

# Xingang Zhang

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## POSITION AND EDUCATION

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|-------------------|---|
| 2012/01 – Present | <b>Professor</b><br>Shanghai Institute of Organic Chemistry, Chinese Academy of Sciences  |
| 2008/05 – 2011/12 | <b>Associate Professor</b><br>Shanghai Institute of Organic Chemistry, Chinese Academy of Sciences  |
| 2003/08 – 2008/03 | <b>Postdoctoral Research Associate</b><br>University of Illinois at Urbana-Champaign (UIUC), Urbana, IL<br>Research Advisor: Prof. Wilfred A. van der Donk (Chemical Biology) |
| 1998/09 – 2003/07 | <b>Ph.D. in Organic Chemistry</b><br>Shanghai Institute of Organic Chemistry (SIOC), Shanghai<br>Research Advisor: Prof. Feng-Ling Qing (Organofluorine Chemistry)            |
| 1994/09 – 1998/07 | <b>B.S. in Applied Chemistry</b><br>Sichuan University, Chengdu, Sichuan  |

## HONORS AND AWARDS

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| 2015 | RSC Fluorine Chemistry Prize   |
| 2015 | The 5 <sup>th</sup> Chinese Chemical Society-RSC Young Chemist Award |
| 2014 | The National Science Fund for Distinguished Young Scholars           |
| 2014 | Thieme Chemistry Journal Award                                       |
| 2009 | Shanghai Rising Star Program, Shanghai, China                        |

## RESEARCH INTERESTS

- **Organometallic Fluorine Chemistry**
  - **Inexpensive and bulk fluorine sources-oriented cross-couplings** including developing new and efficient methods for fluorination/fluoroalkylation via transition-metal catalysis and their applications in late-stage modification of biologically active molecules;
  - **Metal-difluorocarbene chemistry** including design, synthesis and mechanistic studies of novel metal-difluorocarbene complexes and their applications in the catalytic reactions to solve the challenging problems in organofluorine chemistry.
- **Chemical Biology in Combination with Organofluorine Chemistry** including site- and chemo-selective introduction of fluorinated groups into biomacromolecules, such as peptides, proteins, and DNAs and their applications in related chemical biology.

## PROFESSIONAL AND ACADEMIC EXPERIENCE

- Developed a method for palladium-catalyzed oxidative C-H bond functionalization of polyfluoroarenes with olefins and heteroarenes.
- Established a new strategy for fluoroalkylation from inexpensive and widely available fluoroalkyl halides via transition-metal (Cu, Pd, Ni, Fe)-catalyzed cross-couplings. Four modes of catalytic difluoroalkylation reactions, including nucleophilic, electrophilic, radical, and difluorocarbene involved difluoroalkylations have been developed.
- Discovered a new coupling reaction, metal difluorocarbene involved catalytic coupling reaction (MeDIC). Established a palladium-catalyzed strategy that manipulates the reactivity of difluorocarbene to be nucleophilic or electrophilic by altering the oxidation states of palladium difluorocarbene, [Pd]=CF<sub>2</sub>, between Pd(II) and Pd(0) to diversify the catalytic difluorocarbene transfer.
- Developed a chelating-group-assisted (CGA) strategy for nickel-catalyzed three-component carbodifunctionalization of alkenes.
- Established a transition-metal (Cu, Ni)-catalyzed strategy for asymmetric fluoroalkylations.

## INDEPENDENT PUBLICATIONS

1. Xue-Ying Zhang, Xia-Ping Fu, Shu Zhang, and Xingang Zhang\*, "Palladium Difluorocarbene Involved Catalytic Coupling with Terminal Alkynes". *CCS Chem.* **2020**, 2, 293-304.
2. Ran Cheng, Hai-Yang Zhao, Shu Zhang, and **Xingang Zhang\***, "Nickel-Catalyzed Carbonylation of Secondary Trifluoromethylated, Difluoromethylated, and Nonfluorinated Aliphatic Electrophiles with Arylboronic Acids under 1 atm of CO". *ACS Catal.* **2020**, 10, 36-42.
3. Zhi-Fang Yang, Chang Xu, Xing Zheng\*, Xingang Zhang\*, "Nickel-Catalyzed Carbodifunctionalization of *N*-Vinylamides enables Access to  $\gamma$ -Amino Acids". *Chem. Commun.* **2020**, 56, 2642-2645.
4. Xia-Ping Fu,<sup>†</sup> Xiao-Song Xue,<sup>†</sup> Xue-Ying Zhang, Yu-Lan Xiao, Shu Zhang, Yin-Long Guo, Xuebing Leng, Kendall N. Houk\*, **Xingang Zhang\***, "Controllable Catalytic Difluorocarbene Transfer Enables Access to Diversified Fluoroalkylated Arenes". *Nat. Chem.* **2019**, 11, 948-956.
5. Xing Gao, Ran Cheng, Yu-Lan Xiao, Xiao-Long Wan, **Xingang Zhang\***, "Copper-Catalyzed Highly Enantioselective Difluoroalkylation of Secondary Propargyl Sulfonates with Difluoroenoxy silanes". *Chem* **2019**, 5, 2987-2999.
6. Chang Xu, Zhi-Fang Yang, Lun An, and **Xingang Zhang\***, "Nickel-Catalyzed Difluoroalkylation-Alkylation of Enamides". *ACS Catal.* **2019**, 9, 8224-822.
7. Yue-Guang Lou, An-Jun Wang, Liang Zhao, Lin-Feng He, Xiao-Fei Li, Chun-Yang He \* and **Xingang Zhang\***, "Palladium-catalyzed cross-coupling of unactivated alkylzinc reagents with 2-bromo-3,3,3-trifluoropropene and its application in the synthesis of fluorinated amino acids". *Chem. Commun.* **2019**, 55, 3705-3708. (**This paper was highlighted by Synfacts 2019, 15, 1081**).
8. Hai-Yang Zhao, Xing Gao, Shu Zhang, and Xingang Zhang\*, "Nickel-Catalyzed Carbonylation of Difluoroalkyl Bromides with Arylboronic Acids", *Org. Lett.* **2019**, 21, 1031-1036.

9. Minqi Zhou, Jian Zhang, Xing-Guo Zhang\* and **Xingang Zhang\***, "Ni-Catalyzed Defluorination for the Synthesis of *gem*-Difluoro-1,3-dienes and Their [4+2] Cycloaddition Reaction", *Org. Lett.* **2019**, *21*, 671-674.
10. Wen-Hao Guo,<sup>†</sup> Hai-Yang Zhao,<sup>†</sup> Zhi-Ji Luo, Shu Zhang, and **Xingang Zhang\***, "Fluoroalkylation-Borylation of Alkynes: An Efficient Method to Obtain (*Z*)-Tri- and Tetrasubstituted Fluoroalkylated Alkenylboronates", *ACS Catal.* **2019**, *9*, 38-43.
11. Xing Gao, Xu He, and Xingang Zhang,\* "Nickel-Catalyzed Difluoromethylation of (Hetero)aryl Bromides with BrCF<sub>2</sub>H", *Chin. J. Org. Chem.* **2019**, *39*, 215-222 (Invited paper, Dedicated to professor Qing-Yun Chen on the occasion of his 90th birthday)
12. Zhang Feng, Yu-Lan Xiao, and **Xingang Zhang\***, "Transition-Metal (Cu, Pd, Ni)-Catalyzed Difluoroalkylation via Cross-Coupling with Difluoroalkyl Halides", *Acc. Chem. Res.* **2018**, *51*, 2264-2278.
13. Chang Xu,<sup>†</sup> Wen-Hao Guo,<sup>†</sup> Xu He, Ying-Long Guo, Xue-Ying Zhang, and **Xingang Zhang\***, "Difluoromethylation of (Hetero)Aryl Chlorides with Chlorodifluoromethane Catalyzed by Nickel", *Nat. Commun.* **2018**, *9*, 1170 (**This paper was chosen to feature within, under Fluorine for celebrating the International Year of the Periodic Table of Chemical Elements from across Nature and the Nature-branded journals <https://www.nature.com/immersive/d42859-019-00001-7/index.html>**)
14. Xing Gao, Yu-Lan Xiao, and **Xingang Zhang\***, "Copper-Catalyzed Highly Stereospecific Trifluoromethylation and Difluoroalkylation of Secondary Propargyl Sulfonates", *Angew. Chem. Int. Ed.* **2018**, *57*, 3187-3191.
15. Lun An, Yu-Lan Xiao, and **Xingang Zhang\***, "Bulky Diamine Ligand Promoted Cross-Coupling with Difluoroalkyl Bromides via Iron Catalysis", *Angew. Chem. Int. Ed.* **2018**, *57*, 6921-6925 (**This paper was highlighted by *Synfacts* 2018, 14, 850**).
16. Zhi-Ji Luo, Hai-Yang Zhao, and **Xingang Zhang\***, "Highly Selective Pd-Catalyzed Direct C-F Bond Arylation of Simple Polyfluoroarenes", *Org. Lett.* **2018**, *20*, 2543-2546.
17. Xia-Ping Fu, Yu-Lan Xiao, and **Xingang Zhang\***, "Nickel-Catalyzed Difluoromethylation of Arylboronic Acids with Bromodifluoromethane", *Chin. J. Chem.* **2018**, *36*, 143 (Invited paper).
18. Xu He, Xing Gao, and Xingang Zhang\*, "Nickel-Catalyzed Difluoroalkylation of (Hetero)aryl Bromides with Unactivated 1-Bromo-1,1-difluoroalkanes", *Chin. J. Chem.* **2018**, *36*, 1059-1062 (Invited paper, Dedicated to professor Xiyan Lu on the occasion of his 90th birthday).
19. Lun An, Feifei Tong, and **Xingang Zhang\***, "Iron-Catalyzed Cross-Coupling of Diarylzinc Reagents with *gem*-Difluoropropargyl Bromide", *Acta Chim. Sinica* **2018**, *76*, 977 (Invited paper).
20. Yu-Yan Ren, Xing Zheng, and **Xingang Zhang\***, "Bromotrifluoromethane: A Useful Reagent for Hydrotrifluoromethylation of Alkenes and Alkynes", *Synlett* **2018**, *29*, 1028.
21. Jing Wang\*, Yan-Bo Yu, and **Xingang Zhang\***, "Palladium-catalyzed direct allylation of fluorinated

benzothiadiazoles with allyl chlorides”, *Tetrahedron* **2018**, *74*, 6329-6334 (Invited paper for special issue on Organo Fluorine Chemistry).

22. Zhang Feng, † Qiao-Qiao Min, † Xia-Ping Fu, † Lun An, and **Xingang Zhang**,\* “Chlorodifluoromethane-Triggered Formation of Difluoromethylated Arenes Catalysed by Palladium”, *Nature Chemistry*, **2017**, *9*, 918 (This paper was highlighted by *Chemical & Engineering News* **2017**, *95*, *7*; *ACS Molecule of the week* June 19, 2017; *Synfacts* **2017**, *13*, 1126).
23. Lun An, Chang Xu, and **Xingang Zhang**,\* “Highly Selective Nickel-Catalyzed gem-Difluoropropargylation of Unactivated Alkylzinc Reagents”, *Nat. Commun.* **2017**, *8*, 1460 (This paper was highlighted by *Synform* **2018**, *03*, A36).
24. Wen-Hao Guo, Zhi-Ji Luo, Wenbin Zeng, and **Xingang Zhang**,\* “Access to Difluoromethylene-Skipped 1,4-Diynes with gem-Difluoropropargyl Bromide”, *ACS Catal.* **2017**, *7*, 896-901.
25. Ling-Chao Yu, Ji-Wei Gu, Shu Zhang\*, and **Xingang Zhang**,\* “Visible-Light-Promoted Tandem Difluoroalkylation-Amidation: Access to Difluorooxindoles from Free Anilines”, *J. Org. Chem.* **2017**, *82*, 3943-3949.
26. Tao Fan, Wei-Dong Meng, and Xingang Zhang,\* “Palladium-Catalyzed Heck-Type Reaction of Secondary Trifluoromethylated Alkyl Bromides”, *Beilstein J. Org. Chem.* **2017**, *13*, 2610 (Invited paper for the Thematic Series “Organo-Fluorine Chemistry IV”)
27. Tao Fan, Wei-Dong Meng, Yu-Lan Xiao, and **Xingang Zhang**,\* “Synthesis of Pentafluorosulfanyl Indazoles” *Tetrahedron Lett.* **2017**, *58*, 4473.
28. Chun-Yang He,\* Ji-Wei Gu, and **Xingang Zhang**,\* “Visible-Light-Mediated Direct Perfluoroalkylation and Trifluoromethylation of Free Anilines”, *Tetrahedron Lett.* **2017**, *58*, 3939.
29. Ji-Wei Gu, Qiao-Qiao Min, Ling-Chao Yu, and **Xingang Zhang**,\* “Tandem Difluoroalkylation-Arylation of Enamides Catalyzed by Nickel” *Angew. Chem. Int. Ed.* **2016**, *55*, 12270-12274.
30. Hai-Yang Zhao, Feng Zhang, Zhiji Luo, and **Xingang Zhang**,\* “Carbonylation of Difluoroalkyl Bromides Catalyzed by Palladium” *Angew. Chem. Int. Ed.* **2016**, *55*, 10401-10405.
31. Yu-Lan Xiao, Qiao-Qiao Min, Chang Xu, Ruo-Wen Wang, and **Xingang Zhang**,\* “Nickel-Catalyzed Difluoroalkylation of (Hetero)Arylborons with Unactivated 1-Bromo-1,1-difluoroalkanes” *Angew. Chem. Int. Ed.* **2016**, *55*, 5873-5841 (This paper was highlighted in *Synfacts* **2016**, *55*, 5837)
32. Yan-Bo Yu, Zhi-Ji Luo, and **Xingang Zhang**,\* “Copper-Catalyzed Direct Propargylation of Polyfluoroarenes with Secondary Propargyl Phosphates” *Org. Lett.* **2016**, *18*, 3302-3305.
33. Bo Zhang and **Xingang Zhang**,\* “Bronsted Acid Catalyzed gem-Difluoroallylation of Aldehydes with  $\beta$ -Tosyloxy- $\gamma,\gamma$ -Difluoroallylboronic Acid Pinacol Ester” *Chin. J. Chem.* **2016**, *34*, 477-480 (Invited paper).
34. Zhang Feng, Yu-Lan Xiao, and **Xingang Zhang**,\* “Palladium-Catalyzed

- Phosphonyldifluoromethylation of Alkenes with Bromodifluoromethylphosphonate” *Org. Chem. Front.* **2016**, 3, 466-469 (Invited paper as a 2015 Emerging Investigator).
35. Zhang Feng, Qiao-Qiao Min, and **Xingang Zhang**,\* “Access to Difluoromethylated Arenes by Pd-Catalyzed Reaction of Arylboronic Acids with Bromodifluoroacetate” *Org. Lett.* **2016**, 18, 44-47.
  36. Bo Zhang and **Xingang Zhang**,\* “Pd-Catalyzed gem-difluoroallylation of arylboronic acids with  $\gamma,\gamma$ -difluoroallylic acetates” *Chem. Commun.* **2016**, 52, 1238-1241.
  37. Lun An, Yu-Lan Xiao, Qiao-Qiao Min, and **Xingang Zhang**,\* “Facile Access to Fluoromethylated Arenes by Nickel-Catalyzed Cross-Coupling between Arylboronic Acids and Fluoromethyl Bromide” *Angew. Chem. Int. Ed.* **2015**, 54, 9079-9083 (**Hot paper, cover story. This paper was highlighted in *Synfacts* 2015, 54, 9079**).
  38. Wen-Hao Guo, Qiao-Qiao Min, Ji-Wei Gu, and **Xingang Zhang**,\* “Rhodium-Catalyzed ortho-Selective C-F Bond Borylation of Polyfluoroarenes with Bpin-Bpin” *Angew. Chem. Int. Ed.* **2015**, 54, 9075.
  39. Zhang Feng, Qiao-Qiao Min, Hai-Yang Zhao, Ji-Wei Gu, and **Xingang Zhang**,\* “A General Synthesis of Fluoroalkylated Alkenes by Palladium-Catalyzed Heck-Type Reaction of Fluoroalkyl Bromides” *Angew. Chem. Int. Ed.* **2015**, 54, 1270.
  40. Xuefei Li, Zhang Feng, Zhong-Xing Jiang,\* and **Xingang Zhang**,\* “Nickel-Catalyzed Reductive Cross-Coupling of (Hetero)Aryl Iodides with Fluorinated Secondary Alkyl Bromides” *Org. Lett.* **2015**, 17, 5570.
  41. Ji-Wei Gu and **Xingang Zhang**,\* “Palladium-Catalyzed Difluoroalkylation of Isocyanides: Access to Difluoroalkylated Phenanthridine Derivatives” *Org. Lett.* **2015**, 17, 5384 (**This paper was highlighted in *Synfacts* 2016, 12, 242**).
  42. Ji-Wei Gu, Wen-Hao Guo, and **Xingang Zhang**,\* “Synthesis of diaryldifluoromethanes by Pd-catalyzed difluoroalkylation of arylboronic acids” *Org. Chem. Front.* **2015**, 2, 38.
  43. Feng Zhang, Qiao-Qiao Min, and **Xingang Zhang**,\* “Palladium-Catalyzed Heck-Type Difluoroalkylation of Alkenes with Functionalized Difluoromethyl Bromides” *Synthesis* **2015**, 47, 2912-2923 (Invited paper, feature article)
  44. Qiang Pan, Chun-Yang He, Shiqing Han,\* and **Xingang Zhang**,\* “Palladium-Catalyzed Direct Thienylation of Monobromide-Substituted Difluorinated Benzothiadiazoles for Organic Photovoltaics” *Synlett* **2015**, 26, 2175-2179.
  45. Yulan Xiao, Qiang Pan, and **Xingang Zhang**,\* “Nickel-Catalyzed Cross-Coupling of gem-Difluoropropargyl Bromide with Aryl Boronic Acids” *Acta Chim. Sinica* **2015**, 73, 383-387 (Invited paper).
  46. Qiao-Qiao Min, Zengsheng Yin, Zhang Feng, Wen-Hao Guo, and **Xingang Zhang**,\* “Highly Selective gem-Difluoroallylation of Organoborons with Bromodifluoromethylated Alkenes Catalyzed by Palladium” *J. Am. Chem. Soc.* **2014**, 136, 1230.

47. Yu-Lan Xiao, Wen-Hao Guo, Guo-Zhen He, Qiang Pan, and **Xingang Zhang**,\* "Nickel-Catalyzed Cross-Coupling of Functionalized Difluoromethyl Bromides and Chlorides with Aryl Boronic Acids: A General Method for Difluoroalkylated Arenes" *Angew. Chem. Int. Ed.* **2014**, *53*, 9909 (**This paper was highlighted by *Chemical & Engineering News* 2014, 92, 25**).
48. Zhang Feng, Qiao-Qiao Min, Yu-Lan Xiao, Bo Zhang, and **Xingang Zhang**,\* "Pd-Catalyzed Difluoroalkylation of Arylboronic Acids: A New Method for Aryldifluoromethylated Phosphonates and Carboxylic Acid Derivatives" *Angew. Chem., Int. Ed.* **2014**, *53*, 1669 (**This paper was highlighted by *Chemical & Engineering News* 2014, 92, 25**).
49. Yan-Bo Yu, Guo-Zhen He, and **Xingang Zhang**,\* "Synthesis of  $\alpha,\alpha$ -Difluoromethylene Alkynes by Palladium-Catalyzed gem-Difluoropropargylation of Aryl and Alkenyl Boron Reagents" *Angew. Chem. Int. Ed.* **2014**, *53*, 10457 (This paper was highlighted in *Synfacts* **2014**, *10*, 1303).
50. Chun-Yang He, Cai-Zhi Wu, Yan-Lin Zhu, and **Xingang Zhang**,\* "Selective Thienylation of Fluorinated Benzothiadiazoles and Benzotriazoles for Organic Photovoltaics" *Chem. Sci.* **2014**, *5*, 1317 (Back Cover Story)
51. Yu-Lan Xiao, Bo Zhang, Zhang Feng, and Xingang Zhang,\* "Heteroaryldifluoromethylation of Organoborons Catalyzed by Palladium: Facile Access to Aryl(Heteroaryl)difluoromethanes" *Org. Lett.* **2014**, *16*, 4822.
52. Yu-Lan Xiao, Bo Zhang, Chun-Yang He and **Xingang Zhang**,\* "Direct Olefination of Fluorinated Benzothiadiazoles: A New Entry to Optoelectronic Materials" *Chem. Eur. J.* **2014**, *20*, 4532.
53. Zhang Feng, Yu-Lan Xiao, and **Xingang Zhang**,\* "Copper-Catalyzed Cross-Coupling of Bromozincdifluoromethylphosphonate with Iodo/Bromo-Aryl Triazines" *Org. Chem. Front.* **2014**, *1*, 113.
54. Chun-Yang He, Cai-Zhi Wu, Feng-Ling Qing, and **Xingang Zhang**,\* "Direct (Het)Arylation of Fluorinated Benzothiadiazoles and Benzotriazole with (Het)Aryl Iodides" *J. Org. Chem.* **2014**, *79*, 1712 (**This paper was highlighted in *Synfacts*, 2014, 10, 0483**).
55. Chun-Yang He, Feng-Ling Qing, and **Xingang Zhang**,\* "Pd-Catalyzed Aerobic Direct Olefination of Polyfluoroarenes" *Tetrahedron Lett.* **2014**, *55*, 2962.
56. Yan-Bo Yu, Zhen Wang, and **Xingang Zhang**,\* "Pd-catalyzed cross-coupling of polyfluoroarenes with cyclic vinyl triflates" *Sci. China Chem.* **2014**, *57*, 276 (Invited paper).
57. Zhao Chen, Chun-Yang He, Zengsheng Yin, Liye Chen, Yi He, and **Xingang Zhang**,\* "Palladium-Catalyzed ortho-Selective C-F Activation of Polyfluoroarenes with Triethylsilane: A Facile Access to Partially Fluorinated Aromatics" *Angew. Chem. Int. Ed.* **2013**, *52*, 5813-5817 (**This paper was highlighted in *Synfacts*, 2013, 9, 0878**).
58. Chun-Yang He, Zhen Wang, Cai-Zhi Wu, Feng-Ling Qing, and **Xingang Zhang**,\* "Pd-Catalyzed Oxidative Cross-Coupling between Two Electron Rich Heteroarenes" *Chem. Sci.* **2013**, *4*, 3508-3513.
59. Cai-Zhi Wu, Chun-Yang He, Yangen Huang, and **Xingang Zhang**,\* "Thioether-Promoted Direct

- Olefination of Polyfluoroarenes Catalyzed by Palladium” *Org. Lett.* **2013**, *15*, 5266-5269 (**This paper was highlighted in *Synfacts*, 2013, 15, 5266**).
60. Chao Wang, Yan-Bo Yu, Shilu Fan, and **Xingang Zhang**,\* “Pd-Catalyzed Direct Arylation of Nitro(pentafluorosulfanyl)benzenes with Aryl Bromides” *Org. Lett.* **2013**, *15*, 5004-5007.
  61. Gaochao Huang, Zengsheng Yin, and **Xingang Zhang**,\* “Construction of Optically Active Quaternary Propargyl Amines by Highly Enantioselective Zinc/BINOL-Catalyzed Alkynylation of Ketoimines” *Chem. Eur. J.* **2013**, *19*, 11992-11998 (Inside Cover Story).
  62. Yi He, Zhao Chen, Chun-Yang He, and **Xingang Zhang**,\* “Nickel-Catalyzed ortho-Selective Hydrodefluorination of N-Containing Heterocycle-Polyfluoroarenes” *Chin. J. Chem.* **2013**, *31*, 873-877 (Invited paper).
  63. Yan-Bo Yu, Shilu Fan, and **Xingang Zhang**,\* “Copper- and Phosphine-Ligand Free Palladium-Catalyzed Direct Allylation of Electron-Deficient Polyfluoroarenes with Allylic Chlorides” *Chem. Eur. J.* **2012**, *18*, 14643-14648.
  64. Shilu Fan, Zhao Chen, and **Xingang Zhang**,\* “Copper-Catalyzed Dehydrogenative Cross-Coupling of Benzothiazoles with Thiazoles and Polyfluoroarenes” *Org. Lett.* **2012**, *14*, 4950-4953.
  65. Zhang Feng, Fei Chen, and **Xingang Zhang**,\* “Copper Catalyzed Cross-Coupling of Iodobenzoates with Bromozincdifluorophosphate” *Org. Lett.* **2012**, *14*, 1938-1941 (**This paper was highlighted in *Synfacts*, 2012, 8, 0775**).
  66. Fei Chen, Qiao-Qiao Min, and **Xingang Zhang**,\* “Pd-Catalyzed Direct Arylation of Polyfluoroarenes on Water under Mild Conditions Using PPh<sub>3</sub> Ligand” *J. Org. Chem.* **2012**, *77*, 2992-2998.
  67. Fei Chen, Zhang Feng, Chun-Yang He, Hao-Yang Wang, Yin-long Guo, and **Xingang Zhang**,\* “Pd-Catalyzed Dehydrogenative Cross-Coupling of Polyfluoroarenes with Heteroatom-Substituted Enones” *Org. Lett.* **2012**, *14*, 1176-1179.
  68. Chun-Yang He, Qiao-Qiao Min, and **Xingang Zhang**,\* “Palladium-Catalyzed Aerobic Dehydrogenative Cross-Coupling of Polyfluoroarenes with Thiophenes: Facile Access to Polyfluoroarene-Thiophene Structure” *Organometallics* **2012**, *31*, 1335-1340.
  69. Fei Chen and **Xingang Zhang**,\* “Pd-Catalyzed Highly Regio- and Stereocontrolled Direct Alkenylation of Electron-deficient Polyfluoroarenes” *Chem. Lett.* **2011**, *40*, 978-979 (**Invited paper in Celebration for the 2010 Nobel Prize in Chemistry**).
  70. Shilu Fan, Fei Cheng, and **Xingang Zhang**,\* “Direct Palladium-Catalyzed Intermolecular Allylation of Highly Electron-Deficient Polyfluoroarenes” *Angew. Chem. Int. Ed.* **2011**, *50*, 5918.
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  72. Gaochao Huang, Jie Yang, and **Xingang Zhang**,\* “Highly Enantioselective Zinc(BINOL)-Catalyzed

Alkynylation of  $\alpha$ -Ketoimine Esters” *Chem. Commun.* **2011**, 47, 5587-5589. (This paper was highlighted in *Synfacts*, **2011**, **8**, 0867)

73. Yie Yang, Qiao-Qiao Min, Yi He, and **Xingang Zhang**,\* “Highly Diastereoselective Synthesis of Quaternary  $\alpha$ -Trifluoromethyl  $\alpha$ -Amino Acids by Addition of Benzylzinc Reagents to Chiral Imines of Trifluoropyruvate” *Tetrahedron Lett* **2011**, 52, 4675-4677.
74. **Xingang Zhang**\*, Shilu Fan, Chun-Yang He, Xiaolong Wan, Qiao-Qiao Min, Jie Yang and Zhong-Xing Jiang, “Pd(OAc)<sub>2</sub> Catalyzed Olefination of Highly Electron-deficient Perfluoroarenes” *J. Am. Chem. Soc.* **2010**, 132, 4506-4507 (This paper was highlighted in *Synfacts*, **2010**, **6**, 0652).
75. Chun-Yang He, Shilu Fan, and **Xingang Zhang**,\* “Pd-Catalyzed Oxidative Cross-Coupling of Perfluoroarenes with Aromatic Heterocycles” *J. Am. Chem. Soc.* **2010**, 132, 12850-12852.
76. Qiao-Qiao Min, Chun-Yang He, Haibing Zhou, and **Xingang Zhang**,\* “Highly Diastereoselective Synthesis of Quaternary  $\alpha$ -Trifluoromethyl  $\alpha$ -Amino Acids from Chiral Imines of Trifluoropyruvate” *Chem. Commun.* **2010**, 46, 8029-8031.
77. Shilu Fan, Chun-Yang He and **Xingang Zhang**,\* “Direct Pd-Catalyzed Benzylolation of Highly Electron-Deficient Perfluoroarenes” *Chem. Commun.* **2010**, 46, 4926-4928.
78. Shilu Fan, Chun-Yang He, and **Xingang Zhang**,\* “Diastereoselective Synthesis of Propargylic Fluorides and Its Application in Preparation of Monofluorinated Sugar” *Tetrahedron*, **2010**, 66, 5218-5228.



