hydrogenation of heteroaromatic compounds; 2) Palladium-catalyzed asymmetric hydrogenation; 3) Biomimetic asymmetric reduction based on the chiral and regenerable cofactor NAD(P)H. 4) The synthesis of chiral polymers based on the transition metal-catalyzed asymmetric reactions.

➤ Awards

- Natural Science Award Sponsored by Liaoning Province, China, 2016.
- Chang-Jiang Professorship, Ministry of Education, China, 2016.
- Leading Young Scientists for Innovation of Science & Technology, China, 2014.
- Special Government Allowance, People's Republic of China, 2013.
- The Asian Core Program Lectureship Award (Japan), the Asian Cutting-Edge Organic Chemistry programs, 2013.
- Chiral Chemistry Scholar Award Sponsored by Chinese Chemical Society, China, 2012.
- The National Science Fund for Distinguished Young Scholar Sponsored by National Natural Science of Foundation, China, 2011.
- Thieme Chemistry Journal Award, 2006.

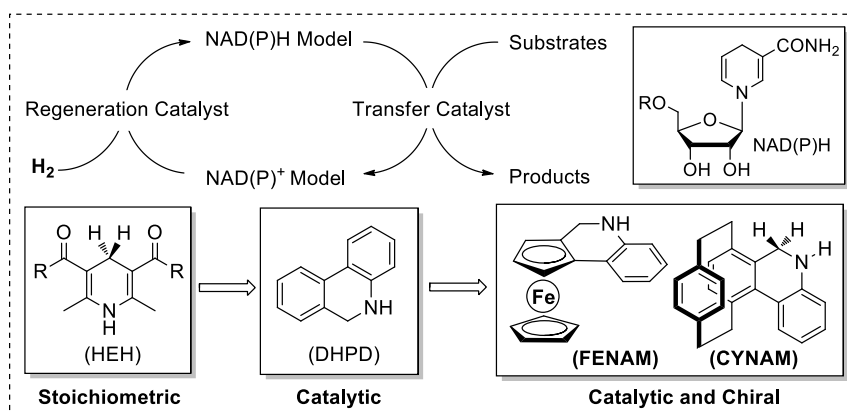
Biomimetic Asymmetric Reduction Based on NAD(P)H

Yong-Gui Zhou (周永贵)

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The development of biomimetic science plays an important role in modern science. In the cell, cofactor NAD(P)H is recognized as a couple of crucial enzymes and over 400 enzyme redox reactions depend on the NAD(P)H. Therefore, the development of biomimetic asymmetric reduction is highly desirable. Design of the NAD(P)H models, transfer catalysts and regeneration catalysts is important topic. Earlier studies focused on the stoichiometric amount of NAD(P)H models and suffered from intractable limitations in regeneration.



Recently, we developed a new regenerable cofactor NAD(P)H model phenanthridine (PD), hydrogen could be used as terminal reductant for reduction of imines and heteroaromatics in the presence of chiral transfer catalyst. Next, through rationale design of chiral and regenerable ferrocene and cyclophane-derived NAD(P)H models (FENAM and CYNAM), a new generation biomimetic reduction was developed using the achiral Brønsted acids, hydrogen bonding donors or Lewis acids as transfer catalysts. This biomimetic system exhibits wide substrate scope and high enantioselectivity. In addition, DFT calculations were carried out to give further insight into transition states.

References:

1. Dihydrophenanthridine: A New and Easily Regenerable NAD(P)H Model for Biomimetic Asymmetric Hydrogenation. Chen, Q.-A.; Gao, K.; Duan, Y.; Ye, Z.-S.; Shi, L.; Yang, Y.; Zhou, Y.-G. *J. Am. Chem. Soc.* **2012**, *134*, 2442.
2. (a) Catalytic Biomimetic Asymmetric Reduction of Alkenes and Imines Enabled by Chiral and Regenerable NAD(P)H Models. Wang, J.; Zhu, Z.-H.; Chen, M.-W.; Chen, Q.-A.; Zhou, Y.-G. *Angew. Chem. Int. Ed.* **2019**, *58*, 1813; (b) Chiral and Regenerable NAD(P)H Models Enabled Biomimetic Asymmetric Reduction: Design, Synthesis, Scope, and Mechanistic Studies. Wang, J.; Zhao, Z.-B.; Zhao, Y.; Luo, G.; Zhu, Z.-H.; Luo, Y.; Zhou, Y.-G. *J. Org. Chem.* **2020**, *85*, 2355.
3. Design and Synthesis of Chiral and Regenerable [2.2]Paracyclophane-Based NAD(P)H Models and Application in Biomimetic Reduction of Flavonoids. Zhu, Z.-H.; Ding, Y.-X.; Wu, B.; Zhou, Y.-G. *Chem. Sci.* **2020**, *10*, DOI: 10.1039/D0SC04188B.

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➤ Educational Background

1994–1998	B.Sc., Southwest Normal University
1998–2001	M.Sc., Chengdu Institute of Organic Chemistry, CAS
2001–2004	Ph.D., Shanghai Institute of Organic Chemistry, CAS

➤ Professional Career

2004–2007	University of Texas Southwestern Medical Center, postdoctor
2007–present	Sichuan University, professor

➤ Research Interests

Natural Product Synthesis (NPS)

Development of NPS-oriented Methodology

➤ Awards

- 2009 Awardee of Program for New Century Excellent Talents in University
- 2009 The First Prize of Natural Science Award, Ministry of Education of China (4th contributor)
- 2013 National Natural Science Foundation for Excellent Young Scholars
- 2014 Thieme Chemistry Journal Award
- 2014 ACP (Asian CORE program) Lectureship Award (Japan)
- 2015 Weishan Natural Product Synthesis Award, Chinese Chemical Society
- 2016 Organic Chemistry Frontier Emerging Investigator
- 2016 ACP (Asian CORE program) Lectureship Award (Singapore)
- 2018 ACP (Asian CORE program) Lectureship Award (Taiwan)
- 2018 Member of 12th Committee of Academic Leaders of Sichuan Province
- 2019 National Natural Science Foundation for Distinguished Young Scholars
- 2020 Senior Member of Chinese Chemistry Society

Synthetic Studies on Natural Diterpenoids Trigoxypin K and Crotophorbolone

Bo Liu (刘波)

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In accordance with our persistent interest in total synthesis of terpenoids with intriguing bioactivities, we have recently been focusing on synthetic studies on diterpenoids, such as atisane-type crotogoudin & crotoharin, as well as dimeric diterpenoid hispidanin A. At the same time, we are allured by complex structures, anti-HIV/anticancer bioactivities and synthetic challenge of daphnane-type, tiglane-type and ingenane-type diterpenoids. These different natural diterpenoids are biogenetically correlated, and have stimulated a lot of synthetic studies and several successful total syntheses in synthetic community. To explore concise synthetic strategy toward daphnane-type diterpenoids, we first initiated a project aiming at trigoxypin K, attempting to install the complex molecular architecture through convergent connection of the fully functionalized six-membered ring and five-membered ring. Failure to construct *trans*-fused 5-7 bicycle at the late stage of synthesis, through olefin transfer, drove us to an alternative convergent strategy in total synthesis of crotophorbolone. Details and discussion on the related research will be presented.

References:

1. B. Du, Z. Huang, X. Wang, T. Chen, G. Shen, S. Fu, B. Liu, A Unified Strategy toward Total Syntheses of Lindenane Sesquiterpenoid [4+2] Dimers, *Nat. Commun.* **2019**, *10*, 1892
2. C. Yuan, B. Du, H. Deng, Y. Man, B. Liu, Total Synthesis of Sarcandrolide J and Shizukaol D: Lindenane Sesquiterpenoid [4+2] Dimers, *Angew. Chem. Int. Ed.*, **2017**, *56*, 637-640.
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9. T. Yu, Y. Sun, C. Tu, T. Chen, S. Fu, B. Liu, Total Synthesis of Crotophorbolone, *Chem. Sci.* **2020**, *11*, 7177-7181.

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➤ Educational Background

1993–1996	B.Sc., Hubei Agriculture College
1997–2000	M.Sc., Huazhong University of Science and Technology
2000–2003	Ph.D., Dalian Institute of Chemical Physics, CAS

➤ Professional Career

2004.09–2008.03	Nagoya University, Postdoctoral Associate
2008.04–2016.03	Lanzhou Institute of Chemical Physics, CAS, full professor
2016.04–present	University of Science and Technology of China

➤ Research Interests

1) Develop new reactions based on inert bond activation; 2) Discover and design new catalysts; 3) Mechanism studies.

➤ Awards

- The National Science Fund for Excellent Young Scholars of China, 2012
- Excellent Hundred Talent, Chinese Academy of Sciences, 2013
- Youth Award for Homogeneous Catalysis, 2013
- The National Science Fund for Distinguished Young Scholars of China, 2019

Catalytic transformation of C-N Bonds: From C-N bond activation to C-N

Bond Metathesis

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One of the research interests in our group is developing new reaction on the basis of C-N bond. With tertiary amines as starting materials, we have developed three kinds of strategies for cleaving the C-N bond, which led us to establish a series of new transformations.^[1-5] Recently, a new type of C-N bond metathesis fundamental process has been established, which enabled a new kind of ring-closing reactions toward saturated *N*-heterocycles. In this talk, recent progresses will be presented.

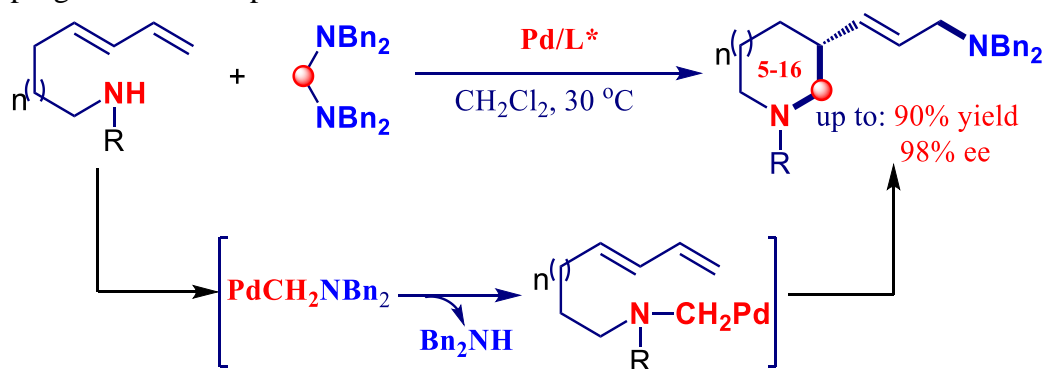


Fig. 1 Ring-closing Reactions Established via C-N bond Metathesis

References:

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2. Y. Hu, Y. Xie, Z. Shen, **H. Huang**, *Angew. Chem. Int. Ed.* **2017**, 56, 2473-2477.
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4. G. Qin, L. Li, J. Li, **H. Huang**, *J. Am. Chem. Soc.* **2015**, 137, 12490-12493.
5. H. Yu, G. Zhang, **H. Huang**, *Angew. Chem. Int. Ed.* **2015**, 54, 10912-10916.

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➤ Educational Background

1978–1982	B.Sc., China University of Geology (Wuhan)
1982–1985	M.Sc., Fujian Institute of Research on the Structure of Matter, CAS
1986–1989	Ph.D., University of Oxford

➤ Professional Career

1990–1993	Texas A&M University: Postdoctoral Research Associate
1994–present	HKUST: Assistant, Associate, Full Professor and Chair Professor

➤ Research Interests

Theoretical and computational inorganic chemistry: Structure, bonding and computer modelling in inorganic, organic, organometallic, inorganic cluster and solid state systems. Development and application of theories in the design of catalysts and other useful materials.

Boryls, Their Compounds and Catalysis-Theoretical and Computational Insights

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Boryls and their compounds, including transition metal boryl complexes and diboranes (4), play important roles in many catalytic/stoichiometric processes related to borylation of various organic substrates.

In this talk, transition metal catalyzed borylation of aldehydes, and various metal-free borylation reactions will be discussed. How boryls play their role in various chemical transformations will be emphasized. The relevant bonding feature and the exceptionally strong σ -donating/nucleophilic/electrophilic properties of boryls will be highlighted.

References:

- (a) Y. Katsuma, Y. L. Wu, Z. Lin, S. Akiyama, M. Yamashita, *Angew. Chem. Int. Ed.* **2019**, 58, 317.
(b) N. Tsukahara, H. Askawa, K. H. Lee, Z. Lin, M. Yamashita, *J. Am. Chem. Soc.* **2017**, 139, 2593.
(c) C. Kojima, K. H. Lee, Z. Lin, M. Yamashita, *J. Am. Chem. Soc.* **2016**, 138, 6662.
(d) T. Ohsato, Y. Okuno, S. Ishida, T. Iwamoto, K. H. Lee, Z. Lin, M. Yamashita, K. Nozaki, *Angew. Chem. Int. Ed.* **2016**, 55, 11426.
- (a) Z. Lin, *Structure and Bonding*. **2016**, 167, 39.
(b) Z. Lin, *Acc. Chem. Res.* **2010**, 43, 602.
(c) L. Dang, Z. Lin, T. B. Marder, *Chem. Comm.* **2009**, 3987.
(d) "Contemporary Metal Boron Chemistry I: Borylenes, Boryls, Borane Sigma-Complexes, and Borohydrides" T. B. Marder, Z. Lin, (Eds.); *Springer-Verlag* **2008**.
- (a) H. T. Zhao, L. Dang, T. B. Marder, Z. Lin, *J. Am. Chem. Soc.* **2008**, 130, 5586.
(b) H. T. Zhao, Z. Lin, T. B. Marder, *J. Am. Chem. Soc.* **2006**, 128, 15637.

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➤ Educational Background

1997–2001	B.Sc., Lanzhou University
2001–2006	Ph.D., Shanghai Institute of Organic Chemistry, CAS

➤ Professional Career

2006.09–2009.09	UNC at Chapel Hill, Postdoctoral Associate
2009.10–2013.12	The Scripps Research Institute, Postdoctoral Associate
2014.02–present	Nankai University, Professor

➤ Research Interests

Synthetic Organic Chemistry: 1) Discover, Design and Develop New Reactions and Catalysts; 2) Green Catalysis.

➤ Awards

Thieme Chemistry Journal Award (2017).

Ligand-Substrate Anchoring Catalysis

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Traditional catalysis relies on direct interaction of metal centers with substrates, which is in general not quite efficient for the activation of inert C–H and C–C bonds owing to high bond strength and low affinity of bond with metals. To enhance the reactivity, either intramolecular reactions are devised or additional directing groups are required to be pre-installed on substrates. Despite big progress achieved by these strategies, some intrinsic limitations such as tedious pre-activation of substrates, restricted product structures and high reaction cost are still extremely difficult to be circumvented. In this context, we hope to develop a new strategy instead of directing-group strategy to enhance the reactivity, in which substrates are pre-anchored with ligands through reversal interactions such as covalent bonding, coordination bonding, etc. Herein, we presented some latest results on this topic in our lab.^[1-5]

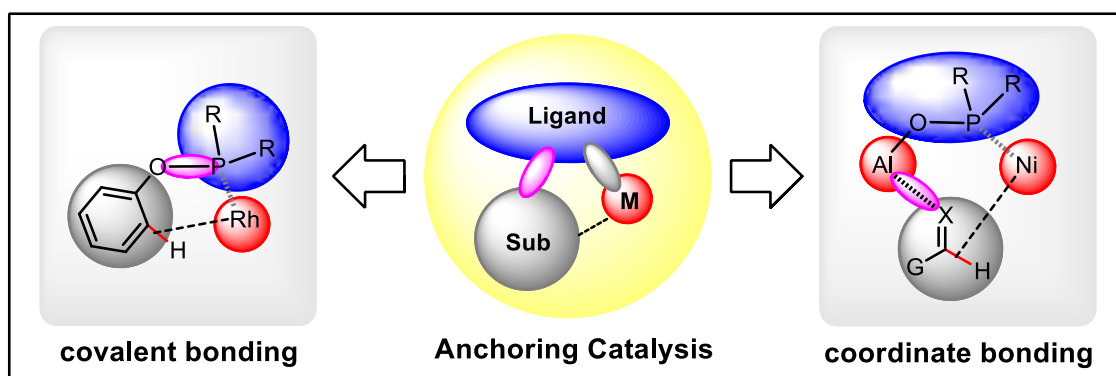


Fig. 1 Ligand-substrate anchoring catalysis

References:

1. Chen, H.; Wang, Y.-X.; Luan, Y.-X.; Ye, M. *Angew. Chem. Int. Ed.* **2020**, 59, 9428.
2. Zhang, T.; Luan, Y.-X.; Zheng, S.-J.; Peng, Q.; Ye, M. *Angew. Chem. Int. Ed.* **2020**, 59, 7439.
3. Wang, Y.-X.; Qi, S.-L.; Luan, Y.-X.; Han, X.-W.; Wang, S.; Chen, H.; Ye, M. *J. Am. Chem. Soc.* **2018**, 140, 5360.
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5. Wang, Y.-X.; Ye, M. *Sci. China Chem.* **2018**, 61, 1004. (review)

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➤ Educational Background

1999–2003	B.Sc., Zhejiang University
2003–2008	Ph.D., Shanghai Institute of Organic Chemistry, Chinese Academy of Sciences (with Prof. Yong Tang)

➤ Professional Career

2008.09–2009.05	The Scripps Research Institute, Postdoctoral Associate (with Prof. Cheng Liu & Subhash Sinha)
2009.05–2011.07	University of California at Santa Barbara, Postdoctoral Associate (with Prof. Liming Zhang)
2011.07–2012.06	Xiamen University, Associate Professor
2012.07–present	Xiamen University, Full Professor

➤ Research Interests

- 1) Alkyne (Ynamide) Chemistry, Transition Metal Catalysis (via metal carbene) and Asymmetric Catalysis;
2) Divergent Heterocycle Synthesis; 3) Natural Product, Bioactive Molecule and Drug Synthesis.

➤ Awards

- Changjiang Young Scholars, 2017.
- National Natural Science Funds for Excellent Young Scholars, 2016.
- Thieme Chemistry Journals Award, 2016.
- Natural Science Foundation of Fujian Province for Distinguished Young Scholars, 2015.

Ynamides in Divergent N-Heterocycle Synthesis

--A Journey of Development of Its Asymmetric Catalysis

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Ynamides are special alkynes attached to the nitrogen atom bearing an electron-withdrawing group, which provides enhanced stability. The electronic properties and the reactivity of ynamides can be easily tuned by the selection of the electron-withdrawing group attached to the nitrogen, thus making them highly versatile synthons. Importantly, the nitrogen atom is able to impose an electronic bias, resulting in the highly regioselective attack of this electron-rich heteroatom-substituted alkyne by a large variety of nucleophiles. In our recent study on the use of heterosubstituted alkynes for heterocycle synthesis, we have realized an array of catalytic ynamide oxidation-, amination- and cycloisomerization-initiated tandem reactions, especially for the asymmetric reactions, thus allowing the highly efficient and selective synthesis of versatile synthetically useful N-heterocycles.^[1-4]

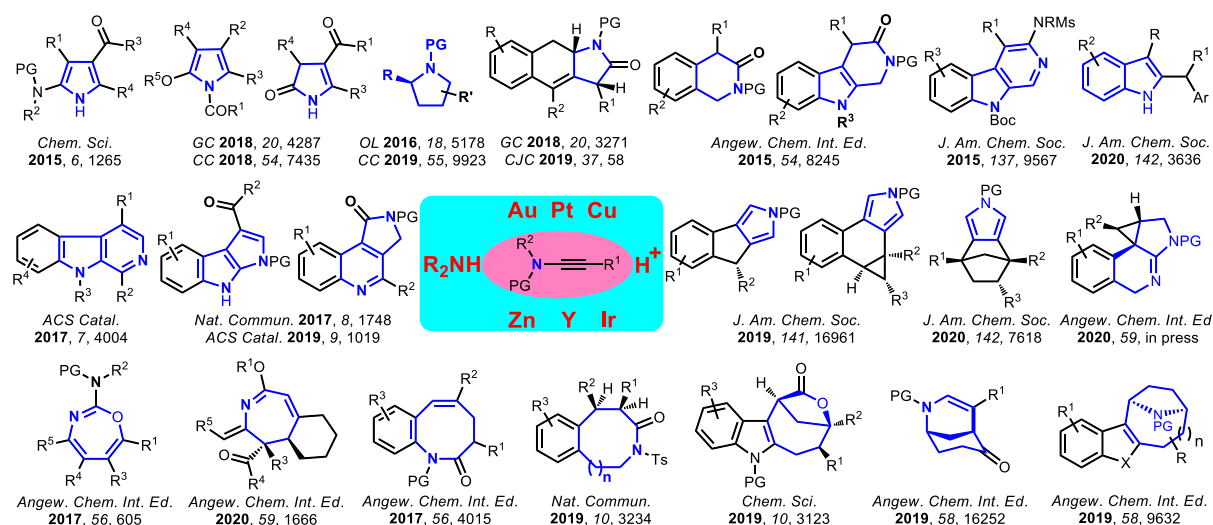


Fig. 1 Divergent N-Heterocycle Synthesis from Ynamides

References:

- Chen, Y.-B.; Qian, P.-C.; Ye, L.-W.* *Chem. Soc. Rev.* (minor revision).
- Hong, F.-L.; Ye, L.-W.* *Acc. Chem. Res.* **2020**, 53, in press.
- Ye, L.-W.* Zhu, X.-Q.; Sahani, R. L.; Xu, Y.; Qian, P.-C.; Liu, R.-S.* *Chem. Rev.* **2020**, 120, in press.
- Zhou, B.; Tan, T.-D.; Zhu, X.-Q.; Shang, M.; Ye, L.-W.* *ACS Catal.* **2019**, 9, 6393.

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➤ **Educational Background**

1997–2001	B.S., Applied Chemistry, Anhui University, China.
2002–2006	Ph.D., Material Science, University of Science and Technology of China, China.

➤ **Professional Career**

2007–2008	Post-Doctoral, Florida International University, USA
2009–2010	Alexander von Humboldt Research Fellow, Max Planck Institute for Solid State Research, Germany
2011–2011	Associate Professor, Beihang University, China
2012.–Now	Professor, University of Science and Technology of China (USTC), China

➤ **Research Interests**

- (1). Li-ion batteries; Na-ion batteries; Li-Sulfur batteries;
- (2). Lithium storage at Solid-Liquid Interfaces;
- (3). Controllable fabrication 1D nanomaterials;
- (4). Synthesis of porous materials by electrostatic spray deposition;
- (5). Graphene-based materials fabrication and application;
- (6). CVD carbon-based materials: fabrication, characterization and application;

➤ **Awards**

- Wiley outstanding Young Researcher (2018).
- Small Young Innovator Award, Wiley, Germany (2017).
- Young Scientist award from The Chemical Industry and Engineering Society of China (2017)
- Young Scientist award from The Ceramic Society of China (2017)
- 1000 Talents Plan from Chinese Government (2012)
- Sofja Kovalevskaja award from the Alexander von Humboldt Foundation, Germany (2012)
- Alexander von Humboldt Research Fellowship from Alexander von Humboldt Foundation, Germany(2008)
- Best Paper Award, the 9th USTC Graduate Research Symposium, 06/2006
- Dean's scholarship of Chinese Academy of Sciences, Chinese Academy of Sciences, 06/2007

Advanced Sodium-ion Batteries

Yan Yu (余彦)

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Sodium-ion batteries are of major importance, especially for large-scale energy storage devices, due to low cost and abundant source of sodium. As for the anode side, commercial graphite shows a limited capacity for sodium storage (31 mAh g⁻¹ using ethyl-methyl carbonate-based electrolyte and 100 mAh g⁻¹ using ether-based electrolyte). Compared to graphite based intercalation, the electrode materials based on conversion and alloy have been identified as promising anode candidates for sodium storage due to high theoretical capacity. However, poor kinetics and large volume change result in a low reversible capacity and fast capacity decay. In principle, nanostructural electrode materials can boost sodium storage kinetics because of shortening the chemical diffusion length of sodium. In reality, a multitude of challenging kinetic and structure stability problems, such as agglomeration of nanoparticles, increased contact resistance, and instability of solid electrolyte interphase (SEI) layers may be met and prevent their use in commercial sodium-ion batteries.

In order to address the above problems, we have designed and synthesized a series of carbon-based hybrid materials with hierarchical structures, such as carbon nanowire-encapsulated selenides, carbon nanosheet-supported sulfides, and mesoporous carbon-encapsulated phosphorus, carbon coated Na₃V₂(PO₄)₃. These multi-scale and hierarchically organized structures construct a highly efficient and stable mixed conductive network around the nano-active components. At the same time, they can keep the electrode integrity on cycling. These lead to excellent electrochemical performance for the obtained electrode materials in terms of reversibility, rate capability, and cycling stability.

References

1. F. Liu, X. Cheng, R. Xu, Y. Wu, Y. Jiang and Y. Yu*, *Adv. Funct. Mater.* **2018**, 28, 1800394.
2. C. Wu, Y. Jiang, P. Kopold, P. A. van Aken, J. Maier, Y. Yu, *Adv. Mater.* **2016**, 28, 7276-7283.
3. Y.-L. Ding, P. Kopold, K. Hahn, P. A. van Aken, J. Maier, Y. Yu, *Adv. Mater.* **2016**, 28, 7774-7782.
4. W. Li, Z. Yang, M. Li, Y. Jiang, X. Wei, X. Zhong, L. Gu, Y. Yu, *Nano Lett.* **2016**, 16, 1546-1553.

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➤ Educational Background

1993–1999	Ph.D., Fujian Institute of Research on the Structure of Chemistry, CAS
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➤ Professional Career

1999–2000	University of Science & Technology of China, postdoctor
2000–2001	University of North Carolina-Chapel Hill, USAS, postdoctor
2001–2003	University of Chicago, USAS, postdoctor
2005–present	Shanghai Jiao Tong University, professor

➤ Research Interests

Porous materials, chiral material; asymmetric catalysis, chiral separation, chiral optics

➤ Awards

- 2010 Award for Outstanding Young Scientists (NSFC)
- 2013 Cheung Kong Scholar (Ministry of Education of China)
- 2015 Fellow of RSC
- 2017 The First Prize of Tianjin Natural Science Award

Multi-Chirality in Porous Metal-Organic Complexes

Yong Cui (崔勇)

School of Chemistry & Chemical Engineering, Shanghai Jiao Tong University, Shanghai,
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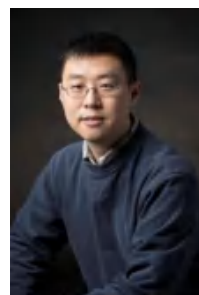
In synthetic materials, chirality related phenomena, such as synchronization, transfer from molecular to macroscopic levels and amplification have been discovered in various systems, including liquid crystals and polymers. In particular, chirality recognition and assembly of molecules in the porous solids help separation of enantiomeric molecules and asymmetric transformation of organic molecules. While early research on stereochemistry mainly focused on point chirality, other motifs that feature axial chirality, helical chirality, and planar chirality have been extensively investigated for their potential use in asymmetric catalysis, enantioseparation and chiroptics, as well as as chiral dopants. However, it remains a challenge to make and identify a complex system that combine two or more types of chirality. In this talk, we will show that crystalline framework materials including MOFs provide an ideal platform to prepare and identify functional materials with multi-chirality feature and understand how chiral recognition and transformation happen within the porous structures.

References:

1. W. Gong, X. Chen, H. Jiang, D. Chu, Y. Cui, Y. Liu, Highly Stable Zr(IV)-Based Metal–Organic Frameworks with Chiral Phosphoric Acids for Catalytic Asymmetric Tandem Reactions, *J. Am. Chem. Soc.* **2019**, *141*, 7498
2. C. Tan, X. Han, Z. Li, Y. Liu, Y. Cui, Controlled Exchange of Achiral Linkers with Chiral Linkers in Zr-Based UiO-68 MOF, *J. Am. Chem. Soc.* **2018**, *140*, 16229.
3. J. Dong, X. Han, Y. Liu, H. Li, Y. Cui, Metal-Covalent Organic Frameworks (MCOFs): A Bridge Between Metal-Organic Frameworks and Covalent Organic Frameworks. *Angew. Chem. Int. Ed.* **2020**, *59*, 13722.
4. C. Tan, K. Yang, J. Dong, Y. Liu, Y. Liu, J. Jiang, Y. Cui, Boosting Enantioselectivity of Chiral Organocatalysts with Ultrathin Two-Dimensional Metal-Organic Framework Nanosheets, *J. Am. Chem. Soc.* **2019**, *141*, 17685-17695.
5. C. Zhu, G. Yuan, X. Chen, Z. Yang, Y. Cui, Chiral Nanoporous Metal-Metallosalen Frameworks for Hydrolytic Kinetic Resolution of Epoxides, *J. Am. Chem. Soc.* **2012**, *134*, 8058-8061.

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➤ Educational Background

2002–2006	B.Sc., Peking University (Advisor: Zhenfeng Xi)
2006–2011	Ph.D., Boston University (Advisor: John A. Porco)

➤ Professional Career

2011–2015	MIT & Caltech, Postdoc (Advisor: Gregory C. Fu)
2015–present	Professor- Technical Institute of Physics and Chemistry, CAS Adjunct Professor-School of Future Technology, University of CAS Associate Director-CAS Key Laboratory of Photochemical Conversion and Optoelectronic Materials

➤ Research Interests

Synthetic organic chemistry focusing on supramolecular macrocycle chemistry and photochemical synthesis of functional molecules.

➤ Awards

- The National Science Fund for Excellent Young Scholars of China (2019)
- Thieme Chemistry Journals Award (2017)
- Recruitment Program of Global Experts (2015)
- Kenneth G. Hancock Memorial Award, American Chemical Society (2011)

Synthesis and Assembly of Conjugated Macrocycles

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Macrocyclic compounds are essential building blocks for topological structures and functional supramolecules. The design, synthesis, and applications of macrocycles facilitate the establishment and development of supramolecular chemistry. In particular, conjugated macrocycles feature strained geometry and optoelectronic properties, but have been underdeveloped because of their synthetic challenges. In this presentation, recent progresses in the Cong Group will be summarized with regard to the synthetic strategies and topological assemblies of conjugated macrocycles.^[1-3]

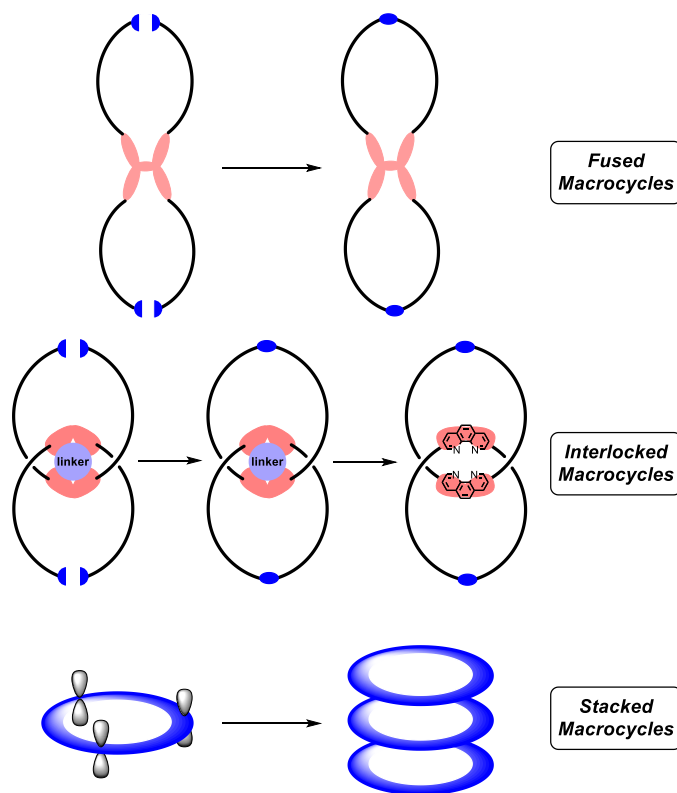


Fig. 1. Synthesis and Assembly of Conjugated Macrocycles

References:

1. (a) Z.-A. Huang, C. Chen, X.-D. Yang, X.-B. Fan, W. Zhou, C.-H. Tung, L.-Z. Wu, H. Cong, *J. Am. Chem. Soc.* **2016**, *138*, 11144. (b) S.-N. Lei, H. Xiao, Y. Zeng, C.-H. Tung, L.-Z. Wu, H. Cong, *Angew. Chem. Int. Ed.* **2020**, *59*, 10059.
2. Y.-Y. Fan, D. Chen, Z.-A. Huang, J. Zhu, C.-H. Tung, L.-Z. Wu, H. Cong, *Nat. Commun.* **2018**, *9*, 3037.
3. Unpublished results.

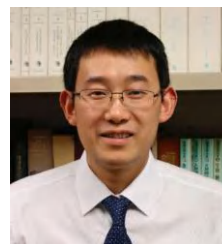
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➤ Educational Background

1998–2002	B.Sc., Sichuan Normal University
2004–2009	Ph.D., Sichuan University
2007–2009	Joint Ph.D. Student, University of California, Riverside

➤ Professional Career

2010.04–2011.12	University of Tokyo, JSPS Research Fellow
2012.01–2017.04	Xi'an Jiaotong University, Professor
2017.05–present	Sichuan University, Professor

➤ Research Interests

1) The development of low-valent Cr-catalyzed reactions for molecule synthesis; 2) The exploration of the ligand behavior of cyclic mono(amino)carbenes (CMAC) and development of CMAC-Cr-catalyzed organic reactions.

➤ Awards

- Thieme Chemistry Journal Award, 2020.
- ACP Lectureship Awards (Japan), 2019.
- ACP Lectureship Awards (Singapore), 2019.
- Reserve Candidates for Academic and Technological Leaders in Sichuan Province, 2018.
- 1000 Young Talent Program of Sichuan Province, 2017.
- High Level Introduction of Talent Researcher in Sichuan University, 2017.
- The Youth Talent Support Program in Xi'an Jiaotong University, 2016
- 3-Year Membership Award to the American Chemical Society, 2015.
- JSPS Postdoctoral Fellowship for Foreign Researchers, 2010.
- Research Fellowship of China Scholarship Council (CSC), 2007.

Cyclic (Monoamino)carbene Ligands and Chromium Catalysis

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The ligand behavior of electron-rich cyclic (monoamino) carbenes in synthetic chemistry has rarely been explored, while the chemistry of low-valent chromium catalysis has been less developed. The major research interests in Zeng's group at Sichuan University is developing cyclic (monoamino) carbene-promoted rhodium and chromium catalysis for hydrofunctionalization transformation. Moreover, the cross-coupling of unactivated C–O and C–N bonds with cost-effective chromium catalysis is disclosed.^[1-4] In this talk, recent advances in these fields will be presented.

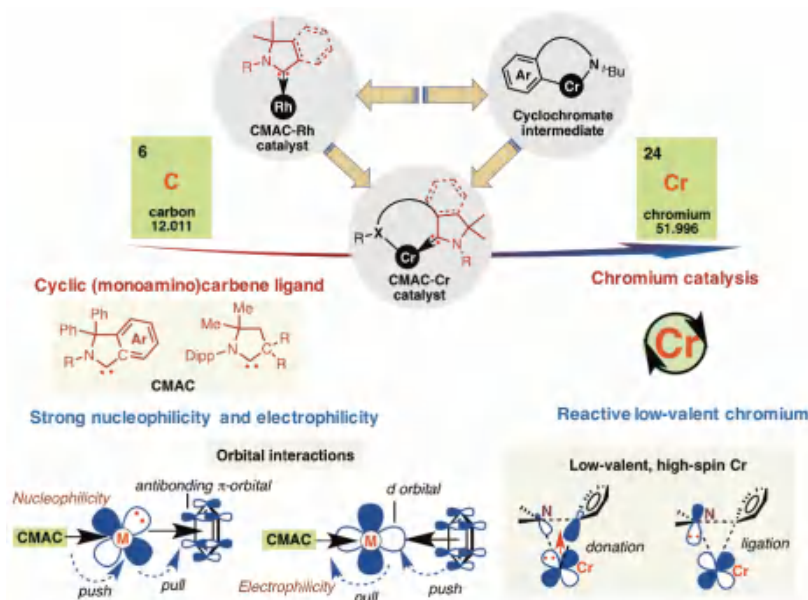


Fig. 1. Application of cyclic (monoamino)carbene ligands and chromium catalysis in synthetic chemistry

References:

1. “Highly Selective Hydrogenation of Aromatic Ketones and Phenols Enabled by Cyclic (Amino)(alkyl)carbene Rhodium Complexes”, Y. Wei, B. Rao, X. Cong, X. Zeng, *J. Am. Chem. Soc.* **2015**, *137*, 9250.
2. “Hydrogenation of (Hetero)aryl Boronate Esters with a Cyclic (Alkyl)(amino)carbene-Rhodium Complex: Direct Access to *cis*-Substituted Borylated Cycloalkanes and Saturated Heterocycles”, L. Ling, Y. He, X. Zhang, M. Luo, X. Zeng, *Angew. Chem. Int. Ed.* **2019**, *58*, 6554.
3. “Chemoselective Cross-Coupling between Two Different and Unactivated C(aryl)-O Bonds Enabled by Chromium Catalysis”, J. Tang, L.-L. Liu, S. Yang, X. Cong, M. Luo, X. Zeng, *J. Am. Chem. Soc.* **2020**, *142*, 7715.
4. “Reductive Cross-Coupling between Unactivated C(aryl)-N and C(aryl)-O Bonds by Chromium Catalysis Using a Bipyridyl Ligand”, J. Tang, F. Fan, X. Cong, L. Zhao, M. Luo, X. Zeng, *J. Am. Chem. Soc.* **2020**, *142*, 12834.

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➤ Educational Background

1999–2003	B.Sc., Wuhan University
2003–2008	Ph.D., Institute of Chemistry, Chinese Academy of Sciences

➤ Professional Career

2008–2013	University of Kansas, Postdoctoral Associate
2014–2015	University of Amsterdam, Postdoctoral Associate
2015–present	Institute of Chemistry, Chinese Academy of Sciences, full professor

➤ Research Interests

Supramolecular chemistry and supramolecular catalysis: Design and synthesis of tailor-made functional macrocycles for developing efficient molecular recognition and supramolecular catalysis.

➤ Awards

- Excellent Award of Young Scientists, Institute of Chemistry, Chinese Academy of Sciences, 2007
- Prize by the Director of the Institute of Chemistry, Chinese Academy of Sciences, 2007
- Excellent Award of Young Scientists, Institute of Chemistry, Chinese Academy of Sciences, 2006
- Prize by the Director of the Institute of Chemistry, Chinese Academy of Sciences, 2006
- Excellent Award of Young Scientists, Institute of Chemistry, Chinese Academy of Sciences, 2005

Recognition-Directed Macrocyclic Supramolecular Catalysis

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The development of highly efficient and selective catalysis is one of the ultimate goals for synthetic chemists. To conquer this challenge, the enzyme-mimetic cavity of macrocyclic compounds has been exploited to promote specific transformations. Their strong and specific recognition ability can be taken to boost or regulate a catalytic process through binding not only the substrate but also possibly an “indirect” reaction species. In this talk, I will first present our recent progress on developing a macrocycle-enabled counteranion trapping strategy for boosting highly efficient and selective catalysis.^[1-2] By applying tailor-made macrocycles with strong anion-binding ability, significant catalytic acceleration and excellent chiral control has been achieved in a series of acid-catalyzed reactions. The high catalytic efficiency and precise stereocontrol is achieved by large, complexation-induced acidity enhancement and tight noncovalent interactions triggered by the chiral macrocyclic cavity. In the second part, I will present a rare artificial substrate-induced assembly catalysis system inspired by enzyme-like induced fit principle.^[3] During the reaction course, the substrate can induce in-situ dimerization assembly of the chiral macrocycle catalysts and enable a reciprocal recognition and activation network. Our work thus showcases the great potential of macrocyclic supramolecular catalysis which we believe will find more applications on boosting challenging transformations.

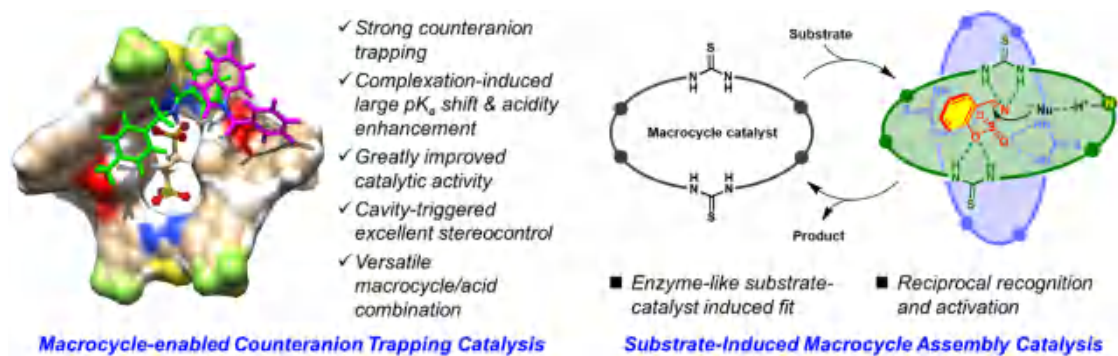


Fig. 1 Recognition-directed macrocyclic supramolecular catalysis developed in Wang's group.

References:

1. “Macrocycle-enabled Counteranion Trapping for Improved Catalytic Efficiency”, R. Ning, Y.-F. Ao, D.-X. Wang, Q.-Q. Wang, *Chem. Eur. J.* **2018**, 24, 4268.
2. “Chiral Macrocycle-enabled Counteranion Trapping for Boosting Highly Efficient and Enantioselective Catalysis”, R. Ning, H. Zhou, S.-X. Nie, Y.-F. Ao, D.-X. Wang, Q.-Q. Wang, *Angew. Chem. Int. Ed.* **2020**, 59, 10894.
3. “Substrate-Induced Dimerization Assembly of Chiral Macrocycle Catalysts toward Cooperative Asymmetric Catalysis”, H. Guo, L.-W. Zhang, H. Zhou, W. Meng, Y.-F. Ao, D.-X. Wang, Q.-Q. Wang, *Angew. Chem. Int. Ed.* **2020**, 59, 2623.

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➤ Educational Background

2003–2007	B.Sc., Beijing Institute of Petrochemical Technology
2007–2010	M.Sc., Nankai University
2010–2013	Ph.D., Nankai University

➤ Professional Career

2020.09–present	Nankai University, Associate professor
2017.09–2020.09	UCLA, Research Scholar
2016.9–2017.9	Nankai University, Associate professor
2013.07–2016.9	Nankai University, Assistant professor

➤ Research Interests

His current research interests include 1) Reactivity and Selectivity Rules in Organic Reactions, 2) Reaction Dynamics, and 3) The Chemistry of the Halogens.

Mechanistic Insights into Hypervalent Iodine Mediated/Catalyzed Fluorination and Dearomatization Reactions

Xiao-Song Xue (薛小松)

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Hypervalent iodine compounds have emerged as versatile and environmentally benign reagents/catalysts for organic chemistry.^[1] Although widely used in organic synthesis, these reagents/catalysts have remained poorly understood with respect to the reaction mechanism.^[2] In this talk, computational mechanistic insights into hypervalent iodine mediated/catalyzed fluorination and dearomatization reactions will be presented.^[3]

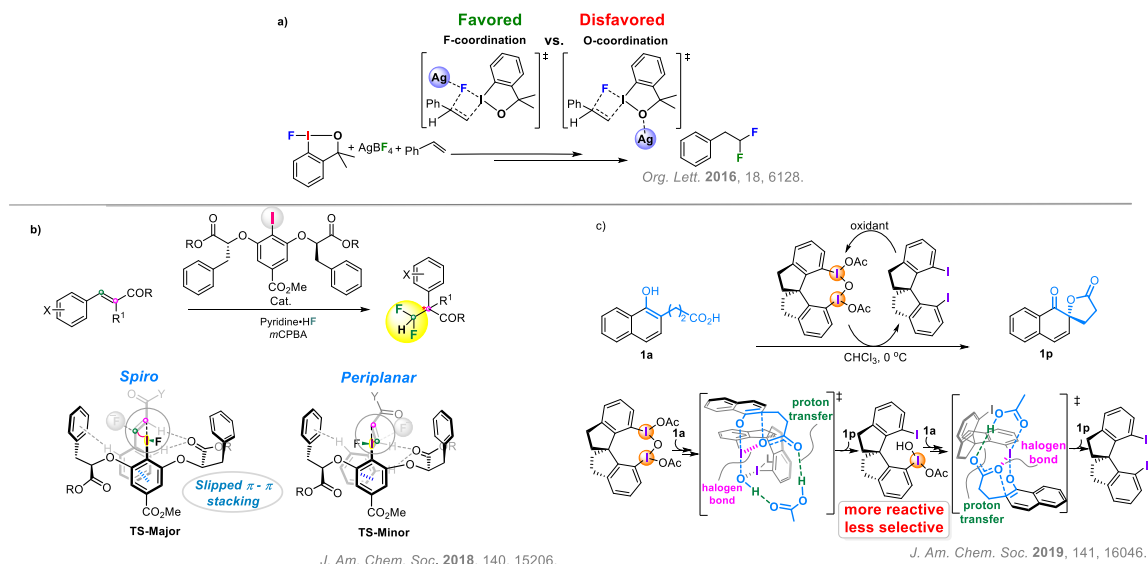


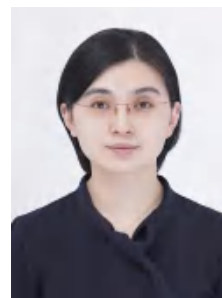
Fig. 1 computational mechanistic insights into hypervalent iodine mediated fluorination and dearomatization reactions

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1. “Advances in Synthetic Applications of Hypervalent Iodine Compounds. Yoshimura”, A.; Zhdankin, V. V. *Chem. Rev.* **2016**, 116, 3328.
2. “Hypercoordinate Iodine(III) Promoted Reactions and Catalysis: an Update on Current Mechanistic Understanding”, Sreenithya, A.; Surya, K.; Sunoj, R. B. *Wires Comput Mol Sci* **2017**, 7, e1299.
3. “Mechanism of Silver-Mediated Geminal Difluorination of Styrenes with a Fluoroiodane Reagent: Insights into Lewis-Acid-Activation Model”, Zhou, B.; Yan, T.; Xue, X.-S.; Cheng, J.-P., *Org. Lett.* **2016**, 18, 6128. “Origins of Chemo- and Stereoselectivities of Aryl Iodide-Catalyzed Asymmetric Difluorinations of β -Substituted Styrenes”, Zhou, B.; Haj, M. K.; Jacobsen, E. N.; Houk, K. N.; Xue, X.-S. Mechanism and *J. Am. Chem. Soc.* **2018**, 140, 15206. “Mechanism and Origins of Enantioselectivities in Spirobiindane-Based Hypervalent Iodine(III)-Induced Asymmetric Dearomatizing Spirolactonizations”, Zheng, H.; Sang, Y.; Houk, K. N.; Xue, X.-S.; Cheng, J.-P. *J. Am. Chem. Soc.* **2019**, 141, 16046-16056.

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➤ Educational Background

1997–2001	B.Sc., Baoji University of Arts and Sciences
2001–2006	Ph.D., Lanzhou University

➤ Professional Career

2006.07–2009.04	WuXi PharmaTech Co., Ltd. Shanghai, China
2009.04–2011.12	Peking University, Postdoctoral Fellow
2012.01–2014.04	Leibniz-Institut für Katalyse e.V. an der Universität Rostock, Germany, Experienced Humboldt Fellowship, Postdoctoral Fellowship
2014.05–present	Xi'an Jiaotong University, Professor

➤ Research Interests

1. Hydrogen generation from biomass; 2. Hydrogen storage related studies; 3. Photoredox catalyzed and transition metal catalyzed hydrogen release coupling.

➤ Awards

- Thieme Chemistry Journals Award, 2020.

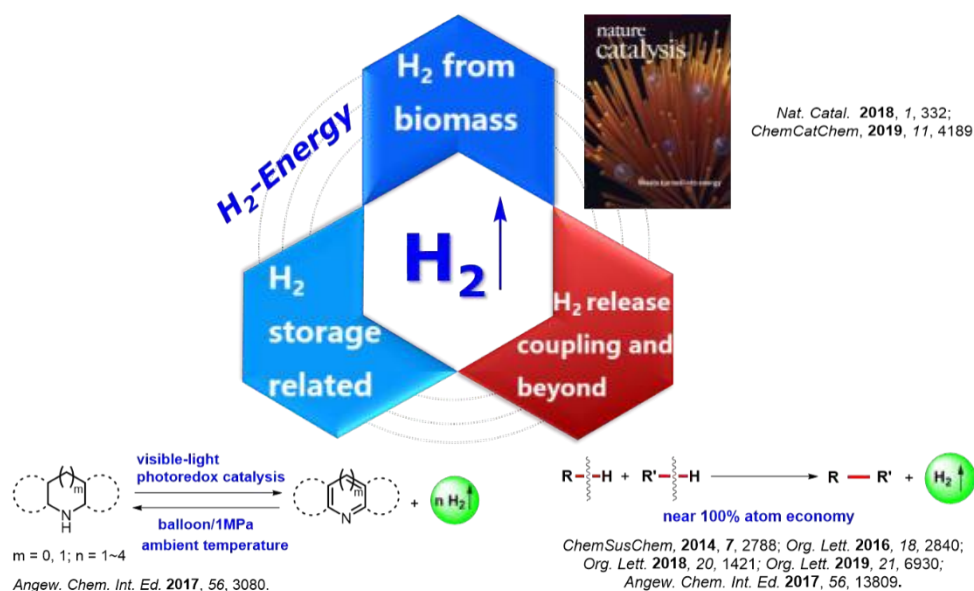
Research around Hydrogen Release and Beyond

Yang Li (李洋)

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Currently our group focus on the H₂ release catalysis for the studies of H₂ storage, H₂-releasing coupling reactions and H₂ generation from non-food biomass according to intramolecular H₂ release, intermolecular H₂ release and complex-molecular H₂ release.

In this lecture, the studies of H₂ storage related with “Acceptorless Dehydrogenation of N-Heterocycles by Merging Visible-Light Photoredox Catalysis and Cobalt Catalysis”^[1] and H₂-releasing coupling^[2-5] will be introduced briefly. H₂ generation from non-food biomass “Streamlined hydrogen production from biomass”^[6] and related studies^[7] will be introduced in detail.



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1. K.-H. He, F.-F. Tan, C.-Z. Zhou, G.-J. Zhou, X.-L. Yang, **Y. Li***, *Angew. Chem. Int. Ed.* **2017**, 56, 3080.
2. K.-H. He, W.-D. Zhang, M.-Y. Yang, K.-L. Tang, M. Qu, Y.-S. Ding, **Y. Li***, *Org. Lett.* **2016**, 18, 2840.
3. W.-F. Tian, D.-P. Wang, S.-F. Wang, X.-P. Cao*, **Y. Li***, *Org. Lett.* **2018**, 20, 1421.
4. W.-F. Tian, C.-H. Hu, K.-H. He, X.-Y. He, **Y. Li***, *Org. Lett.* **2019**, 21, 6930.
5. S.-F. Wang, X.-P. Cao, **Y. Li***, *Angew. Chem. Int. Ed.* **2017**, 56, 13809.
6. P. Zhang, Y.-J. Guo, J. Chen, Y.-R. Zhao, J. Chang, H. Junge, M. Beller*, **Y. Li***, *Nat. Catal.* **2018**, 1, 332.
7. F.-F. Tan, K.-L. Tang, P. Zhang, Y.-J. Guo, M. Qu, **Y. Li***, *ChemCatChem.* **2019**, 11, 4189.

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➤ Educational Background

1998–2002	B.Sc., Nanjing University
2002–2007	Ph.D., Shanghai Institute of Organic Chemistry

➤ Professional Career

2007.08–2008.07	UC Berkeley, Postdoctoral Associate
2008.08–2011.12	UC Santa Barbara, Postdoctoral Associate
2012.03–present	University of Science and Technology of China, professor

➤ Research Interests

Transition-metal Catalysis
Asymmetric Synthesis
Natural Product Synthesis

➤ Awards

- Thieme Synlett/Synthesis Journal Award, 2014.

Catalytic Asymmetric Ring-Opening Reaction

Zhenhua Gu(顾振华)

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One of the research interests in Gu group at University of Science and Technology of China is developing new synthetic methods for the practical synthesis of atropisomers, particular the axially chiral biaryls.^[1-3] In this talk, I will talk about the ring torsional strain promoted bond activation reactions, which are successfully applied to the axially chiral biaryl synthesis (Fig. 1).

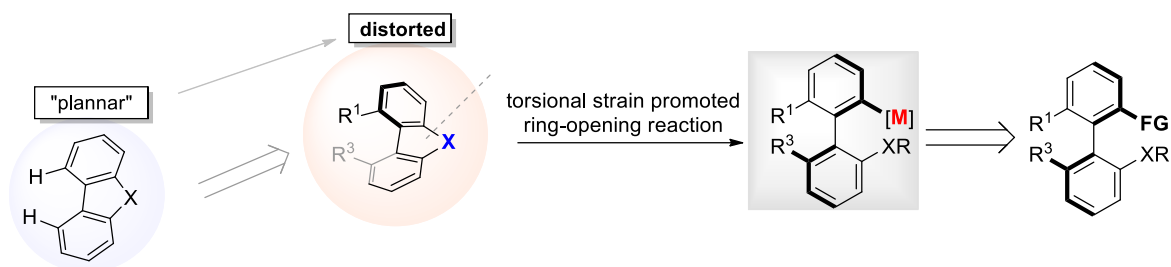


Fig. 1 Torsional Strain Promoted Ring-Opening Reactions

References:

1. Enhanced Reactivity by Torsional Strain of Cyclic Diaryliodonium in Cu-Catalyzed Enantioselective Ring-Opening Reaction, K. Zhao, L. Duan, S. Xu, J. Jiang, Y. Fu, Z. Gu, *Chem* **2018**, 4, 599–612.
2. Atroposelective Ring Opening of Cyclic Diaryliodonium Salts with Bulky Anilines Controlled by a Chiral Cobalt(III) Anion, X. Zhang, K. Zhao, N. Li, J. Yu, L.-Z. Gong, Z. Gu, *Angew. Chem. Int. Ed.* DOI:10.1002/anie.202008431.
3. Enantioselective Carbon-Carbon Bond Cleavage for Biaryl Atropisomers Synthesis, R. Deng, J. Xi, Q. Li, Z. Gu, *Chem* **2019**, 5, 1834-1846.

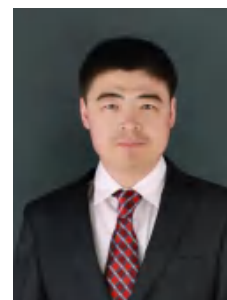
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➤ Educational Background

2002–2006	B.Sc., Northeast Agricultural University
2006–2011	Ph.D., Shanghai Institute for Organic Chemistry, CAS

➤ Professional Career

2011.11–2013.07	Technical University of Munich (TUM), Postdoctoral Associate
2013.09–2014.09	RWTH Aachen University, Postdoctoral Associate
2014.11–2016.08	University of Delaware, Postdoctoral Associate
2016.08–present	Wuhan University, Principal Investigator

➤ Research Interests

Synthetic Organic Chemistry: 1) Development of New Reactions and Catalysts. 2) Exploration of Transformations Involving Metal Migration and Related Mechanism Studies.

➤ Awards

- Thieme Chemistry Journal Award, 2017

When Metal Migration Meets “Boron”

Guoyin Yin (阴国印)

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The main research interests of Yin group at Wuhan University is developing transformations involving metal migration,^[1] particularly focus on Boron-related metal migration reactions and the related mechanism investigations. Some of the metal migration reactions catalyzed by Ni catalysts discovered by the Yin group have been shown in the scheme below.^[2-6] In this talk, recent progresses will be presented.

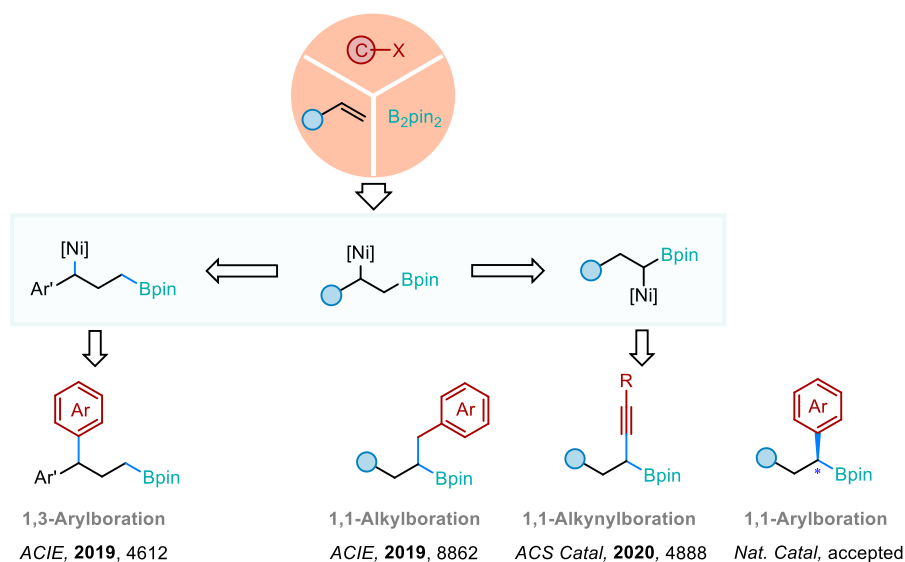


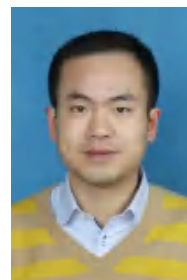
Fig. 1 Migratory Carboboration of Alkenes Discovered by the Yin Group

References:

1. “Difunctionalization of Alkenes Involving Metal Migration”, Hong-Gang Cheng,* and Guoyin Yin*, *Angew. Chem. Int. Ed.* **2020**, 59, 7990-8003.
2. “Nickel-Catalyzed 1,1-Alkylboration of Electronically Unbiased Terminal Alkenes”, Guoyin Yin*, *Angew. Chem. Int. Ed.* **2019**, 58, 8872-8876.
3. “Migratory Arylboration of Unactivated Alkenes Enabled by Nickel Catalysis”, Guoyin Yin*, *Angew. Chem. Int. Ed.* **2019**, 58, 4612-4616.
4. “Reaction Scope and Mechanistic Insights of Nickel-Catalyzed Migratory Suzuki-Miyaura Cross-Coupling”, Yu Lan,* and Guoyin Yin*, *Nat. Commun.* **2020**, 11, 417.
5. “Nickel-Catalyzed Chemodivergent 1,1-Difunctionalization of Unactivated α -Olefins with Alkynyl Electrophiles and B₂pin₂”, Guoyin Yin*, *ACS Catal.* **2020**, 10, 4888-4894.
6. “Catalyst-Controlled Enantioselective 1,1-Arylboration of Unactivated Alkenes”, Guoyin Yin*, *Nat. Catal.* **2020**, Accepted manuscript.

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➤ Educational Background

2002–2006	B.Sc., Hefei University of Technology
2009–2011	Visiting student, Wenzhou University (with Prof. Yuanzhi Xia)
2006–2011	Ph.D., Qinghai Institute of Salt Lakes, CAS (with Prof. Yahong Li)

➤ Professional Career

2011.08–2014.12	Stockholm University, Postdoctoral Associate (with Prof. Fahmi Himo)
2014.12–present	Tianjin University, Associate Professor

➤ Research Interests

Our group is interested in applying state-of-the-art computational methods to investigate organic and organometallic reactions, focusing on the mechanisms, reactivity and selectivity. In addition, our group is always interested in collaborations with experimental groups on a national and international level to provide theoretical insights into the questions of interest.

Computational Studies of Transition Metal-Catalyzed Organic

Reactions: Mechanisms and Selectivities

Genping Huang (黄跟平)

Department of Chemistry, Tianjin University, Tianjin, P. R. China.

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Our group is interested in applying the state-of-the-art computational methods to elucidate the detailed reaction mechanisms and the origins of the various selectivities of the transition metal-catalyzed organic reactions. In this talk, selected examples of our recent work about the computational studies on the Pd-catalyzed allylic substitution toward α,α -disubstituted allylic *N*-alkyl/aryl amines will be presented (Figure 1).^[1-3] By means of density functional theory calculations, we were able to establish the detailed reaction mechanisms and uncover a number of new aspects of the reactions. In particular, the origins of the experimentally observed regio- and enantioselectivities were well reproduced and rationalized.

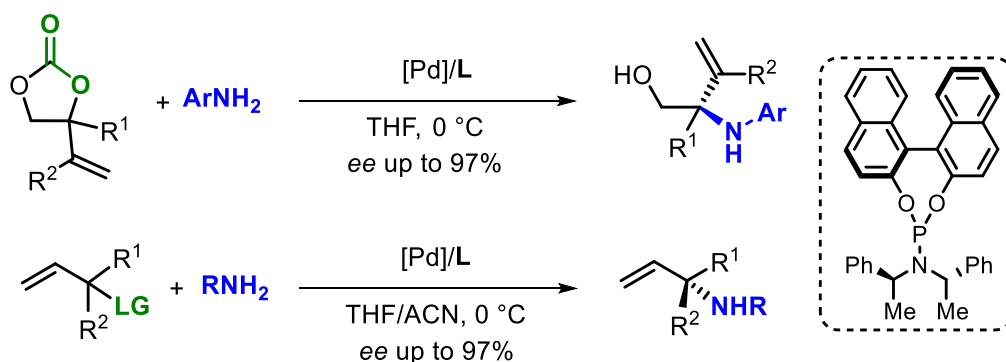


Fig. 1 Pd-Catalyzed Allylic Substitution Reactions

References:

1. A. Cai, W. Guo, L. Martínez-Rodríguez, A. W. Kleij, Palladium-Catalyzed Regio- and Enantioselective Synthesis of Allylic Amines Featuring Tetrasubstituted Tertiary Carbons. *J. Am. Chem. Soc.* **2016**, *138*, 14194-14197.
2. W. Guo, A. Cai, J. Xie, A. W. Kleij, Asymmetric Synthesis of α,α -Disubstituted Allylic Amines through Palladium-Catalyzed Allylic Substitution. *Angew. Chem. Int. Ed.* **2017**, *56*, 11797-11801.
3. L. Hu, A. Cai, Z. Wu, A. W. Kleij, G. Huang, A Mechanistic Analysis of the Palladium-Catalyzed Formation of Branched Allylic Amines Reveals the Origin of the Regio- and Enantioselectivity through a Unique Inner-Sphere Pathway. *Angew. Chem. Int. Ed.* **2019**, *58*, 14694-14702.

Dawen Niu

Sichuan University

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➤ Educational Background

2002–2006	B.Sc., Southeast University
2008–2013	Ph.D., University of Minnesota, Twin Cities

➤ Professional Career

2013–2015	MIT, Postdoctoral Associate
2015–present	Sichuan University, Professor

➤ Research Interests

Carbohydrate Chemistry, Transition Metal Catalysis, Asymmetric Synthesis.

➤ Awards

- Henry Fok Ying Tung Young Investigator
- Thieme Chemistry Journals Journal Award, 2017.

Synthesis of Carbohydrate Derivatives

Dawen Niu (钮大文)

Sichuan University, Chengdu, China

E-mail: niudawen@scu.edu.cn

Glycosides and polyhydroxylated natural products are ubiquitous in Nature, many of which displayed significant potential as therapeutic agents. Direct, site-selective modification of these complex products would allow accesses to their derivatives, thereby facilitating the investigation of their bioactivities. We have developed several different strategies that achieved site-selective and sometimes site-divergent functionalization of these natural products, including digitoxin, ouabain, ecdysterone, and oridonin.

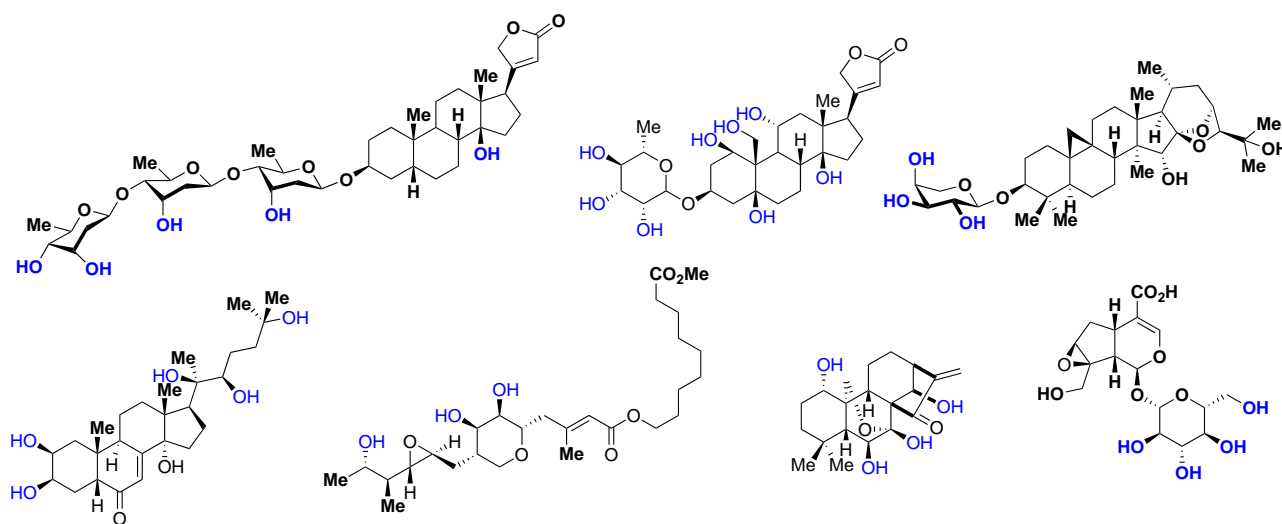


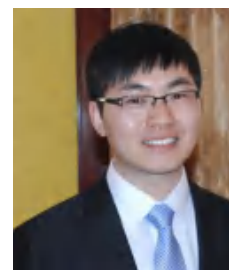
Fig. 1 Some representative natural products that are selectively modified

References

1. Shang, W.-D.; Mou, Z.-D.; Tang, H.; Zhang, X.; Liu, J.; Fu, Z.; Niu, D.* *Angew. Chem. Int. Ed.* **2018**, *130*, 320–324.
2. Li, R.-Z.; Tang, H.; Wan, L.; Zhang, X.; Liu, J.; Fu, Z.; Yang, S.; Jia, D.; Niu, D.* *Chem* **2017**, *3*, 834–845.
3. Li, R.-Z.; Tang, H.; Yang, K. R.; Wan, L.-Q.; Fu, Z.; Liu, J.; Zhang, X.; Niu, D.* *Angew. Chem. Int. Ed.* **2017**, *56*, 7213–7217.

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➤ Educational Background

2002–2006	B.Sc., Lanzhou University
2006–2012	Ph.D., Lanzhou University

➤ Professional Career

2012.07–2015.08	Lanzhou University, Lecturer
2013.01–2015.08	Max Planck Institute of Molecular Physiology, Postdoc
2015.09–present	Shandong University, Professor

➤ Research Interests

1) Organic synthesis based on noncovalent weak interactions; 2) Synthesis of bioactive natural products and their scaffolds oriented chemical biology.

➤ Awards

- National Science Fund for Excellent Young Scholars, 2020.
- Thieme Chemistry Journals Award, 2019.
- Humboldt Research Scholarship, 2013.
- Baosteel Scholarship, 2010.

Noncovalent Chalcogen-Bonding Catalysis

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The noncovalent S \cdots O bonding interaction is an evolutionary force that has been smartly exploited by nature to modulate the conformational preferences of proteins.^[1] One of the research interests in Wang group is to exploit this type of noncovalent force to drive chemical reactions. As shown in the figure below, a class of powerful chalcogen-bonding catalysts were discovered and applied to solving synthetic problems.^[2-3] In this talk, recent progresses will be presented.

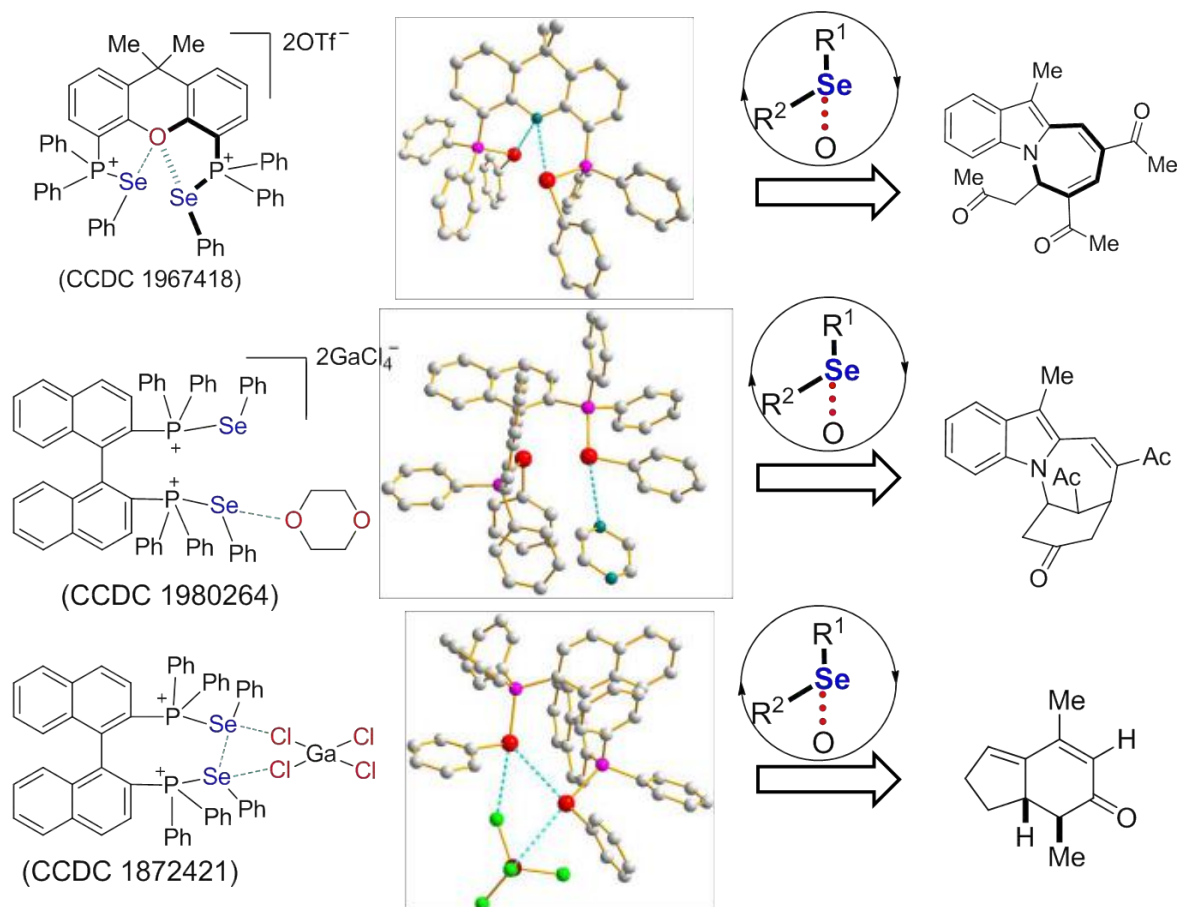


Fig. 1 Discovery of chalcogen-bonding catalysts and their applications.

References:

1. S. Scheiner, *Noncovalent Forces*, Springer International Publishing: Cham, **2015**.
2. Dual Chalcogen-Chalcogen Bonding Catalysis, W. Wang, H. Zhu, L. Feng, Q. Yu, J. Hao, R. Zhu, Y. Wang, *J. Am. Chem. Soc.* **2020**, *142*, 3117.
3. W. Wang, H. Zhu, S. Liu, Z. Zhao, L. Zhang, J. Hao, Y. Wang, Chalcogen-Chalcogen Bonding Catalysis Enables Assembly of Discrete Molecules, *J. Am. Chem. Soc.* **2019**, *141*, 9175.

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➤ Educational Background

1998–2000	B.Sc., Nanjing University
2000–2005	Ph.D., Peking University

➤ Professional Career

2005.07–2007.06	Peking University, Postdoctoral Associate
2007.09–2010.03	University of Muenster, Germany, AvH Postdoctoral Associate
2010.04–present	Institute of Chemistry, CAS, Full Professor

➤ Research Interests

- 1) Manganese Organometallic Catalysis
- 2) Metal Carbyne Catalysis

➤ Awards

- 10th CCS-BASF Youth Knowledge Innovation Prize, CCS, China, 2019.
- 5th Homogeneous Catalysis Young Investigator Award, CCS, China, 2019.
- Spokesman of Manganese, Chinese Young Chemist Periodic Table, CCS, 2019.
- Thieme Chemistry Journal Award, Germany, 2015.
- Asian Core Program Lectureship Award, Japan & Singapore, 2015.
- The National Science Fund for Excellent Young Scholars, China, 2013.
- Alexander von Humboldt Equipment Subsidy, Germany, 2011.
- Outstanding Young Talent from Abroad, ICCAS, 2010.
- Alexander von Humboldt Research Fellowship, Germany, 2008.
- First Class Grant of China Postdoctoral Science Foundation, China, 2006.
- Outstanding Graduate, Peking University, China, 2005.

➤ Academic Services

- Associate Editor, *Green Synthesis & Catalysis*, Elsevier, 2020.
- Associate Editor, *Chinese Chemical Letters*, Elsevier, 2017.

Manganese-catalyzed Grignard-type C-H Addition Reactions

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Transition-metal-catalyzed Grignard-type C-H addition may have potentials to address the issues such as mild reaction conditions, high atom-economy, high step-economy as well as good functional group tolerance. However, a range of challenges remain in this field, such as the selectivity among different C-H bonds, the low nucleophilicity of C-TM bond compared to the C-Mg bond, the reverse of addition, and the release of metal from X-M species, which are relatively stable. The background and advance of manganese-catalyzed Grignard-type C-H addition reactions will be the focus of this talk.

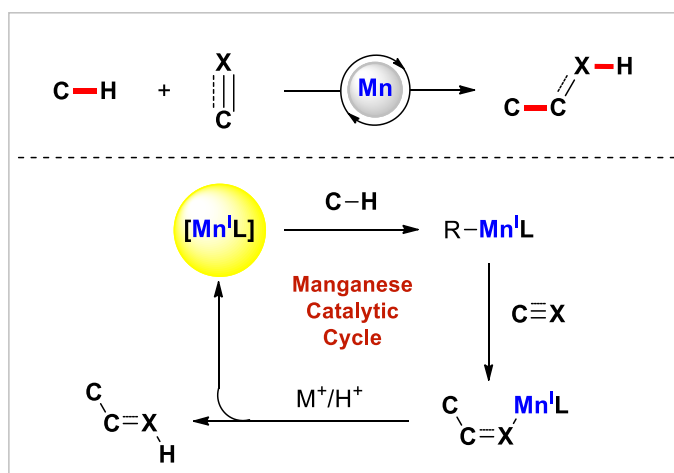


Fig. 1 Manganese-catalyzed Grignard-type C-H addition reactions

References:

1. Zhou, B.; Hu, Y.; Wang, C. Manganese-Catalyzed Direct Nucleophilic C(sp²)-H Addition to Aldehydes and Nitrile, *Angew. Chem., Int. Ed.* **2015**, *54*, 13659.
2. Zhou, B.; Hu, Y.; Liu, T.; Wang, C. Aromatic C-H Addition of Ketones to Imines Enabled by Manganese-Catalysis, *Nat. Commun.* **2017**, *8*, 1169.
3. Liu, T.; Hu, Y.; Yang, Y.; Wang, C. Manganese-Catalyzed Deoxygenative [3+2] Annulations of Ketones and Aldehydes via C-H Activation, *Chem* **2020**, *2*, 749.

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➤ Educational Background

2001–2008	B.Sc. and M.Sc., Yangzhou University
2008–2011	Ph.D., Peking University

➤ Professional Career

2011.08–2014.01	Westfälische Wilhelms-Universität Münster, Postdoctoral Associate
2014.02–present	Nanjing University, full professor

➤ Research Interests

Computational and Synthetic Organic Chemistry: the activation of inert chemical bonds, radical chemistry, boron chemistry and asymmetric catalysis.

➤ Awards

- 2018 Chinese Chemical Society Youth Chemistry Award, China
- 2018 Distinguished Young Scholar from Jiangsu Provincial Government, China
- 2017 “Innovation & Entrepreneurship Talents Plan” of Jiangsu Province, China
- 2016 Thieme Chemistry Journal Awardees
- 2014 Jiangsu Specially-Appointed Professor of Jiangsu Provincial Government, China
- 2014 National 1000-Young Talents Plan, Organization Department, CCCPC

Green and selective C-H functionalization of indoles

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Indoles and their synthetic analogues have become one of the most widely studied structural frameworks due to their prevalence in many bioactive molecules. Owing to the inherent reactivity of the pyrrole ring of indole, the great development has been witnessed for direct functionalization of indole at the C2- and C3-position via transition-metal-catalyzed C–H activation. However, the development of efficient synthetic strategies for the site-direct C4–C7 functionalization of indole remains as a key issue to be addressed. In this report, we have summarized our recent advances on site-selective C–H functionalization of indoles at the benzene core, including 1) C7-arylation, olefination, alkylation, acylation, methylation, esterification, silylation, borylation and hydroxylation, 2) C6-arylation, olefination, 3) C5-arylation, C4-arylation.

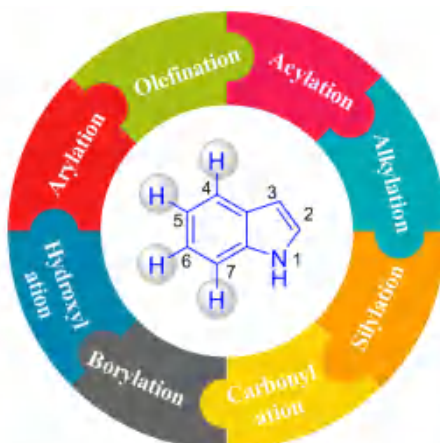


Fig. 1 From C4-C7: Innovative Strategies for Site-selective Functionalization of Indole C–H Bonds

References:

1. J.-H. Lv, X.-Y. Chen, X.-S. Xue, B.-L. Zhao, Y. Liang, M.-Y. Wang, L.-Q. Jin, Y. Yuan, Y. Han, Y. Zhao, Y. Lu, J. Zhao, W.-Y. Sun, Kendall. N. Houk* and Z.-Z. Shi,* Metal-Free Directed sp^2 -C–H Borylation, *Nature* **2019**, 575, 336.
2. X.-D. Qiu, P.-P. Wang, D.-Y. Wang, M.-Y. Wang, Y. Yuan and Z.-Z. Shi,* PIII-Chelation-Assisted Indole C7-Arylation, Olefination, Methylation, and Acylation with Carboxylic Acids/Anhydrides by Rhodium Catalysis, *Angew. Chem. Int. Ed.* **2019**, 58, 1504.
3. Y.-Q. Yang, P. Gao, Y. Zhao and Z.-Z. Shi,* Regiocontrolled Direct C–H Arylation of Indoles at the C4 and C5 Positions, *Angew. Chem. Int. Ed.* **2017**, 56, 3966.
4. Y.-Q. Yang, R.-R. Li, Y. Zhao, D.-B. Zhao and Z.-Z. Shi,* Cu-Catalyzed Direct C6-Arylation of Indoles, *J. Am. Chem. Soc.* **2016**, 138, 8734.
5. Y.-Q. Yang, X.-D. Qiu, Y. Zhao, Y.-C. Mu, Z.-Z. Shi,* Palladium-Catalyzed C–H Arylation of Indoles at the C7-Position, *J. Am. Chem. Soc.* **2016**, 138, 495.

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➤ Educational Background

2004–2007	B.S., Hefei University of Technology
2007–2012	Ph.D., Shanghai Institute of Organic Chemistry, CAS

➤ Professional Career

2013–2016	Princeton University, Post-doc
2016–present	Donghua University, professor

➤ Research Interests

Development of new synthetic strategies that enable facile and selective construction of highly functionalized complex molecules from abundant starting materials by utilizing earth abundant transition metal catalysts.

➤ Awards

- Shanghai Women of Innovation Rookie Award (2020)
- Shanghai Rising-Star Program Scholar (2020)
- National Natural Science Award (Second Class, Ranked 2nd) (2019)
- Shanghai Natural Science Award (First Class, Ranked 2nd) (2017)
- Thousand Talents Program Scholar (2017)
- Shanghai Sailing Program Scholar (2017)
- The Top 100 Best Ph.D. Thesis (2013)
- Outstanding Graduate Award (2012)

Selective, Three-component Dicarbofunctionalization of Unactivated Alkenes via Nickel Catalysis

Lingling Chu (储玲玲)

Center for Advanced Low-dimension Materials, Donghua University, Shanghai, 201610 E-mail: lingling.chu1@dhu.edu.cn

Transition metal-catalyzed dicarbofunctionalization of alkenes has been proven as a powerful strategy to the rapid generation of molecular complexity by simultaneously forging two vicinal sp^3 C–C bonds from abundant building blocks in one single operation; however, selective control, particularly with enantioselective control, of the newly formed stereogenic centers in three-component assembly mode, remains a formidable challenge. Utilizing a nickel-catalyzed radical cascade strategy, we have developed a series of intermolecular, three-component dicarbofunctionalization of unactivated alkenes with excellent selectivity under mild conditions, allowing for facile excess to a wide range of highly functionalized fluoroalkyl-containing molecules from simple starting materials.

Nickel-Catalyzed Selective Intermolecular Dicarbofunctionalizations

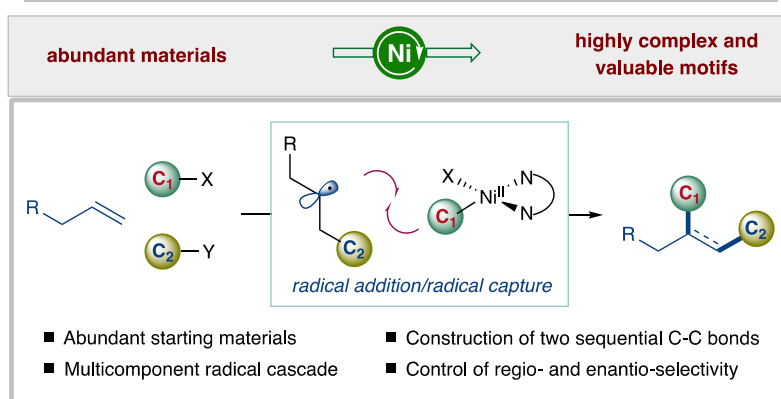


Fig. 1 Ni-catalyzed three-component dicarbofunctionalization of unactivated alkenes

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➤ Educational Background

1996–2000	B.Sc., Xiamen University
2000–2003	M.Sc., Xiamen University
2003–2007	Ph.D., Hong Kong University of Science & Technology

➤ Professional Career

2007.09–2008.07	the University of Hong Kong, Postdoctoral Associate
2008.07–2010.07	Uppsala University, Postdoctoral Associate
2010.07–present	Xiamen University, Associate, full professor

➤ Research Interests

Physical organic chemistry: Investigate the structure and bonding (aromaticity), reaction mechanisms of small molecule activations in organic/organometallic chemistry via quantum calculations and test our predictions by ourselves or via tight collaborations with top experimental groups.

➤ Awards

- The New Century Excellent Talents in University (2013)
- The Top-Notch Young Talents Program of China (2014)
- The Leading Talents in the Fujian Province (2015)
- The First Prize of the Natural Science in Fujian Province (The third authorship, 2019)

Metal-Free Dinitrogen Activation by Frustrated Lewis Pair:

A Theoretical Study

Jun Zhu (朱军)

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Activation of the strongest triplet bond in molecular nitrogen (N_2) under mild conditions is particularly challenging. Recently, its fixation and reduction were achieved by highly reactive dicoordinated borylene species at ambient conditions, ripping the limits of harsh reaction conditions by metallic species. Less reactive species with a facile preparation could be desirable for next-generation N_2 activation. Now density functional theory calculations reveal that tricoordinated boranes could be a potential candidate of N_2 activation/functionalization. As composites of an intramolecular frustrated Lewis pair (FLP), optimal and realistic boranes are screened out to activate N_2 in a significantly favorable manner (both thermodynamically and kinetically). The significant thermodynamic stabilities of the FLP- N_2 adducts as well as the low activation barriers could be particularly interesting for the development of borane-based FLP chemistry applied in N_2 activation.^[1-3]

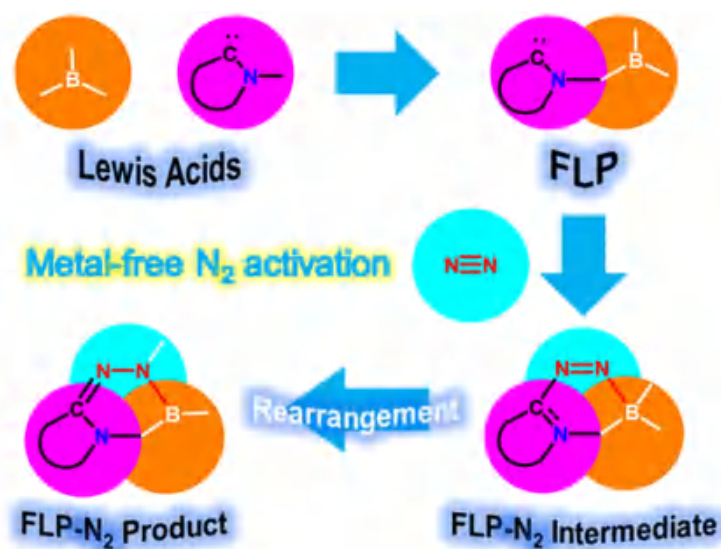


Fig. 1 Proposed Dinitrogen Activation by Frustrated Lewis Pair

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2. "Dinitrogen Activation by Tricoordinated Boron Species: A Systematic Design", A. M. Rouf, C. Dai, F. Xu, J. Zhu, *Adv. Theory Simul.* **2020**, *3*, 1900205.
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➤ Educational Background

1992–1995	B.Sc., Stockholm University
1995–2000	Ph.D., Stockholm University

➤ Professional Career

2000–2003	Scripps Research Institute, postdoctor
2003–2005	Royal Institute of Technology, postdoctor
2005–2009	Royal Institute of Technology, assistant professor
2009–present	Stockholm University, professor

➤ Research Interests

His work is concerned with quantum chemical modeling of both homogeneous and enzymatic catalysis.

➤ Awards

- **Göran Gustafsson Award 2011.** Awarded by the Royal Swedish Academy of Sciences. “For his development and application of quantum mechanical techniques for elucidation of enzymatic and homogeneous catalysis of chemical reactions”.
- **2010-2015:** 6-year Senior Research Position in “Theoretical Modeling of Molecular Catalytic Processes”, awarded by the Swedish Research Council.
- **2005-2009:** 4-year Junior Research Position (Assistant Professor) awarded by the Swedish Research Council.
- **The Sven & Ebba-Christina Hagberg Prize 2003.** Awarded by the Royal Swedish Academy of Sciences. “For Outstanding Quantum Biochemical Studies of Enzyme Catalysis”.
- **2000:** Special 5-year postdoctoral fellowship from The Wenner-Gren Foundations.
- **The Sigrid Arrhenius Award 2000.** Awarded by the Faculty of Science, Stockholm University, for outstanding thesis work.

Modeling of Reactions in Confined Spaces

Fahmi Himo

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In this talk, I will describe our recent effort in using quantum chemistry to model binding and reactions inside self-assembled capsules.^[1-4] Description of these systems requires: 1) structural and energetic characterization of the capsules, 2) accurate determination of the binding free energies of all possible guests, including reactants, solvent and solvent impurities, and 3) calculation of the reaction pathways inside and outside the capsule.

We show that the modern density functional theory (DFT) methodology provides a reasonable approach for this purpose. Detailed energy decomposition analysis is applied to identify the factors causing the rate enhancement and the selectivity introduced by the capsule. However, host-guest binding free energies in aqueous solution require special treatment. A new approach is presented which gives very promising results.

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1. H. Daver, J. N. Harvey, J. Rebek Jr., F. Himo, Quantum Chemical Modeling of Cycloaddition Reaction in a Self-Assembled Capsule, *J. Am. Chem. Soc.* **2017**, *139*, 15494–15503.
2. H. Daver, A. G. Algarra, J. N. Harvey, J. Rebek Jr., F. Himo, A Mixed Explicit-Implicit Solvation Approach for Modeling of Alkane Complexation in Water-Soluble Self-Assembled Capsules, *J. Am. Chem. Soc.* **2018**, *140*, 12527–12537.
3. O. Brea, H. Daver, J. Rebek Jr., F. Himo, Modeling Decomposition of *N*-Nitrosoamides in a Self-Assembled Capsule, *J. Org. Chem.* **2019**, *84*, 7354-7361.
4. H. Daver, J. Rebek Jr., F. Himo, Modeling Reaction of Carboxylic Acids and Isonitriles in a Self-Assembled Capsule, *Chem. Eur. J.* **2020**, *26*, 10861-10870.

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➤ Educational Background

1997–2001	B.Sc., Anhui Normal University
2001–2004	M.Sc., Shanghai Institute of Organic Chemistry and Anhui Normal University
2005–2010	Ph.D., The University of Hong Kong

➤ Professional Career

2010–2012	The Scripps Research Institute and the University of Hong Kong, Postdoctoral
2012–2017	Southern University of Science and Technology, Tenure-Track Associate Professor
2018–Present	Southern University of Science and Technology, Tenured Full Professor

➤ Research Interests

- Radical Asymmetric Chemistry

➤ Awards

- CAPA Distinguished Faculty Award (CAPA), 2019.
- ACP Lectureship Award, 2019.
- The Scholar Program-Youth Project, 2018.
- Award for National Excellent Young Scholar (NSFC), 2017.
- The Distinguished Lectureship Award (Chemical Society of Japan), 2017.

➤ Representative Publications

- X.-Y. Dong, Y.-F. Zhang, C.-L. Ma, Q.-S. Gu, F.-L. Wang, Z.-L. Li, S.-P. Jiang and **X.-Y. Liu***. *Nat. Chem.* **2019**, *11*, 1158.
- Q.-S. Gu, Z.-L. Li and **X.-Y. Liu***. *Acc. Chem. Res.* **2020**, *52*, 170.
- X.-T. Li, L. Lv, T. Wang, Q.-S. Gu, G.-X. Xu, Z.-L. Li, L. Ye, X.-H. Zhang, G.-J. Cheng* and **X.-Y. Liu***. *Chem* **2020**, *6*, 1692.
- C.-J. Yang, C. Zhang, Q.-S. Gu, J.-H. Fang, X.-L. Su, L. Ye, Y. Sun, Y. Tian, Z.-L. Li and **X.-Y. Liu***. *Nat. Catal.* **2020**, *3*, 539.
- Y.-F. Cheng, J.-R. Liu, Q.-S. Gu, Z.-L. Yu, J. Wang, Z.-L. Li, J.-Q. Bian, H.-T. Wen, X.-J. Wang, X. Hong* and **X.-Y. Liu***. *Nat. Catal.* **2020**, *3*, 401.

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➤ Educational Background

1991–1996	B.Sc., Fudan University
2001–2005	Ph.D., Yale University

➤ Professional Career

2005–2006	California Institute of Technology, Postdoctoral Associate
2006–2008	Nanyang Technological University, Assistant Professor
2008–2010	The Scripps Research Institute (Scripps Florida), Assistant Professor
2010–2018	Dalian Institute of Chemical Physics (CAS), Professor
2018–2020	Shaanxi Normal University, Professor

➤ Research Interests

Organometallic chemistry, synthetic organic chemistry, catalytic C-H activation, homogeneous catalysis, reaction mechanism.

➤ Awards

- Fellow of the Royal Society of Chemistry (2015)
- The National Science Fund for Distinguished Young Scholars of China (2015)
- Web of Science Highly Cited Researcher (2018, 2019, 2020)

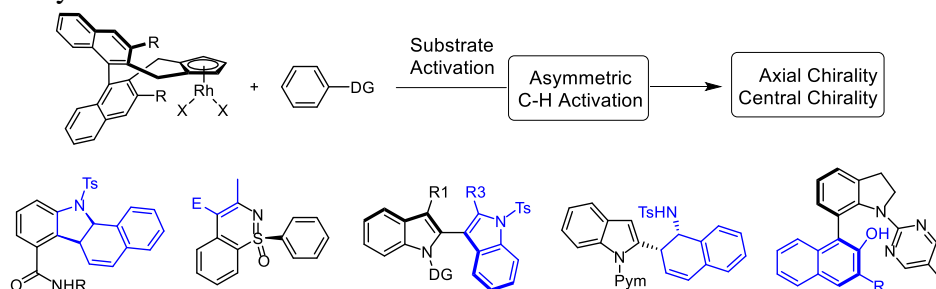
Rhodium-Catalyzed Enantioselective Activation of C-H Bonds

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C-H bond activation has been established as an increasingly important strategy to access value-added organics. In contrast to the typical lower-valent metal catalysts, higher valent Rh(III) catalysts have exhibited exceptionally high activity in activation of aryl and alkenyl C(sp²)-H bond via formation of more polar M(III)-C bond. Despite advances, it is desirable to realize efficient C-H activation with precise control of reaction selectivities. This talk will particularly focuses on the control of reaction enantioselectivity using Rh(III) catalysts stabilized by chiral Cp ligands.^[1] By following desymmetrization of arenes and control of enantioselectivity in insertion of unsaturated coupling reagents, both axial and center chirality has been realized via integration of C-H activation and chemistries of strained ring and nucleophilic cyclizations.^[2-6]



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2. "Enantiodivergent Annulation of Sulfoximines with Diazo Compounds via Rh(III)-Catalyzed Desymmetrization C-H Activation", B. Shen, B. Wan, X. Li, *Angew. Chem. Int. Ed.* **2018**, 57, 15534-15538.
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5. "Rhodium(III)-Catalyzed Enantio- and Diastereoselective C-H Cyclopropylation of N-Phenoxy-sulfonamides: Combined Experimental and Computational Studies", G. Zheng, Z. Zhou, G. Zhu, S. Zhai, H. Xu, X. Duan, W. Yi, X. Li, *Angew. Chem. Int. Ed.* **2020**, 59, 2890-2896.
6. "Rhodium(III)-Catalyzed Asymmetric Access to Spirocycles via C-H Activation and Subsequent Axial-to-Central Chirality Transfer", L. Kong, X. Han, S. Liu, Y. Zou, Y. Lan, X. Li, *Angew. Chem. Int. Ed.* **2020**, 59, 7188-7192.

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➤ Educational Background

1983–1987	B.Sc., Lanzhou University
1987–1990	M.Sc., Lanzhou University
1990–1993	Ph.D., Lanzhou University

➤ Professional Career

1993.06–1995.10	Fudan University, Postdoctoral Fellow
1995.11–1996.11	Kyoto University, Guest Research Fellow
1996.12–1997.09	University of Kentucky, Postdoctoral Scholar
1997.10–1998.12	University of Chicago, Postdoctoral Research Associate
1999.01–2000.04	Yale University, Postdoctoral Research Associate
2000.04–present	University of Science and Technology of China, Professor

➤ Research Interests

Fullerene Chemistry, Mechanochemistry, C–H Activation Reactions.

➤ Awards

- Visiting Lectureship, Chemistry Promotion Center, Ministry of Science and Technology, Taiwan, 2017.
- Asian Core Program Lectureship Award (Singapore), 2012.
- Wuxi PharmaTech Award, 2008.
- Science and Technology Award for Anhui Youth, 2005.
- Awardee of the National Science Fund for Distinguished Young Scholars, 2001.
- Awardee of “Hundred Talents Program” of Chinese Academy of Sciences, 1999.

Recent Advances in Mechanochemical Organic Synthesis

Guan-Wu Wang (王官武)

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In this talk, I will present the recent advances in mechanochemical organic synthesis, including the synthesis of neutral donor-acceptor [2]rotaxanes, boronic ester cage compounds, 3,2'-pyrrolinyl spirooxindoles, spiroimidazolines, polysubstituted trans-2,3-dihydropyrroles and pyrroles, [60]fullerene-fused cyclopentanols and cyclopentenones under vibration milling conditions.

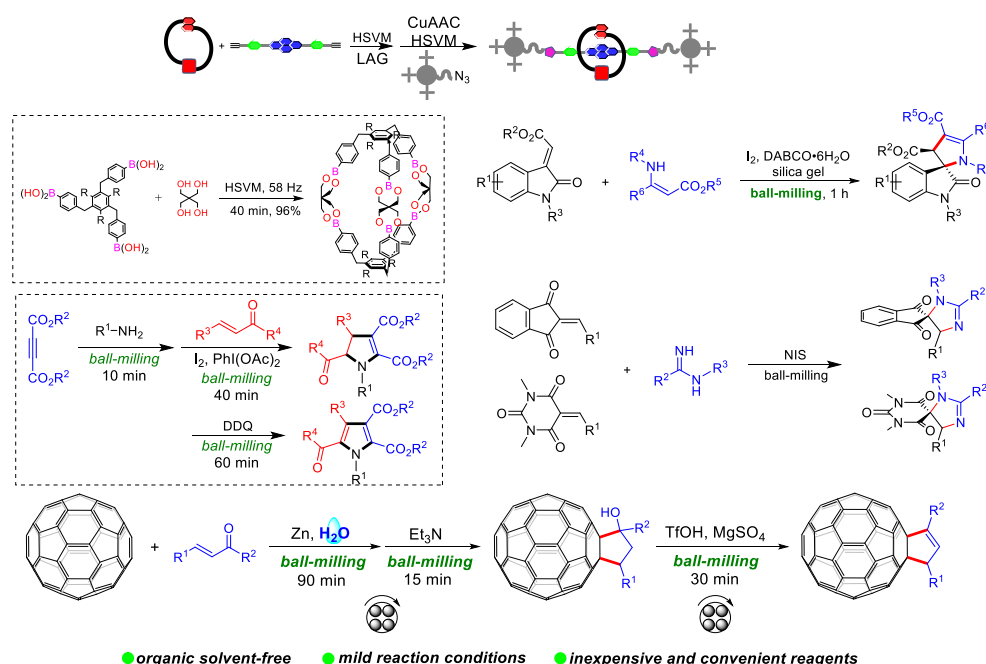


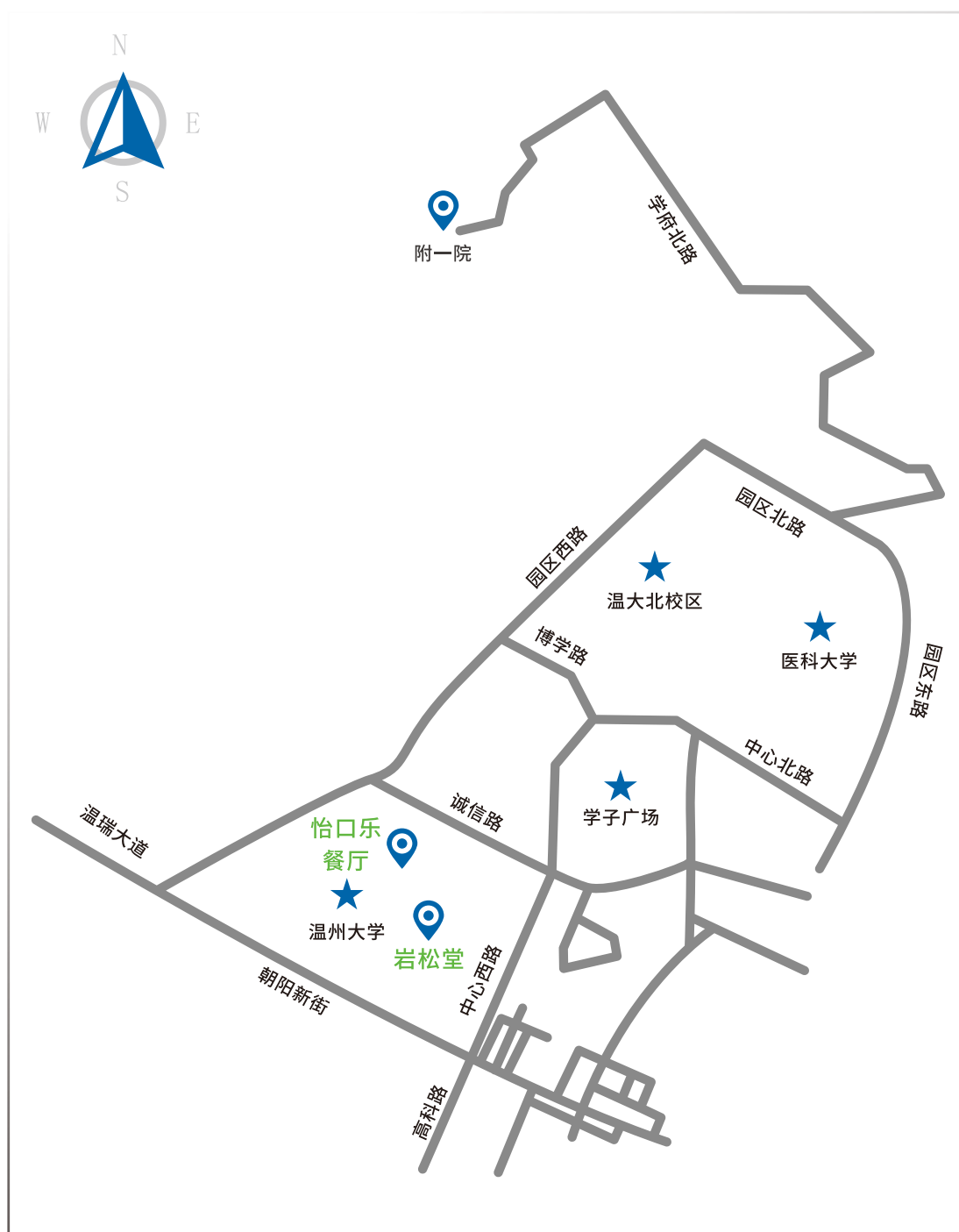
Fig. 1 Recent Mechanochemical Organic Reactions in the Guan-Wu Wang Group

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5. "One-Pot Multicomponent Mechanosynthesis of Polysubstituted trans-2,3-Dihydropyrroles and Pyrroles from Amines, Alkyne Esters, and Chalcones", Xu, H.; Liu, H.-W.; Chen, K.; Wang, G.-W. *J. Org. Chem.* **2018**, 83, 6035.
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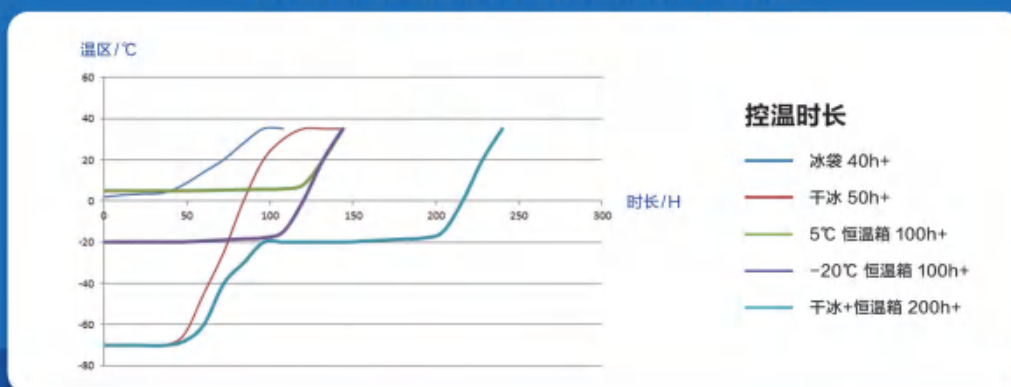




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