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## Prof. Aiwen Lei (08/1973)

### Education :

Ph. D., Organic Chemistry, July, 2000, Shanghai Institute of Organic Chemistry, Chinese Academy of Science (CAS), China Supervisor - Prof. Xiyan Lu  
B.S., Chemistry Education, July, 1995, Huaibei Normal University, Huaibei, Anhui Province, P. R. China

### Research Interest

- Small molecule (such as O<sub>2</sub>, N<sub>2</sub>O, H<sub>2</sub>O<sub>2</sub>, NH<sub>3</sub>, ClO<sub>2</sub><sup>-</sup>, etc.) activation with an emphasis on applying such molecules in efficient synthetic methods
- Developing highly selective and efficient transition-metal-catalyzed C-C, and C-Heteroatom bond formation in syntheses
- Mechanistic and active intermediate studies of chlorite dismutase, cytochrome P450, and peroxidase.

### Research Experience:

2005.3- Professor of Wuhan University  
2003.8-2005.3, Research Associate, Department of Chemistry, Stanford University, with Professor James, P. Collman  
2000.8-2003.8 Postdoctoral Fellow, Department of Chemistry, the Pennsylvania State University, with Professor Xumu Zhang  
1995.9-2000.7 Graduate Studies, Shanghai Institute of Organic Chemistry, CAS, China (SIOC)

### Awards

- 中国化学会 - 约翰威立出版公司青年化学论文奖, 2008
- Royal Society Chemistry Journal Grant, 2008
- Synthesis & Synlett Journal Award, 2008
- Wuxi Pharmtech Biological & Organic Creative Award, 2007
- LuoJia Scholarship Professor (Wuhan University), 2007-
- Outstanding Young Scientist of Hubei Province, 2006

## Publications after Independent Research: <sup>1-27</sup>

- (1) Chen, J.; Zhang, W.; Geng, H.; Li, W.; Hou, G.; Lei, A.; Zhang, X. Efficient Synthesis of Chiral Beta-Arylisopropylamines by Using Catalytic Asymmetric Hydrogenation, *Angew. Chem., Int. Ed.* **2009**, *48*, 800-802.
- (2) He, C.; Chen, C.; Cheng, J.; Liu, C.; Liu, W.; Li, Q.; Lei, A. Aryl halide tolerated electrophilic amination of arylboronic acids with N-chloroamides catalyzed by CuCl at room temperature, *Angew. Chem., Int. Ed.* **2008**, *47*, 6414-6417.
- (3) Shi, W.; Luo, Y.; Luo, X.; Chao, L.; Zhang, H.; Wang, J.; Lei, A. Investigation of an Efficient Palladium Catalyzed C(sp)-C(sp) Cross-Coupling Reaction Using Phosphine-Olefin Ligand--- Application and Mechanism Aspects *J. Am. Chem. Soc.* **2008**, 14713-14720.
- (4) Zhao, Y.; Jin, L.; Li, P.; Lei, A. Palladium-Catalyzed Oxidative Carbonylation of Alkyl and Aryl Iridium Reagents with CO under Mild Conditions, *J. Am. Chem. Soc.* **2008**, *130*, 9429-9433.
- (5) Chen, M.; Weng, Y.; Guo, M.; Zhang, H.; Lei, A. Nickel-catalyzed reductive cyclization of unactivated 1,6-enynes in the presence of organozinc reagents, *Angew. Chem., Int. Ed.* **2008**, *47*, 2279-2282.
- (6) Zhao, Y.; Wang, H.; Hou, X.; Hu, Y.; Lei, A.; Zhang, H.; Zhu, L. Oxidative Cross-Coupling through Double Transmetalation: Surprisingly High Selectivity for Palladium-Catalyzed Cross-Coupling of Alkylzinc and Alkynylstannanes, *J. Am. Chem. Soc.* **2006**, *128*, 15048-15049.
- (7) Wang, H.; Liu, J.; Deng, Y.; Min, T.; Yu, G.; Yang, Z.; Lei, A. Pincer-Thioamide)-Pd or (Pincer-Thioimido)-Pd Complexes Catalyzed Highly Efficient Negishi Couplings of Primary and Secondary Alkylzinc Reagents at Room Temperature', *Chem. Eur. J.* **2009**, *15*, 1499.
- (8) Liu, J.; Wang, H.; Zhang, H.; Wu, X.; Zhang, H.; Deng, Y.; Yang, Z.; Lei, A. Identification of a Highly Efficient Alkylated Pincer Thioimido-PdII Complex as Active Catalyst in Negishi Coupling, *Chem. Eur. J.*, **2009**, In Press.
- (9) Zhang, H.; Luo, X.; Wongkhan, K.; Duan, H.; Li, Q.; Zhu, L.; Wang, J.; Batsanov, A. S.; Howard, J. A. K.; Marder, T. B.; Lei, A. Acceleration of Reductive Elimination of Csp<sup>3</sup>-Pd-Ar via a Phosphine/Electron-Deficient Olefin Ligand: A Kinetic Investigation, *Chem. Eur. J.* **2009**, In Press.
- (10) Yin, W.; He, C.; Chen, M.; Zhang, H.; Lei, A. Nickel-Catalyzed Oxidative Coupling Reactions of Two Different Terminal Alkynes Using O<sub>2</sub> as the Oxidant at Room Temperature: Facile Syntheses of Unsymmetric 1,3-Diynes, *Org. Lett.* **2009**, *11*, 709.
- (11) Chen, J.; Liu, Q.; Zhang, W.; Spinella, S.; Lei, A.; Zhang, X. A Convenient Synthesis and the Asymmetric Hydrogenation of N-Phthaloyl Dehydroamino Acid Esters, *Org. Lett.* **2008**, *10*, 3033-3036.
- (12) Guo, Z.; Jin, Y.; Liang, T.; Liu, Y.; Xu, Q.; Liang, X.; Lei, A. Synthesis, chromatographic evaluation and hydrophilic interaction/reversed-phase mixed-mode behavior of a "Click b-cyclodextrin" stationary phase, *J. Chromatogr., A* **2009**, *1216*, 257-263.
- (13) Liu, J.; Deng, Y.; Wang, H.; Zhang, H.; Yu, G.; Wu, B.; Zhang, H.; Li, Q.; Marder, T. B.; Yang, Z.; Lei, A. Effective Pd-Nanoparticle (PdNP)-Catalyzed Negishi

- Coupling Involving Alkylzinc Reagents at Room Temperature, *Org. Lett.* **2008**, *10*, 2661-2664.
- (14) Luo, X.; Zhang, H.; Duan, H.; Liu, Q.; Zhu, L.; Zhang, T.; Lei, A. Superior Effect of a pi-Acceptor Ligand (Phosphine-Electron-Deficient Olefin Ligand) in the Negishi Coupling Involving Alkylzinc Reagents, *Org. Lett.* **2007**, *9*, 4571-4574.
- (15) Liu, C.; He, C.; Shi, W.; Chen, M.; Lei, A. Ni-catalyzed mild arylation of alpha -halocarbonyl compounds with arylboronic acids, *Org. Lett.* **2007**, *9*, 5601-5604.
- (16) Liu, Q.; Duan, H.; Luo, X.; Tang, Y.; Li, G.; Huang, R.; Lei, A. An electron-deficient diene as ligand for palladium-catalyzed cross-coupling reactions: an efficient alkylation of aryl iodides by primary and secondary alkylzinc reagents, *Adv. Synth. Catal.* **2008**, *350*, 1349-1354.
- (17) Liu, W.; Lei, A. Efficient Fe-catalyzed homo-coupling of aryl Grignard reagents using O<sub>2</sub> as the oxidant, *Tetrahedron Lett.* **2008**, *49*, 610-613.
- (18) Liu, J.; Liang, B.; Shu, D.; Hu, Y.; Yang, Z.; Lei, A. Alkoxyacylation of aryl iodides catalyzed by Pd with a thiourea type ligand under balloon pressure of CO, *Tetrahedron* **2008**, *64*, 9581-9584.
- (19) Jin, L.; Zhao, Y.; Wang, H.; Lei, A. Palladium-catalyzed R(sp<sup>3</sup>)-Zn/R(sp)-SnBu<sub>3</sub> oxidative cross-coupling, *Synthesis* **2008**, 649-654.
- (20) Shi, W.; Liu, C.; Yu, Z.; Lei, A. Alkynylation of alpha -halocarbonyl compounds-a Stille-type cross-coupling for the formation of C(sp)-C(sp<sup>3</sup>) bonds under neutral conditions, *Chem. Commun.* **2007**, 2342-2344.
- (21) Liu, F.; Liu, Q.; He, M.; Zhang, X.; Lei, A. Rh-catalyzed highly enantioselective formation of functionalized cyclopentanes and cyclopentanones, *Org. Biomol. Chem.* **2007**, *5*, 3531-3534.
- (22) Guo, Z.; Lei, A.; Zhang, Y.; Xu, Q.; Xue, X.; Zhang, F.; Liang, X. "Click saccharides": novel separation materials for hydrophilic interaction liquid chromatography, *Chem. Commun.* **2007**, 2491-2493.
- (23) Deng, L.-J.; Liu, J.; Huang, J.-Q.; Hu, Y.; Chen, M.; Lan, Y.; Chen, J.-H.; Lei, A.; Yang, Z. Effect of lithium chloride on tuning the reactivity of Pauson-Khand reactions catalyzed by palladium-tetramethylthiourea, *Synthesis* **2007**, 2565-2570.
- (24) Lei, A.; Chen, M.; He, M.; Zhang, X. Asymmetric hydrogenation of pyridines: enantioselective synthesis of nipecotic acid derivatives, *Eur. J. Org. Chem.* **2006**, 4343-4347.
- (25) Guo, Z.; Lei, A.; Liang, X.; Xu, Q. Click chemistry: a new facile and efficient strategy for preparation of functionalized HPLC packings, *Chem. Commun.* **2006**, 4512-4514.
- (26) Guo, Z.; Liu, Y.; Xu, J.; Xu, Q.; Xue, X.; Zhang, F.; Ke, Y.; Liang, X.; Lei, A. Novel reversed-phase high-performance liquid chromatography stationary phase with oligo(ethylene glycol) "click" to silica, *J. Chromatogr., A* **2008**, *1191*, 78-82.
- (27) Zhang, Y.; Guo, Z.; Ye, J.; Xu, Q.; Liang, X.; Lei, A. Preparation of novel b-cyclodextrin chiral stationary phase based on click chemistry, *J. Chromatogr., A* **2008**, *1191*, 188-192.

## Publications before Independent Research:<sup>28-42</sup>

- (28) Shen, Z.; Lu, X.; Lei, A. Highly enantioselective hydrogenation of exocyclic double bond of N-tosylloxazolidinones catalyzed by a neutral rhodium complex and its synthetic applications, *Tetrahedron* **2006**, *62*, 9237-9246.
- (29) Collman, J. P.; Zeng, L.; Wang, H. J. H.; Lei, A.; Brauman, J. I. Kinetics of (porphyrin)manganese(III)-catalyzed olefin epoxidation with a soluble iodosylbenzene derivative, *Eur. J. Org. Chem.* **2006**, 2707-2714.
- (30) He, M.; Lei, A.; Zhang, X. Enantioselective syntheses of 3,4,5-trisubstituted gamma-lactones: formal synthesis of (-)-blastmycinolactol, *Tetrahedron Lett.* **2005**, *46*, 1823-1826.
- (31) Lei, A.; Wu, S.; He, M.; Zhang, X. Highly Enantioselective Asymmetric Hydrogenation of alpha -Phthalimide Ketone: An Efficient Entry to Enantiomerically Pure Amino Alcohols, *J. Am. Chem. Soc.* **2004**, *126*, 1626-1627.
- (32) Lei, A.; Lu, X.; Liu, G. A novel highly regio- and diastereoselective haloamination of alkenes catalyzed by divalent palladium, *Tetrahedron Lett.* **2004**, *45*, 1785-1788.
- (33) Lei, A.; He, M.; Zhang, X. Rh-Catalyzed Kinetic Resolution of Enynes and Highly Enantioselective Formation of 4-Alkenyl-2,3-disubstituted Tetrahydrofurans, *J. Am. Chem. Soc.* **2003**, *125*, 11472-11473.
- (34) Lei, A.; Zhang, X. A novel palladium-catalyzed homocoupling reaction initiated by transmetalation of palladium enolates, *Tetrahedron Lett.* **2002**, *43*, 2525-2528.
- (35) Lei, A.; Zhang, X. Palladium-Catalyzed Homocoupling Reactions between Two Csp<sup>3</sup>-Csp<sup>3</sup> Centers, *Org. Lett.* **2002**, *4*, 2285-2288.
- (36) Lei, A.; Waldkirch Jason, P.; He, M.; Zhang, X. Highly enantioselective cycloisomerization of enynes catalyzed by rhodium for the preparation of functionalized lactams, *Angew. Chem., Int. Ed.* **2002**, *41*, 4526-4529.
- (37) Lei, A.; Srivastava, M.; Zhang, X. Transmetalation of palladium enolate and its application in palladium-catalyzed homocoupling of alkynes: a room-temperature, highly efficient route to make diynes, *J. Org. Chem.* **2002**, *67*, 1969-1971.
- (38) Lei, A.; Liu, G.; Lu, X. Palladium(II)-catalyzed highly regio- and diastereoselective cyclization of difunctional allylic N-tosylcarbamates. A convenient synthesis of optically active 4-vinyl-2-oxazolidinones and total synthesis of 1,4-dideoxy-1,4-imino-L-xylitol, *J. Org. Chem.* **2002**, *67*, 974-980.
- (39) Lei, A.; He, M.; Zhang, X. Highly Enantioselective Syntheses of Functionalized alpha -Methylene-gamma -butyrolactones via Rh(I)-catalyzed Intramolecular Alder Ene Reaction: Application to Formal Synthesis of (+)-Pilocarpine, *J. Am. Chem. Soc.* **2002**, *124*, 8198-8199.
- (40) Lei, A.; He, M.; Wu, S.; Zhang, X. Highly enantioselective Rh-catalyzed intramolecular Alder-ene reactions for the syntheses of chiral tetrahydrofurans, *Angew. Chem., Int. Ed.* **2002**, *41*, 3457-3460.
- (41) Lei, A.; Lu, X. A Facile Highly Regio- and Stereoselective Preparation of N-Tosyl Allylic Amines from Allylic Alcohols and Tosyl Isocyanate via Palladium(II)-Catalyzed Aminopalladation-beta -Heteroatom Elimination, *Org. Lett.* **2000**, *2*, 2357-2360.
- (42) Lei, A.; Lu, X. Palladium(II)-Catalyzed Tandem Intramolecular Aminopalladation of Alkynes and Conjugate Addition. Synthesis of Oxazolidinones, Imidazolidinones, and Lactams, *Org. Lett.* **2000**, *2*, 2699-2702.