Hyehwang Kim (金慧皇)

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EDUCATION

University of Toronto	Ph.D. Chemistry	09/2020 – 03/2024
MIT	M.Sc. Chemistry	09/2018 – 03/2020
University of Toronto	B.Sc. Chemistry, *High distinction*	09/2014 – 06/2018

RESEARCH EXPERIENCE

Hokkaido University *Supervisor*: Hajime Ito 06/2024 – present

Postdoctoral researcher working on the mechanochemical synthesis and utilization of silyllithium reagents and disilylboronates.

University of Toronto *Supervisor*: Douglas W. Stephan 09/2020 – 03/2024

Worked on investigating the frustrated Lewis pair (FLP) reactivity of phosphino-phosphenium cations, and on fluorination of (pentafluorophenyl)borate anions for the synthesis of new weakly coordinating anions.
Ph.D. Thesis: "Frustrated Lewis Pair Reactivity of Phosphino-Phosphenium Cations"
(Link to thesis: `https://tspace.library.utoronto.ca/handle/1807/140071`)

MIT *Supervisor*: Christopher C. Cummins 11/2018 – 03/2020

Worked on utilizing tetrametaphosphate anhydride ($[P_4O_{11}]^{2-}$) and developing new metaphosphate anhydrides ($[P_5O_{14}]^{3-}$, $[P_6O_{17}]^{4-}$) for the tetra-, penta-, and hexaphosphorylation of nucleosides.
M.Sc. Thesis: "Utilization of Tetrametaphosphate Anhydride for the Synthesis of Disubstituted Tetraphosphates, Terminally Modified Nucleoside 5'-Pentaphosphates, and Beyond"
(Link to thesis: `http://oastats.mit.edu/handle/1721.1/127439`)

University of Toronto *Supervisor*: Dwight S. Seferos 09/2017 – 04/2018

Worked on expanding the scope of a nickel diimine catalyst by developing various external initiators to be installed at the initiating end of polymer chains.
B.Sc. Thesis: "Synthesis of a Novel Nickel Diimine Catalyst for the External Initiation of Electron Deficient Polymers"

University of Toronto *Supervisor*: Sophie A. L. Rousseaux 05/2017 – 08/2017

Worked on the nickel-catalyzed cyanation of benzylic and allylic pivalate esters.

University of Toronto *Supervisor*: Dvira Segal 05/2016 – 04/2017

Worked on utilizing the Landauer-Büttiker probe method to model the intermediate coherent-incoherent charge transport mechanism and the tunnelling to hopping crossover in DNA.

University of Toronto *Supervisor*: Datong Song 09/2015 – 04/2016

Worked on developing an iron catalyst for the cyclization of linear azides to synthesize N-heterocycles.

University of Toronto *Supervisor*: Jik Chin 06/2013 – 04/2014

Worked on developing a chiral shift reagent for amino acids, and the synthesis of chiral diamines.

PUBLICATIONS

1. **Kim, H.**; Mandal, D.; Ng, J. K. J.; Qu, Z.-w.; Grimme, S.; Stephan, D. W. Fluorination/dearomatization of C_6F_5 groups: An FLP route to an electrophilic borane and non-coordinating anions. *Chem. Eur. J.* **2024**, *30*, e202401776. (*Featured on Cover*)

2. **Kim, H.**; Lough, A.; Qu, Z.-w.; Grimme, S.; Stephan, D. W. Addition and N=N bond cleavage of diazo-compounds by phosphino-phosphenium cations. *Chem. Commun.* **2024**, *60*, 1031–1034.

3. **Kim, H.**; Qu, Z.-w.; Grimme, S.; Al-Zuhaika, N.; Stephan, D. W. Phosphino-phosphinations: Frustrated Lewis pair reactions of phosphino-phosphonium cations with alkynes. *Angew. Chem. Int. Ed.* **2023**, *62*, e202312587.

4. **Kim, H.**; Stephan, D. W. Reactive FLP-alkyne addition products: A route to anionic and zwitterionic phosphines. *Dalton Trans.* **2023**, *52*, 5023–5027.

5. Shepard, S. M.; **Kim, H.**; Bang, Q. X.; Alhokbany, N.; Cummins, C. C. Synthesis of α-δ disubstituted tetraphosphates and terminally-functionalized nucleoside pentaphosphates. *J. Am. Chem. Soc.* **2021**, *143*, 463–470.

6. Zhou, J.; **Kim, H.**; Liu, L. L.; Cao, L. L. Stephan, D. W. An arene-stabilized η^5-pentamethylcyclopentadienyl antimony dication acts as a source of Sb^+ or Sb^{3+} cations. *Chem. Commun.* **2020**, *56*, 12953–12956.

7. Michel, N. W. M.; Jeanneret, A. D. M.; **Kim, H.**; Rousseaux, S. A. L. Nickel catalyzed cyanation of benzylic and allylic pivalate esters. *J. Org. Chem.* **2018**, *83*, 11860–11872.

8. **Kim, H.**; Segal, D. Controlling charge transport mechanisms in molecular junctions: Distilling thermally-induced hopping from coherent-resonant conduction. *J. Chem. Phys.* **2017**, *146*, 164702.

9. **Kim, H.**; Kilgour, M.; Segal, D. Intermediate coherent-incoherent charge transport: DNA as a case study. *J. Phys. Chem. C* **2016**, *120*, 23951–23962.

ORAL PRESENTATIONS

1. 104th Chemical Society of Japan Annual Meeting, Chiba, Japan, March 2024 – "Frustrated Lewis Pair Reactivity of Phosphino-Phosphenium Cations"

TEACHING EXPERIENCE

MIT Laboratory Teaching Assistant 02/2019 – 05/2019

Supervised students during their laboratory sessions for *5.310: Laboratory Chemistry.*

MIT Recitation Teaching Assistant 09/2018 – 12/2018

Reviewed course material for *5.111: Principles of Chemical Science* for students in recitations.

MENTORING EXPERIENCE

Mentored one undergraduate student (Qing Xin Bang) at MIT, and three undergraduate students (Jacob Przywolski, Jitian Chen, Joshua Kye Jin Ng) at the University of Toronto. Mentored M.Sc. and first-year Ph.D. students in the Stephan group (Nahil Al-Zuhaika, Elena Zelenco, Agata Dawidowicz, Kathrin Kolling) who worked on research derived from my Ph.D. work.

AWARDS

JSPS Short-term Postdoctoral Fellowship 05/2024, *Declined*

104th CSJ Annual Meeting Student Presentation Award 04/2024

Department of Chemistry Travel Grant 01/2024

Jim Guillet Chemistry Graduate Scholarship 04/2022, 2024

NSERC Canada Graduate Scholarship (CGS-D) 09/2021 – 04/2024

KOGAS Canada Scholarship 09/2021

Ontario Graduate Scholarship 09/2020 – 08/2021

MIT Lewis Paul Chapin Fellowship 09/2019 – 01/2020

Ivan Szak Prize in Chemistry 12/2017

Sarah C. Gollop and William G. Gollop Memorial Scholarship in Chemistry 12/2017

NSERC Undergraduate Student Research Award 05/2017 – 08/2017

Best Poster Award at the Department of Chemistry 08/2016, 2017

Korea University Alumni Association Scholarship 12/2015, 2016

Richard Ivey Foundation Summer Research Scholarship 05/2016 – 08/2016

Later Life Learning OSOTF Award 10/2015, 2016, 2017

Later Life Learning Scholarship 10/2015, 2016, 2017

University of Toronto Dean's List 2015 – 2018

University of Toronto Scholars Award 09/2014

Canadian Chemistry Olympiad: Ontario Provincial Finalist 05/2010