

Curriculum Vitae

March. 23, 2020

Name: Koji Kubota

Personal Information

Nationality: Japanese

Affiliation: Institute for chemical reaction design and discovery (WPI-ICReDD),
Hokkaido University

Date of Birth: April 2, 1989

Address: WPI-ICReDD, Hokkaido University, Nishi 10, Kita 21, Kita-ku,
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ResearcherID: E-6798-2017

Degree

2016. Doctoral degree of Engineering, Hokkaido University

Supervisor: Prof. Hajime Ito

Education and Experience

April 2019 to present

Specially Appointed Assistant Professor at Institute for chemical reaction design
and discovery (WPI-ICReDD), Hokkaido University, Sapporo, Japan.

April 2018 to March 2019

Specially Appointed Assistant Professor at Graduate School of Engineering,
Hokkaido University, Sapporo, Japan.

April 2017 to March 2018

JSPS Postdoctoral Fellow at Massachusetts Institute of Technology, Cambridge,
Massachusetts, United States (Advisor: Prof. Stephen L. Buchwald and Prof.
Bradley L. Pentelute)

May 2016 to March 2017

Postdoctoral Fellow at University of California, Berkeley, California, United States (Advisor: Prof. F. Dean Toste)

October 2013 to March 2016

Ph.D. Hokkaido University, Sapporo, Japan (Ph.D. Advisor: Prof. Hajime Ito)

April 2012 to September 2013

M.Sc. Hokkaido University, Sapporo, Japan (Master Thesis; Advisor: Prof. Hajime Ito)

January 2014 to March 2014

Visiting Researcher in Department of Chemistry, University of Alberta, Edmonton, Canada (Advisor: Prof. Dennis G. Hall)

Research Interests

Mechanochemistry, Organic synthesis, Organometallic chemistry, Catalytic enantioselective synthesis, Organocatalysis, Phase-transfer catalysis, Chemical biology,

Fellowships and Awards

2019 ACP Lectureship Award (Singapore)

2019 47th Naito Conference Best Poster Award

2018 Inoue Research Award for Young Scientists

2017 Lindau Nobel Laureate Meeting Fellow

2017 JSPS Overseas Research Fellowship

2016 2016 Springer Thesis Award

2016 Reaxys PhD Prize 2016 Finalist

2015 2015 Pacifichem Student Competition Poster Award

2015 6th Otsu Conference Research Proposal Award

2015 6th Otsu Conference Award Fellow

2015 7th HOPE Meeting Best Presentation Award

2015 7th HOPE Meeting Fellow

2014 JSPS Research Fellowship DC1

2014 Hokkaido University Otsuka Award

2012 Hokkaido University Frontier Fellowship

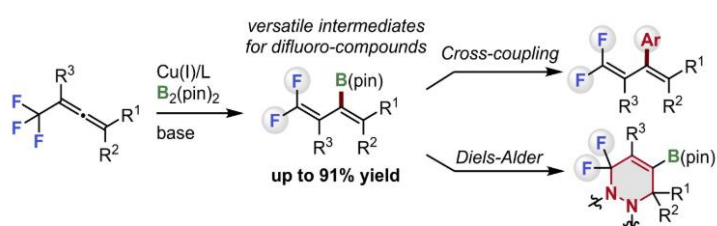
2012 59th Symposium of Organometallic Chemistry Best Poster Award

2012 Hokkaido University William Wheeler Prize Award

Publications

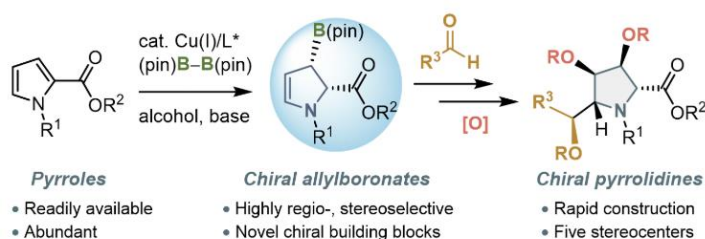
1. Akiyama, S.; Nomura, S.; **Kubota, K.**; Ito, H.* "Copper(I)-catalyzed boryl substitution of 1-trifluoromethyl allenes for the synthesis of 3-boryl-substituted 1,1-gem-difluorodienes".

J. Org. Chem. **2020**, *85*, 4172.



2. Hayama, K.; Kojima, R.; **Kubota, K.**; Ito, H.* "Synthesis of chiral *N*-heterocyclic allylboronates via the enantioselective borylative dearomatization of pyrroles".

Org. Lett. **2020**, *22*, 739.



3. Takahashi, R.; **Kubota, K.***; Ito, H. "Air- and moisture-stable Xantphos-ligated palladium dialkyl complex as a precatalyst for cross-coupling reactions".

Chem. Commun. **2020**, *56*, 407.

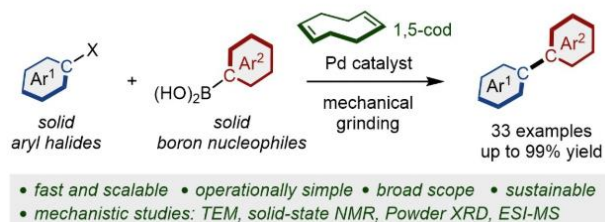


4. **Kubota, K.***; Pang, Y.; Miura, A.; Ito, H.* “Redox reactions of small organic molecules using ball milling and piezoelectric materials”.
Science 2019, 366, 1500.

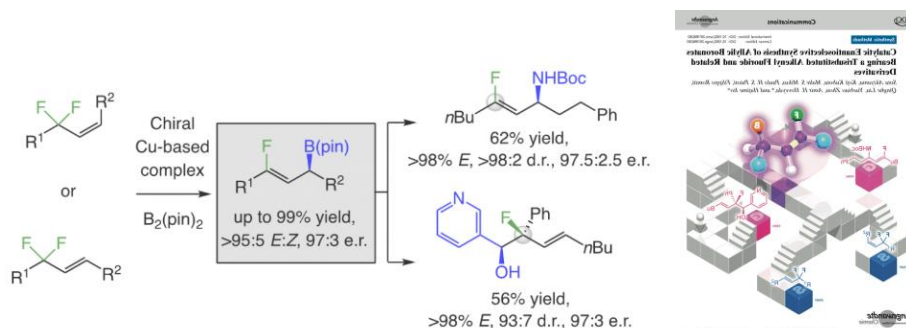


5. Seo, T.; Ishiyama, T.; **Kubota, K.***; Ito, H.* “Solid-state Suzuki-Miyaura cross-coupling reactions: olefin-accelerated C-C coupling using mechanochemistry”.
Chem. Sci. 2019, 10, 8202.

The first general C-C cross-coupling reactions in the solid-state



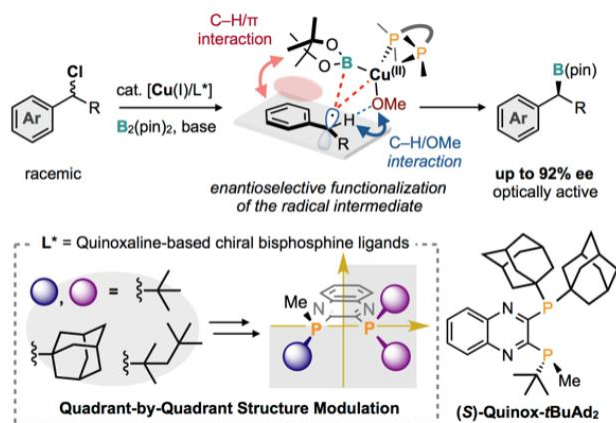
6. Akiyama, S.; **Kubota, K.**; Mikus, M. S.; Paioti, P. H. S.; Romiti, F.; Liu, Q.; Zhou, Y.; Hoveyda, A. H.*; Ito, H.* “Catalytic enantioselective synthesis of allylic boronates bearing a trisubstituted alkenyl fluoride and related derivatives”.
Angew. Chem. Int. Ed. 2019, 58, 11998.



7. Iwamoto, H.; Endo, K.; Ozawa, Y.; Watanabe, Y.; **Kubota, K.**; Imamoto, T.; Ito, H.* “Copper(I)-catalyzed enantioconvergent borylation of racemic benzyl

chlorides enabled by quadrant-by-quadrant structure modulation of chiral bisphosphine ligands”.

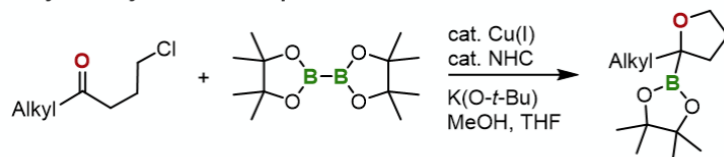
Angew. Chem. Int. Ed. **2019**, *58*, 11112.



8. **Kubota, K.;** Uesugi, M.; Osaki, S.; Ito, H.* “Synthesis of 2-alkyl-2-boryl-substituted-tetrahydrofurans via copper(I)-catalyzed borylative cyclization of aliphatic ketones”.

Org. Biomol. Chem. **2019**, *17*, 5680.

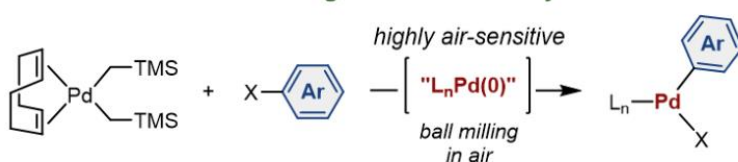
Borylative cyclization of aliphatic ketones



9. **Kubota, K.*;** Takahashi, R.; Ito, H.* “Mechanochemistry allows carrying out sensitive organometallic reactions in air: glove-box-and-Schlenk-line-free synthesis of oxidative addition complexes from aryl halides and palladium(0)”.

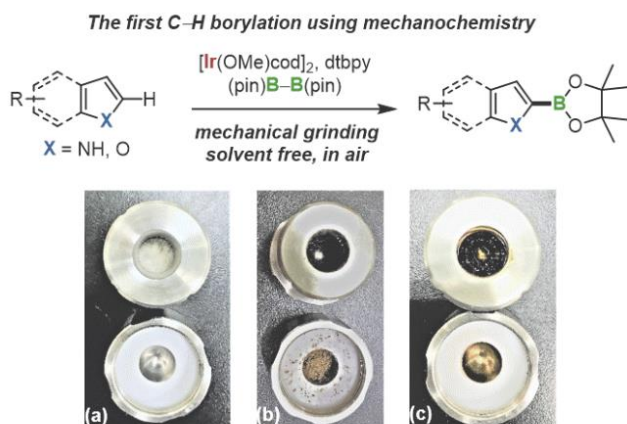
Chem. Sci. **2019**, *10*, 5837.

Oxidative addition in air using mechanochemistry



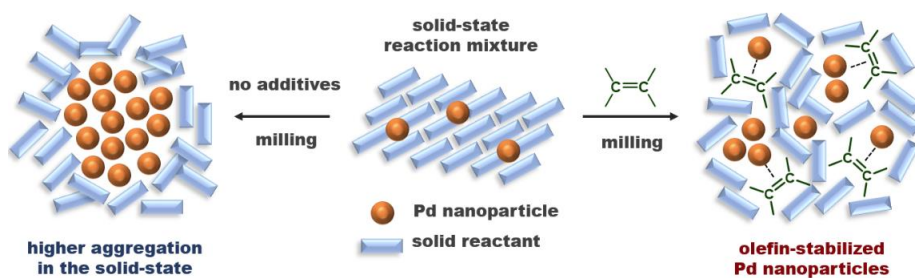
10. Pang, Y.; Ishiyama, T.; **Kubota, K.*;** Ito, H.* “Iridium(I)-catalyzed C-H borylation in air by using mechanochemistry”.

Chem. Eur. J. **2019**, *25*, 4654.



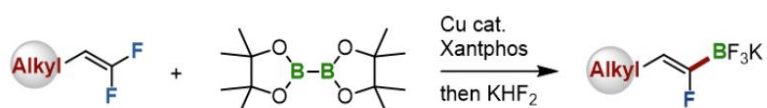
11. **Kubota, K.***; Seo, T.; Koide, K.; Hasegawa, Y.; Ito, H.* “Olefin-accelerated solid-state C–N cross-coupling reactions using mechanochemistry”.

Nature Commun. **2019**, *10*, 111.



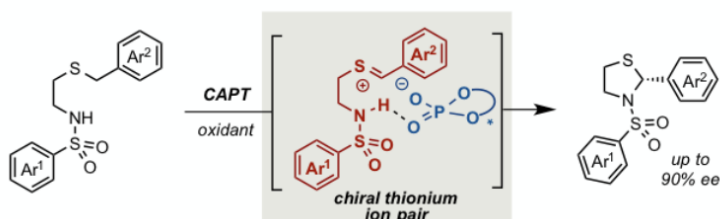
12. Ito, H.*; Seo, T.; Kojima, R.; **Kubota, K.** “Copper(I)-catalyzed stereoselective defluoroborylation of aliphatic gem-difluoroalkenes”.

Chem. Lett. **2018**, *47*, 1330.

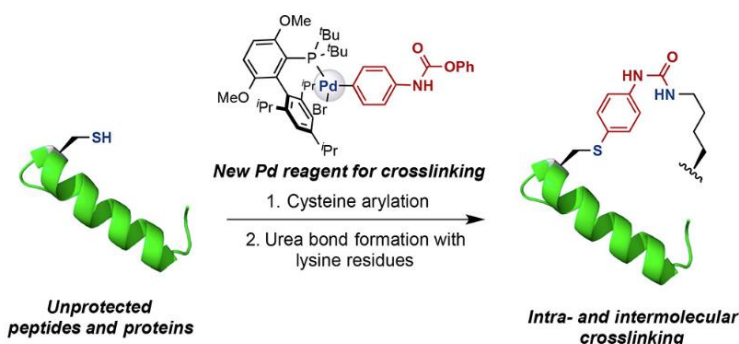


• Z-Selective • Expanding substrate scope • Mechanistic study based on DFT

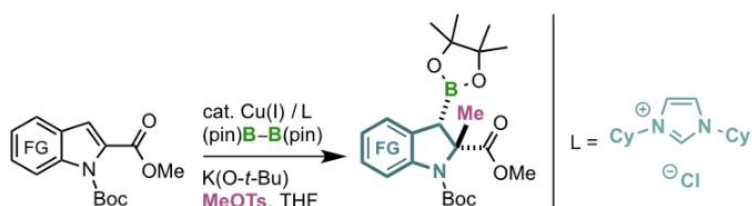
13. Biswas, S.; **Kubota, K.**; Orlandi, M.; Turberg, M.; Miles, D. H.; Sigman, M. S.*; Toste, F. D.* “Enantioselective synthesis of N,S-acetals by an oxidative Pummerer type transformation using phase-transfer catalysis”.
Angew. Chem. Int. Ed. **2018**, *57*, 589.



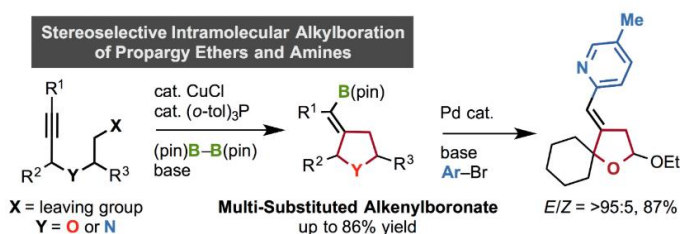
14. **Kubota, K.**; Dai, P.; Pentelute, B. L.*; Buchwald, S. L.* “Palladium oxidative addition complexes for peptide and protein crosslinking”.
J. Am. Chem. Soc. **2018**, *140*, 3128.



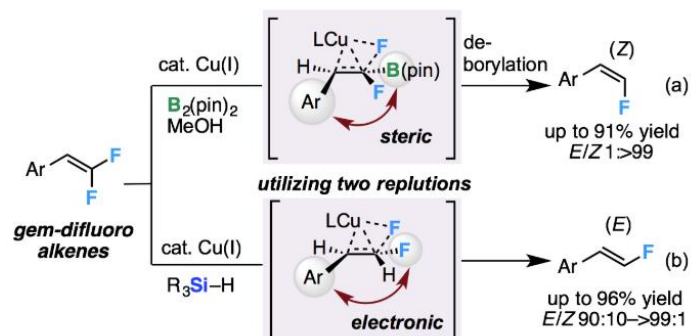
15. Hayama, K.; **Kubota, K.**; Iwamoto, H.; Ito, H.* “Copper(I)-catalyzed diastereoselective dearomative carboborylation of indoles”.
Chem. Lett. **2017**, *46*, 1800.



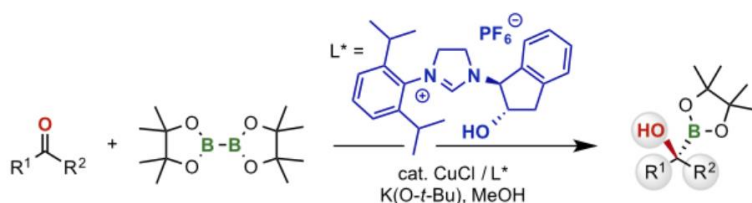
16. Iwamoto, H.; Ozawa, Y.; **Kubota, K.**; Ito, H.* “Copper(I)-catalyzed regio- and stereoselective intramolecular alkylation of propargyl ethers and amines”.
J. Org. Chem. **2017**, *82*, 10563.



17. Kojima, R.; **Kubota, K.**; Ito, H.* “Stereodivergent hydrodefluorination of gem-difluoroalkenes: selective synthesis of (Z)- and (E)-monofluoroalkenes”
Chem. Commun. **2017**, *53*, 10688.

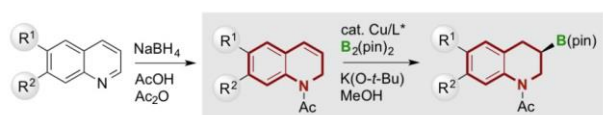


18. **Kubota, K.**; Osaki, S.; Jin, M.; Ito, H.* “Copper(I)-catalyzed enantioselective nucleophilic borylation of ketones: synthesis of enantioenriched chiral tertiary alpha-hydroxyboronates”
Angew. Chem. Int. Ed. **2017**, *56*, 6646.



19. **Kubota, K.;** Watanabe, Y.; Ito, H.* “Synthesis of enantiomerically enriched chiral tetrahydroquinolines via sequential dearomatization/enantioselective borylation reactions”

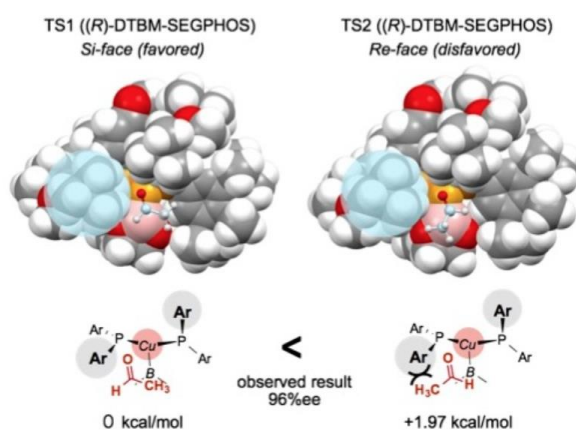
Adv. Synth. Catal. **2016**, *358*, 2379.



- High yield and enantioselectivity (up to 99%, up to 99% ee)
- Readily available starting materials
- Chiral boryl-tetrahydroquinolines: Useful intermediate

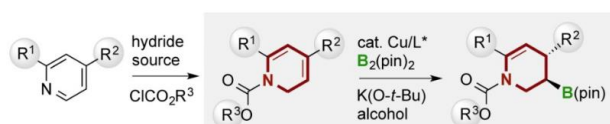
20. **Kubota, K.;** Jin, M.; Ito, H.* “Computational insight into the enantioselective nucleophilic borylation of a polarized C=O double bond catalyzed by diphosphine-borylcopper(I) complexes”

Organometallics **2016**, *35*, 1376.



21. **Kubota, K.;** Watanabe, Y.; Hayama, K.; Ito, H.* “Enantioselective synthesis of chiral piperidines via the stepwise dearomatization/borylation of pyridines”

J. Am. Chem. Soc. **2016**, *138*, 4338.



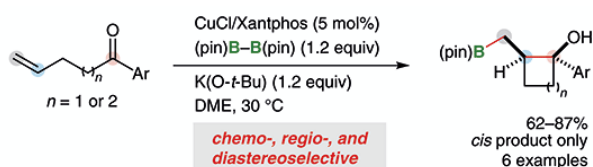
- Unprecedented regio-, diastereo- and enantioselective
- Readily available starting materials
- Chiral boryl-tetrahydropyridines: Novel building blocks

22. Iwamoto, H.; **Kubota, K.;** Ito, H.* “Highly selective Markovnikov hydroboration of alkyl-substituted terminal alkenes with a phosphine-copper(I) catalyst”

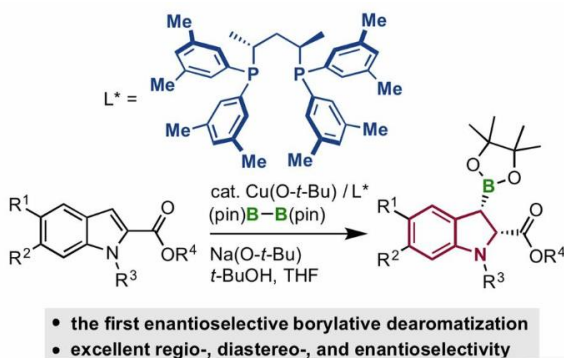
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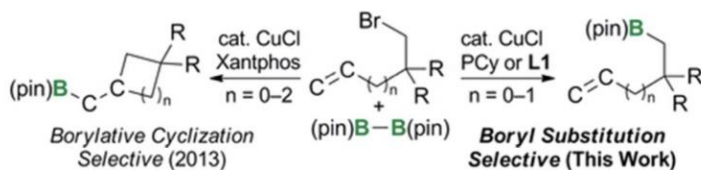
23. Yamamoto, E.; Kojima, R.; **Kubota, K.**; Ito, H.* “Copper(I)-catalyzed diastereoselective borylative exo-cyclization of alkenyl aryl ketones”
Synlett **2015**, *27*, 272.



24. **Kubota, K.**; Hayama, K.; Iwamoto, H.; Ito, H.* “Enantioselective borylative dearomatization of indoles through copper(I) catalysis”
Angew. Chem. Int. Ed. **2015**, *54*, 8809.

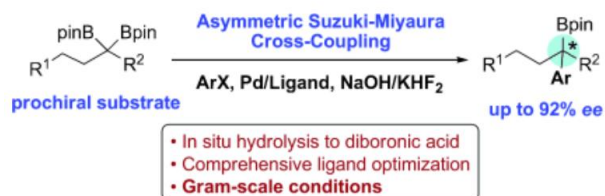


25. Iwamoto, H.; **Kubota, K.**; Yamamoto, E.; Ito, H.* “Copper(I)-catalyzed carbon-halogen bond-selective boryl substitution of alkyl halides bearing terminal alkene moieties”
Chem. Commun. **2015**, *51*, 9655.



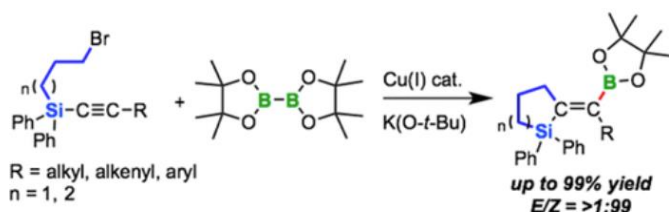
26. Sun, H.; **Kubota, K.**; Hall, D. G.* "Reaction optimization, scalability, and mechanistic insight on the catalytic enantioselective desymmetrization of 1,1-diborylalkanes via Suzuki-Miyaura cross-coupling"

Chem. Eur. J. **2015**, *21*, 19186.



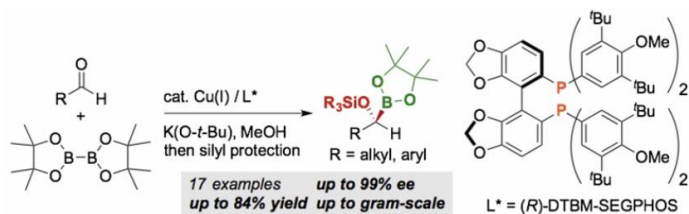
27. **Kubota, K.**; Iwamoto, H.; Yamamoto, E.; Ito, H.* "Silicon-tethered strategy for copper(I)-catalyzed stereo- and regioselective alkylation of alkynes"

Org. Lett. **2015**, *17*, 620.



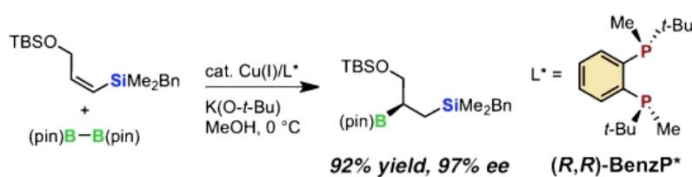
28. **Kubota, K.**; Yamamoto, E.; Ito, H.* "Copper(I)-catalyzed enantioselective nucleophilic borylation of aldehydes: an efficient route to enantiomerically enriched alpha-alkoxyorganoboronate esters"

J. Am. Chem. Soc. **2015**, *137*, 420.

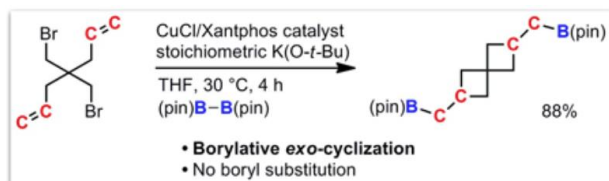


29. **Kubota, K.**; Yamamoto, E.; Ito, H.* "Regio- and enantioselective monoborylation of alkenylsilanes catalyzed by an electron-donating chiral phosphine-copper(I) complex"

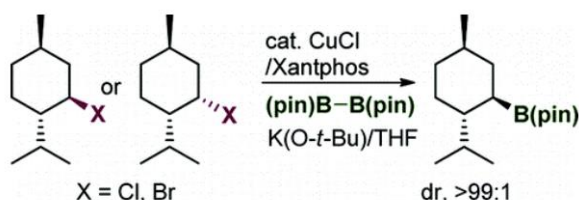
Adv. Synth. Catal. **2013**, 355, 420.



30. **Kubota, K.;** Yamamoto, E.; Ito, H.* “Copper(I)-catalyzed borylative exo-cyclization of alkenyl halides containing unactivated double bond”
J. Am. Chem. Soc. **2013**, 135, 2635.



31. Ito, H.*; **Kubota, K.** “Copper(I)-catalyzed boryl substitution of unactivated alkyl halides”
Org. Lett. **2012**, 14, 890.



Reviews

1. **Kubota, K.** “Synthesis of functionalized organoboron compounds through copper(I) catalysis” **2017**, Springer Theses, Springer
2. **Kubota, K.;** Ito, H. “Chapter 1- Catalytic generation of silicon nucleophiles in Organosilicon Chemistry: Novel approaches and reactions” **2020**, Eds. Hiyama, T.; Oestreich, M., Wiley-VCH
3. **Kubota, K.;** Iwamoto, H.; Ito, H.* “Formal nucleophilic borylation and borylative cyclization of organic halides” *Org. Biomol. Chem.* **2017**, 15, 285.
4. Yamamoto, E.; Takenouchi, Y.; **Kubota, K.;** Ito, H.* “Selective synthesis of organoboron compounds with copper(I)-phosphine complex catalysts” *J. Synth. Org. Chem. Jpn.* **2014**, 72, 758.
5. **Kubota, K.** “Topochemical photocyclizations for the synthesis of two-dimensional polymers” *J. Synth. Org. Chem. Jpn.* **2014**, 72, 834.

References

[1] Prof. Stephen L. Buchwald (Massachusetts Institute of Technology, United States) Email: sbuchwal@mit.edu

[2] Prof. Bradley L. Pentelute (Massachusetts Institute of Technology, United States) Email: blp@mit.edu

[3] Prof. F. Dean Toste (University of California, Berkeley, United States)
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[4] Prof. Dennis G. Hall (University of Alberta, Canada)
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[5] Prof. Hajime Ito (Hokkaido University, Japan)
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