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Appointment

Jul 2017- Associate Professor of Chemistry
National University of Singapore

Aug 2011-Jun 2017 Assistant Professor of Chemistry
National University of Singapore

Education and Professional Experience

2008- 2011 Postdoctoral associate with Prof. Richard R. Schrock
Massachusetts Institute of Technology, Cambridge, MA, USA

2002- 2008 Ph.D. in Organic Chemistry with Prof. Marc L. Snapper & Prof. Amir H. Hoveyda
Boston College, Chestnut Hill, MA, USA

1998- 2002 B.S. in Chemistry with Prof. Limin Qi
Peking University, Beijing, P. R. China

Awards

- 2016 **Thieme Chemistry Journal Award**
- 2015 **Young Scientist Award**, Faculty of Science, NUS
- 2015 **Young Chemist Award**, Department of Chemistry, NUS
- 2015 **Asian Core Program Lectureship Award** from Japan and Hong Kong
- 2014 **Asian Core Program Lectureship Award** from Taiwan and Thailand
- 2013 **Asian Core Program Lectureship Award** from China and South Korea
- 2011-2016 **Singapore National Research Foundation Fellowship**, Singapore
- 2006-2007 **John LaMattina Graduate Student Fellowship**, Boston College
- 1998-1999 **Guanghua Scholarship**, Peking University

Publications

1. "Catalyst-Enabled Scaffold Diversity: Highly Chemo- and Stereoselective Synthesis of Tricyclic Ketals and Triarylmethanes," Liao, J.-Y.; Ni, Q.; Zhao, Y. *Org. Lett.* **2017**, *19*, 4074-4077.
2. "Three-Component Reactions of Isocynoacetates, Amines and 3-Formylchromones Initiated by an Unexpected *aza*-Michael Addition," Liao, J.-Y.; Yap, W. J.; Wu, J.; Wong, M. W.;* Zhao, Y.* *Chem. Commun. accepted*.
3. "Enantioselective Synthesis of Tetrahydroquinolines Using Borrowing Hydrogen: Cooperative Catalysis by Achiral Iridacycle and Chiral Phosphoric Acid," Lim, C. S.; Quach, T. T.; Zhao, Y. *Angew. Chem. Int.*

Ed. **2017**, *56*, 7176-7180 (VIP).

4. "Divergent Reactivities in Fluorination of Allylic Alcohols: Synthesis of Z-Fluoroalkenes via Carbon-Carbon Bond Cleavage," Liu, T.-L.; Wu, J.; Zhao, Y. *Chem. Sci.* **2017**, *8*, 3885-3890.
5. "Rhodium-Catalyzed Enantioselective Isomerization of Secondary Allylic Alcohols," Liu, T.-L.; Ng, T. W.; Zhao, Y. *J. Am. Chem. Soc.* **2017**, *139*, 3643-3646.
6. "Construction of Nine-Membered Heterocycles through Palladium-Catalyzed Formal [5 + 4] Cycloaddition," Yang, L.-C.;[†] Rong, Z.-Q.;[†] Wang, Y.-N.; Tan, Z. Y.; Wang, M. Zhao, Y. *Angew. Chem. Int. Ed.* **2017**, *56*, 2927-2931.
7. "Access to Enantiopure Triarylmethanes and 1,1-Diarylalkanes by NHC-Catalyzed Acylative Desymmetrization," Lu, S.;[†] Song, X.;[†] Poh, S. B.; Yang, H.; Wong, M. W.;* Zhao, Y.* *Chem. Eur. J.* **2017**, *23*, 2275-2281).
8. "Acid-Assisted Ru-Catalyzed Enantioselective Amination of 1,2-Diols through Borrowing Hydrogen," Yang, L.-C.; Wang, Y.-N.; Zhang, Y.;* Zhao, Y.* *ACS Catal.* **2017**, *7*, 93-97.
9. "Access to Acyclic (Z)-Enediyne via Alkyne Trimerization: Cooperative Bimetallic Catalysis Using Air as the Oxidant," Lee, J. T. D.; Zhao, Y. *Angew. Chem. Int. Ed.* **2016**, *55*, 13872-13876.
10. "Stereoselective 1,6-Conjugate Addition/Annulation of Para-Quinone Methides with Vinyl Epoxides/Cyclopropanes," Ma, C.;[†] Huang, Y.;[†] Zhao, Y. *ACS Catal.* **2016**, *6*, 6408-6412.
11. "Asymmetric Transfer Hydrogenation of Imines using Alcohol: Efficiency and Selectivity Are Affected by the Hydrogen Donor," Pan, H.-J.; Zhang, Y.; Shan, C.; Yu, Z.; Lan, Y.;* Zhao, Y.* *Angew. Chem. Int. Ed.* **2016**, *55*, 9615-9619.
12. "Cobalt-Catalyzed Enantioselective Vinylation of Activated Ketones and Imines," Huang, Y.;[†] Huang, R.-Z.;[†] Zhao, Y. *J. Am. Chem. Soc.* **2016**, *138*, 6571-6576.
13. "Catalyst-Enabled Diastereodivergent aza-Diels-Alder Reaction: Complementarity of N-Heterocyclic Carbene and Chiral Amine," Rong, Z. Q.;[†] Wang, M.;[†] Chow, C. H. E.; Zhao, Y. *Chem. Eur. J.* **2016**, *22*, 9483-9487.
14. "Iron-catalyzed transfer hydrogenation of imines assisted by an iron-based Lewis acid," Pan, H.-J.; Ng, T. W.; Zhao, Y. *Org. Biomol. Chem.* **2016**, *14*, 5490-5493 (Invited article for "New Talent Issue").
15. "Cobalt-Catalyzed Allylation of Heterobicyclic Alkenes: Ligand-Induced Divergent Reactivities," Huang, Y.; Ma, C.; Lee, Y. X.; Huang, R.-Z.; Zhao, Y. *Angew. Chem. Int. Ed.* **2015**, *54*, 13696-13700.
16. "Iron-catalyzed amination of alcohols assisted by Lewis acid," Pan, H.-J.; Ng, T. W.; Zhao, Y. *Chem. Comm.* **2015**, *51*, 11907-11910.
17. "Phase-Transfer-Catalyzed Enantioselective α -Hydroxylation of Acyclic and Cyclic Ketones with Oxygen," Sim, S. B. D.; Wang, M.; Zhao, Y. *ACS Catal.* **2015**, *5*, 3609-3612.
18. "Dynamic Kinetic Asymmetric Amination of Alcohols: From A Mixture of Four Isomers to Diastereo- and Enantiopure α -Branched Amines," Rong, Z. Q.;[†] Zhang, Y.;[†] Chua, R. H. B.; Pan, H.-J.; Zhao, Y. *J. Am. Chem. Soc.* **2015**, *137*, 4944-4947.
19. "Catalytic Divergent Synthesis of 3H or 1H Pyrroles by [3+2] Cyclization of Allenates with Activated Isocyanides," Liao, J.-Y.;[†] Shao, P.-L.;[†] Zhao, Y. *J. Am. Chem. Soc.* **2015**, *137*, 628-631.

20. "Stereoselective Synthesis of ϵ -Lactones or Spiro-Heterocycles through NHC-Catalyzed Annulation: Divergent Reactivity by Catalyst Control," Wang, M.;[†] Rong, Z.-Q.;[†] Zhao, Y. *Chem. Comm.* **2014**, 50, 15309–15312.
21. "Kinetic Resolution of 1,1'-Biaryl-2,2'-Diols and Amino Alcohols through NHC-Catalyzed Atroposelective Acylation," Lu, S.; Poh, S. B.; Zhao, Y. *Angew. Chem. Int. Ed.* **2014**, 53, 11041–11045.
22. "Highly Diastereo- and Enantioselective Ag-Catalyzed Double [3+2] Cyclization of α -Imino Esters with Isocyanacetate," Shao, P.-L.; Liao, J.-Y.; Ho, Y. A.; Zhao, Y. *Angew. Chem. Int. Ed.* **2014**, 53, 5435–5439.
23. "Enantioselective Oxidation of 1,2-Diols with Quinine-derived Urea Organocatalyst," Rong, Z.-Q.; Pan, H.-J.; Yan, H.-L.; Zhao, Y. *Org. Lett.* **2014**, 16, 208–211.
24. "Catalytic Enantioselective Amination of Alcohols by the Use of Borrowing Hydrogen Methodology: Cooperative Catalysis by Iridium and a Chiral Phosphoric Acid," Zhang, Y.; Lim, C.-S.; Sim, D. S. B.; Pan, H.-J.; Zhao, Y. *Angew. Chem. Int. Ed.* **2014**, 53, 1399–1403.
25. "Practical, Highly Stereoselective Allyl- and Crotylsilylation of Aldehydes Catalyzed by Readily Available Cinchona Alkaloid Amide," Huang, Y.; Yang, L.; Shao, P.; Zhao, Y. *Chem. Sci.* **2013**, 4, 3275–3281.
26. "Kinetic Resolution of 3-Hydroxy-3-Substituted Oxindoles through NHC-Catalyzed Oxidative Esterification," Lu, S.; Poh, S. B.; Siau, W.-Y.; Zhao, Y. *Synlett*, **2013**, 24, 1165–1169.
27. "Kinetic Resolution of Tertiary Alcohols: Highly Enantioselective Access to 3-Hydroxy-3-Substituted Oxindoles," Lu, S.; Poh, S. B.; Siau, W.-Y.; Zhao, Y. *Angew. Chem. Int. Ed.* **2013**, 52, 1731–1734.
28. "Stereoselective Synthesis of Z-Alkenes," Siau, W.-Y.; Zhang, Y.; Zhao, Y. *Top. Curr. Chem.* **2012**, 327, 33–58.

PhD and Postdoc Periods:

29. "Preparation of Highly Pure Disubstituted *E* Olefins through Mo-Catalyzed *Z*-Selective Ethenolysis of Stereoisomeric Mixtures," Marinescu, S. C.; Levine, D. S.; Zhao, Y.; Schrock, R. R.; Hoveyda, A. H. *J. Am. Chem. Soc.* **2011**, 133, 11512–11514.
30. "Regiodivergent Reactions through Catalytic Enantioselective Silylation of Chiral Diols. Synthesis of Sapinofuranone A," Rodrigo, J.; Zhao, Y.; Hoveyda, A. H.; Snapper, M. L. *Org. Lett.* **2011**, 13, 3778–3781.
31. "Endo-Selective Enyne Ring-Closing Metathesis Promoted by Stereogenic-at-W Mono-Pyrrolide Complexes," Zhao, Y.; Hoveyda, A. H.; Schrock, R. R. *Org. Lett.* **2011**, 13, 784–787.
32. "Highly *Z*-Selective Metathesis Homocoupling of Terminal Olefins," Jiang, A. J.; Zhao, Y.; Hoveyda, A. H.; Schrock, R. R. *J. Am. Chem. Soc.* **2009**, 131, 16630–16631.
33. "Kinetic Resolution of 1,2-Diols through Highly Site- and Enantioselective Catalytic Silylation," Zhao, Y.; Mitra, A. W.; Hoveyda, A. H.; Snapper, M. L. *Angew. Chem. Int. Ed.* **2007**, 44, 8471–8474.
34. "Enantioselective Silyl Protection of Alcohols Catalysed by an Amino-Acid-Based Small Molecule," Zhao, Y.; Rodrigo, J.; Hoveyda, A. H.; Snapper, M. L. *Nature* **2006**, 443, 67–70.
35. "Proline-Based *N*-Oxides as Readily Available and Modular Chiral Catalysts. Enantioselective Reactions of Allyltrichlorosilane with Aldehydes," Traverse, J. F.; Zhao, Y.; Hoveyda, A. H.; Snapper, M. L. *Org. Lett.* **2005**, 7, 3151–3154.

[†]Equal contribution.

Patents

1. "Highly Z-Selective Olefin Metathesis," Schrock, R. R.; Hoveyda, A. H.; Jiang, A. J.; Zhao, Y.; Flook, M. M. US patent No. 9713808 (issued on 25-07-2017).
2. "Catalytic Enantioselective Silylations of Substrates," Snapper M. L.; Hoveyda A. H.; Rodrigo, J.; Zhao, Y. PCT Int. Appl. **2007**, # WO2007082026.
3. "Novel Cinchona Alkaloid Derived Catalyst Available in One-Pot Synthesis for Highly Diastereo- and Enantioselective Addition of Allyltrichlorosilane and Crotyltrichlorosilane to Aldehydes," Zhao, Y.; Huang, Y.; Shao, P.; Yang, L. US 61/765,315.

Funding as PI

1. NRF-NRFF2011-10: \$2,998,500; 08/2011 – 08/2016
2. MOE2014-T2-2-156: \$692,123; 08/2015 – 07/2018
3. A*STAR SERC PSF: \$583,253; 04/2016 – 03/2019