

PENGXIANG SHEN

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Education

Ph.D. Chemical and Biological Science, The Scripps Research Institute, La Jolla, CA, USA

2019

B.S. Chemistry, Peking University, Beijing, China

2014

Research Experience

Post-doctoral fellow, Department of Chemistry and Chemical Biology, Harvard University

July 2019 – Present

Prof. Daniel Kahne

- **Studied the assembly of outer membrane protein of Gram-negative bacteria** (develop new molecules that interact with Bam complex to interfere the assembly of outer membrane and assays to monitor this interaction.) (*in process*)

Graduate researcher, Department of Chemistry, The Scripps Research Institute

August 2014 – May 2019

Prof. Jin-Quan Yu

- **Researched on development of DNA-compatible C–H activation reaction to construct DNA-encoded Library** (collaborate with company to develop C–H activation reaction which occurred on DNA-linked small molecule under DNA-compatible condition.) (*manuscript preparing*)

- **Realized enantioselective C(sp³)–H arylation of free acid** (newly design and synthesize amine-type ligands which enable free carboxyl group-directed C(sp³)–H enantioselective arylation of cyclopropanecarboxylic acid and amino acid.) (*Published on Journal of American Chemical Society*)

- **Achieved formation of alpha-chiral centers by asymmetric beta-C(sp³)-H arylation, alkenylation, and alkylation** (Work with postdoc to finish synthesis of ligands, further functionalization of obtained chiral product and paper writing.) (*Published on Science*)

- **Realized ligand-enabled alkylation of C(sp³)-H bonds with Pd(II) catalysts** (develop new ligands and conditions to achieve the alkylation of β -C(sp³)-H of carboxamide within or without α -H) (*Published on Angewandte Chemie International Edition*)

- **Designed and achieved ligand-enabled meta-C-H alkylation and arylation using a modified norbornene** (Identify a new norbornene-type mediator with high efficiency and selectivity to achieve meta-C-H functionalization, which overcomes the deflections of simple norbornene and provide possibilities to achieve more difficult transformations on meta-C-H bond) (*Published on Journal of American Chemical Society*)

Undergraduate researcher, College of Chemistry and Molecular Engineering, Peking University

October 2011- June 2014

Prof. Zhangjie Shi

- **Achieved cross-coupling of thioether with aryl boroxines to construct biaryls via Rh catalyzed C-S activation**

- **Realized direct arylation of primary and secondary sp³ C-H bonds with diaryliodonium salts via Pd catalysis and preliminary studied its mechanism**

- **Designed and researched on chiral auxiliary directed asymmetric functionalization of sp³ C-H bond**

Publication

1. Hu, L.; Shen, P.-X.; Shao, Q.; Hong, K.; Qiao, J. X.; Yu, J.-Q. "Pd(II)-Catalyzed Enantioselective C(sp³)-H Activation/Cross-Coupling Reactions of Free Carboxylic Acids" *Angew. Chem., Int. Ed.* **2019**, 58, 2134.
2. Park, H.; Chekshin, N.; Shen, P.-X.; Yu, J.-Q. "Ligand-Enabled, Palladium-Catalyzed β -C(sp³)-H Arylation of Weinreb Amides" *ACS Catal.* **2018**, 8, 9292.
3. Shen, P.-X.; Hu, L.; Shao, Q.; Hong, K.; Yu, J.-Q. "Pd(II)-Catalyzed Enantioselective C(sp³)-H Arylation of Free Carboxylic Acids" *J. Am. Chem. Soc.* **2018**, 140, 6545.
4. Wu, Q.-F.; Wang, X.-B.; Shen, P.-X.; Yu, J.-Q. "Enantioselective C-H Arylation and Vinylation of Cyclobutyl Carboxylic Amides" *ACS Catal.* **2018**, 8, 2577.
5. Wu, Q.-F.; Shen, P.-X.; He, J.; Wang, X.-B.; Zhang, F.; Shao, Q.; Zhu, R.-Y.; Mapelli,

- C.; Qian, J. X.; Poss, M. A.; Yu, J.-Q. "Formation of α -chiral Centers by Asymmetric β -C(sp³)-H Arylation, Alkenylation, and Alkynylation" *Science* **2017**, 355, 499.
6. Fu, H.[#]; Shen, P.-X.[#]; He, J.; Zhang, F.; Li, S.; Wang, P.; Liu, T.; Yu, J.-Q. "Ligand-Enabled Alkynylation of C(sp³)-H Bonds with Pd(II) Catalysts" *Angew. Chem. Int. Ed.* **2017**, 56, 1873. ([#] equal contribution)
 7. Wang, P.; Li, G.-C.; Jain, P.; Farmer, M. E.; He, J.; Shen, P.-X.; Yu, J.-Q. "Ligand-Promoted *Meta*-C-H Amination and Alkynylation" *J. Am. Chem. Soc.* **2016**, 138, 14092.
 8. Wang, P.; Farmer, M. E.; Huo, X.; Jain, P.; Shen, P.-X.; Ishoey, M.; Bradner, J. E.; Wisniewski, S. R.; Eastgate, M. D.; Yu, J.-Q. "Ligand-Promoted *Meta*-C-H Arylation of Anilines, Phenols, and Heterocycles" *J. Am. Chem. Soc.* **2016**, 138, 9269.
 9. Shen, P.-X.; Wang, X.-C.; Wang, P.; Zhu, R.-Y.; Yu, J.-Q. "Ligand-Enabled *Meta*-C-H Alkylation and Arylation Using A Modified Norbornene" *J. Am. Chem. Soc.* **2015**, 137, 11574. (Highly Cited Paper)
 10. Chen, K.; Li, Z.-W., Shen, P.-X., Zhao, H.-W.; Shi, Z.-J. "Development of Modifiable Bidentate Amino Oxazoline Directing Group for Pd-Catalyzed Arylation of Secondary C-H Bonds" *Chem. Eur. J.* **2015**, 21, 7389.
 11. Pan, F.; Shen, P.-X.; Zhang, L.-S.; Wang, X.; Shi, Z.-J. "Direct Arylation of Primary and Secondary sp³ C-H Bonds with Diarylhyperiodonium Salts via Pd Catalysis" *Org. Lett.*, **2013**, 15, 4758
 12. Pan, F.; Wang, H.; Shen, P.-X.; Zhao, J.; Shi, Z.-J. "Cross Coupling of Thioethers with Aryl Boroxines to Construct Biaryls via Rh Catalyzed C-S Activation" *Chem. Sci.* **2013**, 4, 1573

Conference Attended

August 2018	ACS National Meeting Poster: Achieving Regio- and Enantioselective Pd-catalyzed C-H Functionalization through New Ligand Design
September 2012	1 st International Symposium on C-H Activation Staff

Experience on Instrument

Frequent user of Agilent GCMS, LCMS and SFC, Bruker/Varian NMR, and automatic flash purification machines.

Instructing Experience

Mentoring junior students, new postdocs and visiting scholars on research of C–H activation, The Scripps Research Institute, 2016-2019.

Awards

Honors Student of College of Chemistry and Molecular Engineering, Peking University,
Second Prize 2013

Freshmen Scholarship, Peking University, Third Prize 2010

National Chemistry Olympiad Competition (Nation-level), Chinese Chemistry Society,
First Prize 2010

National Chemistry Olympiad Competition (Province-level), Chinese Chemistry Society,
First Prize 2009