

# Seung Hwan Cho

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## EDUCATION

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<b>Ph. D.</b> in Organic Chemistry, KAIST	2006 – 2011
<b>B. S.</b> in Chemistry, KAIST	2001– 2005

## PROFESSIONAL EXPERIENCE

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<b>Department of Chemistry, POSTECH</b> <i>Associate Professor</i>	2018.09 – present
<b>Department of Chemistry, POSTECH</b> <i>Assistant Professor</i>	2014.07 – 2018.08
<b>Department of Chemistry, University of California, Berkeley</b> <i>Postdoctoral Fellow (with Professor John F. Hartwig)</i>	2012 – 2014
<b>Department of Chemistry, KAIST</b> <i>Postdoctoral Fellow (with Professor Sukbok Chang)</i>	2011 – 2012
<b>Department of Chemistry, KAIST</b> <i>Researcher (with Professor Sukbok Chang)</i>	2005 – 2006

## AWARDS AND HONORS

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<i>"Toray Research Grant for Young Investigator"</i> Korea Toray Science Foundation	2022
<i>"Hanseong Science Award"</i> Hanseong Sonjaehan Foundation	2022
<i>"Young Organic Chemist Award"</i> Division of Organic Chemistry, Korean Chemical Society (KCS)	2021
<i>"KCS-Wiley Young Chemist Award"</i> Korean Chemical Society (KCS)	2020
<i>"The Best Teaching Award (우수강의상)"</i> Department of Chemistry, POSTECH	2018, Spring

<p><i>"Young Korean Academy of Science and Technology (Y-KAST)"</i> Korean Academy of Science and Technology (한림원)</p>	2018
<p><i>"Thieme Journal Award"</i> Synlett/Synthesis/Synfact Award for Young Investigator</p>	2017
<p><i>"TJ Park Cheongam Science Fellowship for Young Investigator"</i> Cheongam (POSCO) Foundation</p>	2017
<p><i>"Selected One of Outstanding Young Scientists in Korea"</i> POSTECH, Dong-A Ilbo</p>	2016
<p><i>"Best Thesis Award"</i> Korea University President Association (한국 과학재단), Korean Academy of Science and Technology (한림원) and S-oil</p>	2012
<p><i>"TJ Park Cheongam Science Fellowship for PostDoc"</i> Cheongam (POSCO) Foundation</p>	2012
<p><i>"Best PhD Thesis Award"</i> Korean Chemical Society (KCS)</p>	2011
<p><i>"Best PhD Thesis Award"</i> KAIST</p>	2011
<p><i>"Thieme SYNStar Award"</i> Synlett/Synthesis/Synfact Student Award</p>	2010
<p><i>"National Graduate Student Science and Technology Scholarship"</i> National Research Foundation of Korea (NRF)</p>	2009
<p><i>"Award for Excellence in Graduate Research"</i> KAIST</p>	2009

## EDITORIAL ADVISORY BOARD MEMBER OF JOURNALS

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<i>Green Synthesis and Catalysis</i> (Editorial Board Member)	2022-present
<i>ACS Catalysis</i> (Early Career Advisory Board)	2019-2021

## PUBLICATIONS

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52. Han, S.; Lee, Y.; Jung, Y.; **Cho, S. H.\*** "Stereoselective Access to Tetra- and Tri-substituted Fluoro- and Chloroborylalkenes via Boron-Wittig Reaction" *Angew. Chem., Int. Ed.* **2022**, *61*, e202210532.

51. Hwang, C.; Lee, Y.; Kim, M.; Seo, Y.; **Cho, S. H.**\* "Diborylmethyl Group as a Transformable Building Block for the Diversification of Nitrogen-Containing Molecules" *Angew. Chem., Int. Ed.* **2022**, *61*, e202209079. (Selected as "Very Important Publication")
50. Ahn, Y.; Park, J.; Park, M.; Jin, S.; Jo, W.; Kim, J.; **Cho, S. H.**; Seo, D.\* "Combinatorial selective synthesis and excitation experiments for quantitative analysis of the effects of Au on a semiconductor photocatalyst" *Chem* **2022**, *in press*
49. Kim, H.; Jung, Y.; **Cho, S. H.**\* "Defluorinative C-C Bond Forming Reaction of Trifluoromethyl Alkenes with (*gem*-Diborylalkyl)lithiums" *Org. Lett.* **2022**, *24*, 2705.
48. Lee, Y.; Han, S.; **Cho, S. H.**\* "Catalytic Chemo and Enantioselective Transformations of *gem*-Diborylalkanes and (Diborylmethyl)metallic Species" *Acc. Chem. Res* **2021**, *54*, 3917.
47. Jo, W.; Lee, J. H.\*; **Cho, S. H.**\* "Advances in Transition Metal-Free Deborylative Transformations of *gem*-Diborylalkanes" *Chem. Commun.* **2021**, *27*, 4346. (Invited "Feature Article")
46. Kim, M.; Park, B.; Shin, M.; Kim, S.; Kim, J.; Baik, M.-H.\*; **Cho, S. H.**\* "Copper-Catalyzed Enantiotopic-Group-Selective Allylation of *gem*-Diborylalkanes" *J. Am. Chem. Soc.* **2021**, *143*, 1069.
45. Park, J.; Jung, Y.; Kim, J.; Lee, E.; Lee, S. Y.; **Cho, S. H.**\* "Kinetic Resolution of  $\alpha$ -Silyl-Substituted Allylboronate Esters via Chemo- and Stereoselective Allylboration of Aldehydes" *Adv. Synth. Cat.* **2021**, *363*, 1069. (Special Issue on "Boron in Catalysis and Organic Synthesis"; Selected as "very important publication; Selected as "Front Cover" )
44. Kim, M.; Lee, J.; **Cho, S. H.**\* "Pd-Catalyzed Negishi Cross-Coupling of Vinyl Bromides with Diborylmethylzinc Chlorides" *Bull. Kor. Chem. Soc.* **2021**, *42*, 199. (Special Issue on "Chemical Synthesis & Reaction Development")
43. Jo, W.; Baek, S.; Hwang, C.; Heo, J.; Baik, M.-H.\*; **Cho, S. H.**\* "ZnMe<sub>2</sub>-Mediated, Direct Alkylation of Electron Deficient N-Heteroarenes with 1,1-Diborylalkanes: Scope and Mechanism" *J. Am. Chem. Soc.* **2020**, *142*, 13235.
42. Lim, S.; Cho, H.; Jeong, J.; Jang, M.; Kim, H.; **Cho, S. H.**; Lee, E.\* "Cobalt-Catalyzed Defluorosilylation of Aryl Fluorides via Grignard Reagent Formation" *Org. Lett.* **2020**, *22*, 7387.
41. Shin, M.; Kim, M.; Hwang, C.; Kwon, H.; Park, J.; Lee, E.; **Cho, S. H.**\* "Facile Synthesis of  $\alpha$ -Boryl-Substituted Allylboronate Esters Using Stable Bis[(pinacolato)boryl]methylzinc Reagents" *Org. Lett.* **2020**, *22*, 2476.
40. Dutta, S.; Mumari, N.; Dubbu, S.; Jang, S. W.; Kumar, A.; Ohtsu, H.; Kim, J.; **Cho, S. H.**; Kawano, M.; Lee, I. S.\* "Highly Mesoporous Metal-Organic Frameworks as Synergistic Multimodal Catalytic Platforms for Divergent Cascade Reactions" *Angew. Chem., Int. Ed.* **2020**, *59*, 3416.

39. Kim, J.; Shin, M.; **Cho, S. H.\*** "Copper-Catalyzed Diastereo- and Enantioselective Addition of 1,1-Diborylalkanes to Cyclic Ketimines and  $\alpha$ -Imino Esters" *ACS Catal.* **2019**, *9*, 8503.
38. Kim, J.; **Cho, S. H.\*** "Chemoselective Palladium-Catalyzed Suzuki-Miyaura Cross-Coupling of (Diborylmethyl)silanes with Alkenyl Bromides" *Asian J. Org. Chem.* **2019**, *8*, 1664. (*Invited Issue on "Researchers in Korea"*)
37. Kim, J.; Hwang, C.; Kim, Y.; **Cho, S. H.\*** "Improved Synthesis of  $\beta$ -Aminoboronate Esters via Copper-Catalyzed Diastereo- and Enantioselective Addition of 1,1-Diborylalkanes to Acyclic Aryldimines" *Org. Process. Res. Dev.* **2019**, *23*, 1663. (*Invited Issue on "Honoring 25 years of Buchwald-Hartwig Amination"*)
36. Lee, H.; Lee, Y.; **Cho, S. H.\*** "Palladium-Catalyzed Chemoselective Negishi Cross-Coupling of Bis[(pinacolato)boryl]methyl Zinc Halides with Aryl (Pseudo)Halides" *Org. Lett.* **2019**, *21*, 5912.
35. Kim, J.; **Cho, S. H.\*** "Access to Enantioenriched Benzylic 1,1-Silylboronate Esters by Palladium-Catalyzed Enantiotopic Group Selective Suzuki-Miyaura Coupling of (Diborylmethyl)silanes with Aryl Iodides" *ACS Catal.* **2019**, *9*, 230.
34. Lee, Y.; Park, J.; **Cho, S. H.\*** "Generation and Application of (Diborylmethyl)zinc Halide: Synthesis of Enantioenriched *gem*-Diborylalkanes by an Asymmetric Allylic Substitution Reaction" *Angew. Chem., Int. Ed.* **2018**, *57*, 12930.
33. Singh, A.; Kim, M.-G.; Lee, H.-J.; Singh, R.; **Cho, S. H.**; Kim, D.-P. "Direct aryl-aryl coupling without pre-functionalization enabled by excessive oxidation of two-electron Ag(I)/Ag(III) catalyst" *Adv. Synth. Catal.* **2018**, *360*, 2032.
32. Park, J.; Choi, S.; Lee, Y.; **Cho, S. H.\*** "Chemo- and Stereoselective Crotylation of Aldehydes and Cyclic Aldimines with Allylic *gem*-Diboroate Ester" *Org. Lett.* **2017**, *19*, 4054.
31. Kim, J.; Ko, K.; **Cho, S. H.\*** "Diastereo- and Enantioselective Synthesis of  $\beta$ -Aminoboronate Esters by Copper(I)-Catalyzed 1,2-Addition of 1,1-Bis[(pinacolato)boryl]alkanes to Imines" *Angew. Chem., Int. Ed.* **2017**, *56*, 11584.
30. Hwang, C.; Jo, W.; **Cho, S. H.\*** "Base-Promoted, Deborylative Secondary Alkylation of *N*-Heteroaromatic *N*-Oxides with Internal *gem*-Bis[(pinacolato)boryl]alkanes: A Facile Derivatization of 2,2'-Bipyridyl Analogues" *Chem. Commun.* **2017**, *53*, 7573.
29. Lee, Y.; Park, J.; Baek, S.-Y.; Kim, S. T.; Tussupbayev, S.; Kim, J.; Baik, M.-H.\*; **Cho, S. H.\*** "Chemoselective Coupling of 1,1-Bis[(pinacolato)boryl]alkanes for the Transition-Metal-Free Borylation of Aryl and Vinyl Halides: A Combined Experimental and Theoretical Investigation" *J. Am. Chem. Soc.* **2017**, *139*, 976.

28. Kim, J.; Kumar, A.; Lee, S. J.; Kim, J.; Lee, D.-G.; Kwon, T.; **Cho, S. H.**; Lee, I.\* "Concave Silica Nanosphere with a Functionalized Open-Mouthed Cavity as Highly Active and Durable Catalytic Nanoreactor" *Chem. Mater.*, **2017**, *29*, 7785.

27. Kim, D.; Choi, J. K.; Kim, S. M.; Hwang, I.; Kii, J.; Choi, S.; **Cho, S. H.**; Kim, K.\*; Lee, I. S.\* "Confined Nucleation and Growth of PdO Nanocrystals in a Seed-Free Solution inside Hollow Nanoreactor" *ACS Appl. Mater. Interfaces*, **2017**, *9*, 29992.

26. Cho, Y. S.; Kim, S. M.; Ju, Y.; Kim, J.; Jeon, K.-W.; **Cho, S. H.**; Kim, J.; Lee, I. S.\* "Spontaneous Pt Deposition on Defective Surfaces of In<sub>2</sub>O<sub>3</sub> Nanocrystals Confined within Cavities of Hollow Silica Nanoshells: Pt Catalyst-Modified ITO Electrode with Enhanced ECL Performance" *ACS Appl. Mater. Interfaces*, **2017**, *9*, 20728.

25. Kim, J.; **Cho, S. H.**\* "Recent Developments in the Direct Methylation of Electron Deficient *N*-Heteroarenes", *Synlett*, **2016**, *27*, 2525. (*Invited Synpact article*)

24. Jo, W.; Kim, J.; Choi, S.; **Cho, S. H.**\* "Transition-Metal Free Regioselective Alkylation of Heterocyclic *N*-Oxides Using 1,1-Diborylalkanes as Alkylation Reagents", *Angew. Chem., Int. Ed.* **2016**, *55*, 9690.

23. Park, J.; Lee, Y.; Kim, J.; **Cho, S. H.**\* "Copper-catalyzed Diastereoselective Addition of Diborylmethane to *N*-*tert*-Butansulfinyl Aldimines: Synthesis of  $\beta$ -Aminoboronates" *Org. Lett.*, **2016**, *18*, 1210.

22. Kim, J.; Park, S.; Park, J.; **Cho, S. H.**\* "Synthesis of Alkylboronates by Copper-catalyzed Allylic Substitution of Allylic Chlorides with 1,1-Diborylalkanes" *Angew. Chem., Int. Ed.* **2016**, *55*, 1498.

21. Larsen, M.; **Cho, S. H.**; Hartwig, J. F. "Iridium-Catalyzed, Hydrosilyl-Directed Borylation of Unactivated Alkyl C-H Bonds" *J. Am. Chem. Soc.* **2016**, *138*, 762.

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**BEFORE  
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20. **Cho, S. H.**; Hartwig, J. F.\* "Iridium-catalyzed Bisborylation Reaction for the Synthesis of 1,1-Benzylidiboronate Esters" *Chem. Sci.* **2014**, *5*, 694.

19. **Cho, S. H.**; Hartwig, J. F.\* "Iridium-catalyzed Borylation of Secondary Benzylic C-H Bonds Directed by Hydrosilane" *J. Am. Chem. Soc.* **2013**, *135*, 8157.

18. Kim, J. Y.; Park, S.; Ryu, J.; **Cho, S. H.**; Kim, S. H.; Chang, S.\* "Rhodium-Catalyzed Intermolecular Amidation of Arenes with Sulfonyl Azides via Chelation-Assisted C-H bond" *J. Am. Chem. Soc.* **2012**, *134*, 9110.

17. Ryu, J.; **Cho, S. H.**\*; Chang, S.\* "A Versatile Rh(I) Catalyst System Enabling the Addition of Heteroarenes to both Alkenes and Alkynes via C-H Bond Activation Pathway", *Angew. Chem., Int. Ed.* **2012**, *51*, 3677. (\**Co-corresponding authors*)

16. Kim, H. J.; **Cho, S. H.**; Chang, S.\* "A Intramolecular Oxidative Diamination and Aminohydroxylation of Olefins under Metal-Free Conditions" *Org. Lett.* **2012**, *14*, 1424.

15. Kim, H. J.; Kim, J.; **Cho, S. H.\***; Chang, S.\* “Intermolecular Oxidative C–N Bond Formation under Metal-Free Conditions: Control of Chemoselectivity between Aryl sp<sup>2</sup> and Benzylic sp<sup>3</sup> C–H Bond Imidation” *J. Am. Chem. Soc.* **2011**, *133*, 16382. (\*Co-corresponding authors)
14. **Cho, S. H.**; J. Y. Kim, J. Kwak, Chang, S.\* “Recent Advances in the Transition Metal-Catalyzed Twofold Oxidative C–H Bond Activation Strategy for C–C and C–N Bond Formation” *Chem. Soc. Rev.* **2011**, *40*, 5068.
13. **Cho, S. H.**; Yoon, J.; Chang, S.\* “Intramolecular Oxidative C–N Bond Forming Reaction for the Synthesis of Carbazoles: Comparison of Reactivity between the Cu-Catalyzed and Metal-Free Conditions” *J. Am. Chem. Soc.* **2011**, *133*, 5996.
12. Kim, J. Y.; **Cho, S. H.**; Joseph, J.; Chang, S.\* “Cobalt- and Manganese-Catalyzed Direct Amination of Azoles under Highly Mild Conditions” *Angew. Chem., Int. Ed.* **2010**, *49*, 9899.
11. **Cho, S. H.**; Kim, J. Y.; Lee, S. Y.; Chang, S.\* “Silver-Mediated Direct Amination of Benzoxazoles: Tuning the Amino Group Source from Formamides to Parents Amines” *Angew. Chem., Int. Ed.* **2009**, *48*, 9127.
10. Hwang, S. J.; **Cho, S. H.**; Chang, S.\* “Synthesis of Condensed Pyrroloindoles via Pd-Catalyzed Intramolecular C–H Bond Functionalization of Pyrroles” *J. Am. Chem. Soc.* **2008**, *130*, 16158.
9. **Cho, S. H.**; Hwang, S. J.; Chang, S.\* “Palladium-Catalyzed C–H Functionalization of Pyridine N-Oxides: Highly Selective Alkenylation and Direct Arylation with Unactivated Arenes” *J. Am. Chem. Soc.* **2008**, *130*, 9254.
8. Lee, J. M.; Park, E. J.; **Cho, S. H.**; Chang, S.\* “Cu-Facilitated C–O Bond Formation Using N-Hydroxyphthalimide: Efficient and Selective Functionalization of Benzyl- and Allylic C–H Bonds” *J. Am. Chem. Soc.* **2008**, *130*, 7824.
7. Hwang, S. J.; **Cho, S. H.**; Chang, S.\* “Evaluation of Catalytic Activity of Copper Salts and their Removal Processes in the Three-Component Coupling Reactions” *Pure Appl. Chem.* **2008**, *80* (5), 873.
6. **Cho, S. H.**; Chang, S.\* “Room Temperature Copper-Catalyzed 2-Functionalization of Pyrrole Rings by a Three-Component Coupling Reaction” *Angew. Chem., Int. Ed.* **2008**, *47*, 2836.
5. **Cho, S. H.**; Hwang, S. J.; Chang, S.\* “Copper-Catalyzed Three-Component Reaction of 1-Alkynes, Sulfonyl Azides, and Water: N-(4-Acetamidophenylsulfonyl)-2-phenylacetamide” *Organic Syntheses* **2008**, *85*, 131.
4. **Cho, S. H.**; Chang, S.\* “Rate-Accelerated Nonconventional Amide Synthesis in Water: A Practical Catalytic Aldol-Surrogate Reaction” *Angew. Chem., Int. Ed.* **2007**, *46*, 1897.
3. Chang, S.\*; Lee, M. J.; Jung, D. Y.; Yoo, E. J.; **Cho, S. H.**; Han, S. K. “Catalytic One-Pot Synthesis of Cyclic Amidines by Virtue of Tandem Reactions Involving Intramolecular Hydroamination Under Mild Conditions” *J. Am. Chem. Soc.* **2006**, *128*, 12366.
2. Yoo, E. J.; Bae I.; **Cho, S. H.**; Han, H.; Chang, S.\* “A Facile Access to N-Sulfonylimidates and their Synthetic Utility for the Transformations to Amidines and Amides” *Org. Lett.* **2006**, *8*, 1347.

1. **Cho, S. H.;** Yoo, E. J.; Bae I.; Chang, S.\* "Copper-Catalyzed Hydrative Amide Synthesis with Terminal Alkyne, Sulfonyl Azide, and Water" *J. Am. Chem. Soc.* **2005**, *127*, 16046.

## PATENTS

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5. **Cho, S. H.;** Kim, J.; Jo, W. "Regioselective alkylation method of heterocyclic-N-oxides using 1,1-diborylalkane compounds" (*Korea Patent 10-1819824*)
4. Chang, S.; **Cho, S. H.;** Kim, H. J.; Kim, J. Y. "Manufacturing method for imide compound using iodobenzene diacetate" (*Korea Patent 10-2013-032561*)
3. Chang, S.; **Cho, S. H.;** Yoo E. J.; Bae, I. "Preparation process of N-sulfonylamide using copper catalyst" (*Korea Patent 10-2006-003248*)
2. Chang, S.; **Cho, S. H.** "Preparation process of N-sulfonyl iminium heterocycle and bezocycle derivatives using copper catalyst" (*Korea Patent 10-2008-0008002*)
1. Chang, S.; **Cho, S. H.;** Kim, J. Y. "Process for the preparation of 2-amino benzazoles using oxidant and acid" (*Korea Patent 10-2009-0086513*)