Korean Chemical Society
Division of Organic Chemistry

제 246 회 유기화학 분과회 세미나

- 일시: 2020 년 12 월 16 일 (수)
- 주관: 대한화학회 유기화학 분과회
- 공식후원업체: 세진시아이

제 246 회 유기화학 분과회 세미나

[프로그램]

13:30-13:40 **인사말** (이필호 대한화학회 유기화학분과회 회장, 강원대학교)

Session I <좌장: 김정곤 (전북대학교)>

13:40-14:05 고민섭 (부산대학교 화학과)
Target Identification and Chemical Proteomics Approach to Identify Novel Interactor of Small Molecules and Microproteins

14:05-14:30 김기태 (충북대학교 화학과)
Ruthenium Photocatalysis in Templated Reactions: Toward Nucleic Acid Sensing Systems

14:30-14:55 김범진 (울산대학교 화학과)
Self-Assembly of Organic Molecules for Chemical Manipulation of Cell Viability

14:55-15:25 **감사패 증정/Coffee Break**

Session II <좌장: 신승훈 (한양대학교)>

15:25-15:50 손종우 (동아대학교 화학과)
New Synthetic Opportunities with Nitrones, Hydroxamic Acids, and Peptides

15:50-16:15 이효준 (군산대학교 화학과)
Phase-Transfer Catalysis (PTC): A Powerful Tool for Practical Asymmetric Synthesis

16:15-16:40 박상준 (국방과학연구소)
Catalytic Enantio- and Regioselective Hydrofunctionalization of Dienes

16:40-16:50 **맺음말** (이필호 대한화학회 유기화학분과회 회장, 강원대학교)

Session I

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Education

Ph.D. (2013)	Department of Chemistry, Seoul National University (Prof. Seung Bum Park)
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Position

2020 – present	Assistant Professor, Department of Chemistry, Pusan National University, Busan, South Korea
2014 – 2020	Post-doc., Department of Chemistry, Scripps Research, San Diego, USA (Prof. Peter G. Schultz)
2013 – 2014	Post-doc., Bio-MAX/N-BIO, Seoul, South Korea (Prof. Seung Bum Park)

Representative Publications

1. **Koh, M.**; Yao, A.; Gleason, P. R.; Mills, J. H. & Schultz, P. G.*, "A general strategy for engineering noncanonical amino acid dependent bacterial growth" *J. Am. Chem. Soc.* **2019**, 141, 16213.

2. **Koh, M.**; Cho, H.-Y.; Yu, C.; Choi, S.; Lee, K.-B.* & Schultz, P. G.*, "Site-specific incorporation of a dithiolane containing amino acid into proteins", *Bioconjug. Chem.* **2019**, 30, 2102.

3. **Koh, M.**; Nasertorabi, F.; Han, G. W.; Stevens, R. C.* & Schultz, P. G.*, "Generation of an orthogonal protein-protein interface with a noncanonical amino acid", *J. Am. Chem. Soc.* **2017**, 139, 5728.

4. **Koh, M.**; Park, J.; Koo, J. Y.; Lim, D.; Cha, M. Y.; Jo, A.; Choi, J. H. & Park, S. B.* "Phenotypic screening to identify small-molecule enhancers for glucose uptake: target identification and rational optimization of their efficacy", *Angew. Chem. Int. Ed.* **2014**, 53, 5102.

5. **Koh, M.**; Park, J.; An, H. & Park, S. B.* "Ratiometric analysis of zidovudine (ZDV) incorporation by reverse transcriptases or polymerases via bio-orthogonal click chemistry", *Chem. Commun. (Camb.)* **2011**, 47, 7614.

Target Identification and Chemical Proteomics Approach to Identify Novel Interactor of Small Molecules and Microproteins

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Target identification of bio-active compounds is a critical step in drug discovery process. However, it is still challenging due to non-specific interactions and low affinity of small molecules. In addition, there are hundreds of previously unidentified short open reading frame encoded peptides (SEPs) now have been found to be translated. Some of them were characterized as important regulator of biological processes. But, a general method to define their interactomes is still lacking. In this Seminar, I will introduce photo-crosslinking based protocols to identify interactors of small molecules or SEPs.

In the first section, a model study of phenotype-based drug discovery process will be introduced. To identify target of a new modulator of glucose uptake, we conducted a FITGE (fluorescence difference in two-dimensional gel electrophoresis) for a small molecule that enhances the glucose uptake in myotube. We showed that the target of the glucose uptake enhancer in myotube is a nuclear receptor PPAR gamma (peroxisome proliferator-activated receptor gamma). Subsequent optimization by introducing additional carbamoyl moiety generated lead compounds having enhanced potency to the PPAR gamma. We confirmed that the PPAR gamma can be a selective target out of the other subtypes (alpha and delta) via transactivation reporter assay. Overall, using a novel platform of the phenotype-based drug discovery process, this study has identified a new small-molecule modulator of glucose uptake targeting the PPAR gamma.

In the second section, genetically introduced UV-reactive amino acid will be demonstrated for its ability to identify interacting proteins of SEPs. The small size of SEPs has made it difficult to identify their cellular binding partners using standard methods. In this seminar, I will introduce a photo-crosslinking amino acid AbK can be incorporated into overexpressed, epitope-tagged SEP transgenes, allowing covalent bond formation between SEPs and their interactors in live cells. From an AP-MS-based screen of conserved mammalian SEPs, we identified short ORF encoded histone binding protein (SEBHP), a micropeptide which acts as a transcriptional regulator, capable of modulating more than 15% of the active transcriptome. The methodology described herein will likely be of broad utility in annotating the essential physiological roles of SEPs.

References

1. Koh, M.; Park, J.; Koo, J. Y.; Lim, D.; Cha, M. Y.; Jo, A.; Choi, J. H. & Park, S. B.* “Phenotypic screening to identify small-molecule enhancers for glucose uptake: target identification and rational optimization of their efficacy”, *Angew. Chem. Int. Ed.* **2014**, 53, 5102.

2. Koh, M.; Ahmad, I.; Ko, Y.; Zhang, Y.; Martinez, T. F.; Diedrich, J. K.; Chu, Q.; Moresco, J. J.; Erb, M. A.; Saghatelian, A.; Schultz, P. G. & Bollong, M. J., “A short ORF-encoded transcriptional regulator” *submitted*

김 기 태 (Ki Tae Kim)

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Education

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Position

2020 – present	Assistant Professor, Department of Chemistry, Chungbuk National University, Korea
2020 – 2020	Scientific Collaborator, Department of Organic Chemistry, University of Geneva, Switzerland
2016 – 2020	Post-doc., Department of Organic Chemistry, University of Geneva, Switzerland (Prof. Nicolas Winssinger)
2015 – 2016	Post-doc., Department of Chemistry, POSTECH, Korea (Prof. Byeang Hyean Kim)

Representative Publications

1. **Kim, K. T.**; Winssinger, N.* "Enhanced SNP-sensing using DNA-templated reactions through confined hybridization of minimal substrates (CHOMS)." *Chem. Sci.* **2020**, *11*, 4150-4157.

2. **Kim, K. T.**; Angerani, S.; Chang, D.; Winssinger, N.* "Coupling of DNA Circuit and Templated Reactions for Quadratic Amplification and Release of Functional Molecules." *J. Am. Chem. Soc.* **2019**, *141*, 16288-16295.

3. **Kim, K. T.**; Chang, D.; Winssinger, N.* "Double-Stranded RNA-Specific Templated Reaction with Triplex Forming PNA." *Helv. Chim. Acta* **2018**, *101*, e1700295.

4. **Kim, K. T.**; Veedu, R. N.; Seo, Y. J.; Kim, B. H.* "Quencher-free molecular beacons as probes for oligonucleotides containing CAG repeat sequences." *Chem. Commun.* **2014**, *50*, 1561-1563.

5. **Kim, K. T.**; Kim, B. H.* "A fluorescent probe for the 3′-overhang of telomeric DNA based on competition between two interstrand G-quadruplexes." *Chem. Commun.* **2013**, *49*, 1717-1719.

Ruthenium Photocatalysis in Templated Reactions: Toward Nucleic Acid Sensing Systems

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Nucleic acid-templated reactions proceed by high effective concentrations induced by sequence-specific hybridization of reactive oligonucleotides to a template sequence. One of the attractive features of nucleic acid-templated reactions is catalytic nature originated from iterative strand exchange that leads to signal amplification. Such advantageous feature of the reaction enables the design of amplification-based nucleic acid sensing platforms that conditionally release or synthesize a fluorescent molecule only in the presence of particular DNA or RNA molecules. Although templated reactions are currently being considered as a powerful signal amplification technique for the nucleic acid sensing, however, templated reactions suffer from low turnover frequency and signal amplification (<100-fold). Therefore, improvements in turnover efficiency are still needed and this can be achieved by an expending scope of nucleic acid templated chemistry.

In this talk, I will present our recent research on nucleic acid-templated reactions using ruthenium photocatalysis. Based on the fastest templated reaction achieved by a pyridinium linker that immolates upon photocatalytic reduction by a ruthenium complex, we have designed new templated reactions showing greatly improved turnover frequency. Nucleic acid sensing system based on extremely robust and biocompatible ruthenium photocatalysis allows us to clearly detect low-abundance targets such as miRNA and single nucleotide polymorphism (SNP).

References

1. Kim, K. T.; Winssinger, N.* "Enhanced SNP-sensing using DNA-templated reactions through confined hybridization of minimal substrates (CHOMS)." *Chem. Sci.* **2020**, *11*, 4150-4157.
2. Kim, K. T.; Angerani, S.; Chang, D.; Winssinger, N.* "Coupling of DNA Circuit and Templated Reactions for Quadratic Amplification and Release of Functional Molecules." *J. Am. Chem. Soc.* **2019**, *141*, 16288-16295.
3. Kim, K. T.; Chang, D.; Winssinger, N.* "Double-Stranded RNA-Specific Templated Reaction with Triplex Forming PNA." *Helv. Chim. Acta* **2018**, *101*, e1700295.

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B.Sc. (2012)	Department of Chemistry, Sungkyunkwan University

Position

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2019 – 2020	Postdoctoral Associate., Department of Chemistry, Brandeis University (Prof. Bing Xu)
2018 – 2019	Postdoctoral Associate., Department of Chemistry, KAIST (Prof. Insung Choi)

Representative Publications

1. **Kim, B. J.**; Fang, Y.; He, H.; Xu, B.* "Trypsin-Instructed Self-Assembly on Endoplasmic Reticulum for Selectively Inhibiting Cancer Cells" *Adv. Healthcare Mater.* DOI: 10.1002/adhm.202000416.

2. **Kim, B. J.**; Lee, J. K.; Choi, I. S.* "Iron Gall Ink Revisited: Hierarchical Formation of Fe(III)-Tannic Acid Coacervate Particles in Microdroplets for Protein Condensation" *Chem. Commun.* **2019**, *55*, 2142–2145.

3. **Kim, B. J.**; Cho, H.; Park, J. H.; Mano, J. F.; Choi, I. S.* "Strategic Advances in Formation of Cell-in-Shell Structures: From Syntheses to Applications" *Adv. Mater.* **2018**, *30*, 1706063.

4. **Kim, B. J.**; Han, S.; Lee, K.-B.; Choi, I. S.* "Biphasic Supramolecular Self-Assembly of Ferric Ions and Tannic Acid across Interfaces for Nanofilm Formation" *Adv. Mater.* **2017**, *29*, 1700784.

5. **Kim, B. J.**; Park, T.; Moon, H. C.; Park, S.-Y.; Hong, D.; Ko, E. H.; Kim, J. Y.; Hong, J. W.; Han, S. W.; Kim, Y.-G.*; Choi, I. S.* "Cytoprotective Alginate/Polydopamine Core/Shell Microcapsules in Microbial Encapsulation" *Angew. Chem. Int. Ed.* **2014**, *53*, 14443-14446.

Self-Assembly of Organic Molecules for Chemical Manipulation of Cell Viability

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Molecular self-assembly, the spontaneous organization of molecules under equilibrium conditions, is ubiquitous in living systems, leading to the formation of innumerable biological complexes spatiotemporally regulated. Inspiring by nature, the novel methodologies, such as enzyme-catalyzed self-assembly and interfacial self-assembly, has been developed for the spatiotemporal control of self-assembly. It also enables molecular self-assembly to be regulated in cellular milieu, leading to the formation of assemblies at the specific position of living cells. The nanometric shell is able to be formed on the cell surface via the interfacial self-assembly of tannic acid and ferric ion, allowing to the protection of the living cells against harmful stresses. The PRSS1-catalyzed self-assembly of peptide derivatives facilitates the selectively targeting of endoplasmic reticulum (ER) in OVSAHO cancer cell, promising the application in cancer therapy. These simple strategies for molecular self-assembly in cellular milieu will advance chemical manipulability of cell viability.

References

1. Kim, B. J.; Han, S.; Lee, K.-B.; Choi, I. S.* "Biphasic Supramolecular Self-Assembly of Ferric Ions and Tannic Acid across Interfaces for Nanofilm Formation" *Adv. Mater.* **2017**, *29*, 1700784.
2. Kim, B. J.; Fang, Y.; He, H.; Xu, B.* "Trypsin-Instructed Self-Assembly on Endoplasmic Reticulum for Selectively Inhibiting Cancer Cells" *Adv. Healthcare Mater.* DOI: 10.1002/adhm.202000416.

Session II

손 종 우 (Jongwoo Son)

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Education

Ph.D. (2012-2018)	University of Illinois at Chicago (Prof. Laura L. Anderson)
M.Sc. (2009-2011)	Chungnam National University (Prof. Eul-Kgun Yum)
B.Sc. (2002-2009)	Chungnam National University

Position

2020-present	Assistant Professor, Department of Chemistry, Dong-A University
2019-2020	Postdoc., University of Wisconsin-Madison (Prof. Jennifer E. Golden)
2018-2019	Postdoc., University of Göttingen, Germany (Prof. Lutz Ackermann)
2011-2012	Researcher, Korea Research Institute of Chemical Technology

Representative Publications

1. Lorion, M. M.; Kaplaneris, N.; **Son, J.**; Kuniyil, R.; Ackermann, L. 'Late-Stage Peptide Diversification by Cobalt-Catalyzed C–H Activation: Sequential Multicatalysis for Stapled Peptides' *Angew. Chem. Int. Ed.* **2019**, *58*, 1684.

2. **Son, J.**; Reidl, T. W.; Kim, K. H.; Wink, D. J.; Anderson, L. L. 'Generation and Rearrangement of *N*,*O*-Dialkenylhydroxylamines for the Synthesis of 2-Aminotetrahydrofurans' *Angew. Chem. Int. Ed.* **2018**, *57*, 6597.

3. Reidl, T. W.; **Son, J.**; Wink, D. J.; Anderson, L. L. 'Facile Synthesis of Azetidine Nitrones and Diastereoselective Conversion to Densely-Substituted Azetidines' *Angew. Chem. Int. Ed.* **2017**, *56*, 11579.

4. **Son, J.**; Kim, K. H.; Mo, D-L.; Wink, D. J.; Anderson, L. L. 'Single-Step Modular Synthesis of Unsaturated Morpholine *N*-Oxides and Their Cycloaddition Reactions' *Angew. Chem. Int. Ed.* **2017**, *56*, 3059.

5. Pecak, W. H.; **Son, J.**; Burnstine, A. J.; Anderson, L. L. 'Synthesis of 1,4-Enamino Ketones by [3,3]-Rearrangements of Dialkenylhydroxylamines' *Org. Lett.* **2014**, *16*, 3440.

New Synthetic Opportunities with Nitrones, Hydroxamic Acids, and Peptides

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New transformations involving *N*-vinylnitrone and *N*,*O*-divinylhydroxylamine intermediates, and tryptophan-containing peptides were developed to facilitate the synthesis of functionalized molecules and to access novel heterocyclic and peptide motifs.[1] We have expanded the scope of these methods to include the synthesis of morpholine-*N*-oxides through the 6π-electrocyclization of transient *N*-vinylnitrones and the preparation of *2*-aminotetrahydrofurans through the addition of *N*,*O*-divinylhydroxylamines to electron-deficient allenes.[2] Also, we introduced the examples of C–H functionalization of tryptophan-containing peptides through the allylation and hydroalkylation.[3] The scope and limitations of these new transformations will be discussed to emphasize new fundamental reactivity patterns and a detailed description of the synthetic versatility of these products will be presented to illustrate their utility in facilitating the preparation of sophisticated heterocyclic scaffolds and functionalized peptides.

References

1. (a) Wang, H-Y.; Mueller, D. S.; Sachwani, R. M.; Kapadia, R.; Londino, H. N.; Anderson, L. L. *J. Org. Chem.* **2011**, *76*, 3203. (b) Mo, D-L.; Wink, D. J.; Anderson, L. L. *Org. Lett.* **2012**, *14*, 5180. (c) Wang, H-Y.; Anderson, L. L. *Org. Lett.* **2013**, *15*, 3362. (d) Pecak, W. H.; Son, J.; Burnstine, A. J.; Anderson, L. L. *Org. Lett.* **2014**, *16*, 3440. (e) Zhu, Y.; Bauer, M.; Ackermann, L. *Chem. Eur. J.* **2015**, *21*, 9980. (f) Ruan, Z.; Sauermann, N.; Manoni, E.; Ackermann, L. *Angew. Chem. Int. Ed.* **2017**, *56*, 3172. (g) Wang, W.; Lorion, M. M.; Martinazzoli, O.; Ackermann, L. *Angew. Chem. Int. Ed.* **2018**, *57*, 10554.
2. (a) Son, J.; Kim, K. H.; Mo, D-L.; Wink, D. J.; Anderson, L. L. *Angew. Chem. Int. Ed.* **2017**, *56*, 3059. (b) Reidl, T. W.; Son, J.; Wink, D. J.; Anderson, L. L. *Angew. Chem. Int. Ed.* **2017**, *56*, 11579. (c) Son, J.; Reidl, T. W.; Kim, K. H.; Wink, D. J.; Anderson, L. L. *Angew. Chem. Int. Ed.* **2018**, *57*, 6597.
3. (a) Schischko, A.; Kaplaneris, N.; Rogge, T.; Sirvinskaite, G.; Son, J.; Ackermann, L. *Nat. Commun.* **2019**, *10*, 3553. (b) Lorion, M. M.; Kaplaneris, N.; Son, J.; Kuniyil, R.; Ackermann, L. *Angew. Chem. Int. Ed.* **2019**, *58*, 1684.

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Education

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B.S. (2009)	Kyungpook National University

Position

2020-Present	Assistant Professor, Dept. of Chemistry, Kunsan National University
2016-2020	Post-doctoral Fellow, Kyoto University (Prof. Keiji Maruoka)
2015-2016	Post-doctoral Fellow, Kyungpook National University (Prof. Chang-Woo Cho)

Representative Publications

1. Paria, S.; **Lee, H.-J.**; Maruoka, K.* "Enantioselective Alkynylation of Isatin Derivatives Using a Chiral Phase-Transfer/Transition-Metal Hybrid Catalyst System" *ACS Catal.* **2019**, *9*, 2395-2399.

2. **Lee, H.-J.**; Arumugam, N.; Almansour, A. I.;Kumar, R. S.; Maruoka, K.* "Design of New Amino Tf-Amido Organocatalysts: Environmentally Bengin Approach to Asymmetric Aldol Synthesis" *Synlett* **2019**, *30*, 401-404.

3**. Lee, H.-J.;** Arumugam, N.; Almansour, A. I.; Kumar, R. S.; Maruoka, K.* "Practical Synthesis of Four Different Pseudoenantiomeric Organocatalysts with both *cis*- and *trans*-Substituted 1,2-*cis*-cyclohexxanediamine Structures from a Common Intermediate" *Tetrahedron*, **2018**, *74*, 5263.-5269.

4. **Lee, H.-J.**; Eun, B.; Sung, E.; Hwang, G. T.; Ko, Y. K.; Cho, C.-W.* "Catalytic Enantioselective Synthesis of Carboxy-Substituted 2-Isoxxazolines by Cascade oxa-Michael-Cyclization" *Org. Biomol. Chem.* **2018**, 16, 657-664.

5. **Lee, H.-J.**; Cho, C.-W.; Seo, H.; Singha, S.; Jun, Y. W.; Lee, K.-H.; Jung, Y.; Kim, K.-T.; Park, S.; Bae, S. C.; Ahn, K. H.* "A Two-Photon Fluorescent Probe for Lysosomal Zinc Ions" *Chem. Commun.* **2016**, 52, 124-127.

6. **Lee, H.-J.**; Cho, C.-W.* "Enantioselective Phase-Transfer-Catalyzed Synthesis of Chiral *N*-Substituted 3,3-Dinitroazetidines by Aza-Michael Reaction**"** *J. Org. Chem.* **2015**, *80*, 11435-11440.

Phase-Transfer Catalysis (PTC): A Powerful Tool for Practical Asymmetric Synthesis

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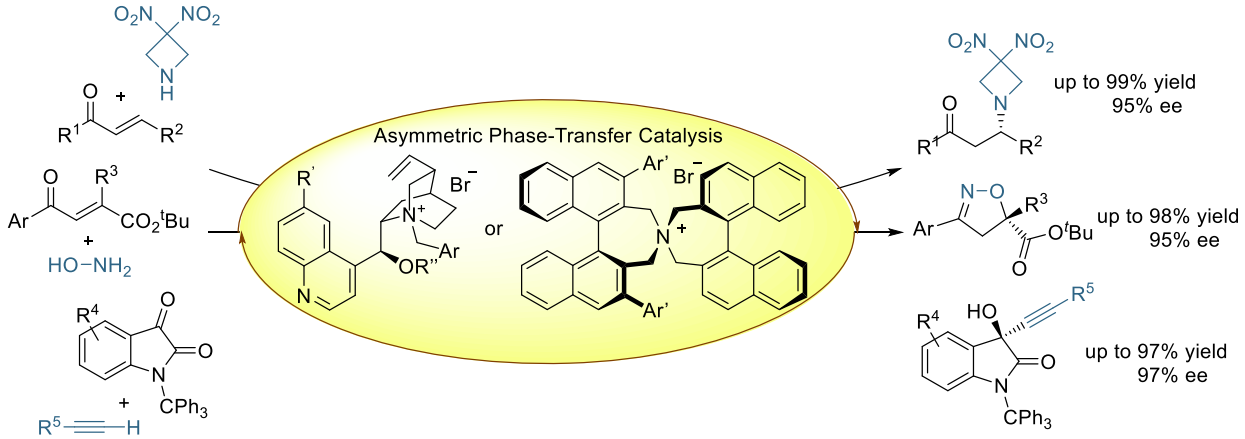
Phase-transfer catalysis (PTC) has been developed as one of the most powerful and versatile tools in organocatalytic synthesis. Asymmetric PTC, especially, based on the use of structurally well-defined chiral, nonracemic catalysts has become a topic of great scientific interest in both of academic and industrial laboratories during more than last 30 years. Various chiral building blocks and bio-active compounds have been synthesized in high yield and stereoselectivities by generating a chiral ion pair efficiently from prochiral anionic nucleophile in the presence of chiral phase-transfer catalyst. Herein, we report three types of asymmetric phase-transfer catalysis with several chiral quaternary ammonium catalysts. Firstly, asymmetric synthesis of DNAZ derivatives using azetidines as a *N*-nucleophile.[1] Secondly, enantioselective synthesis of 2-isoxazolines employing hydroxyl amine as *an O*-nucleophile.[2] Finally, chiral phase-transfer/transition metal hybrid catalyst system for asymmetric alkynylation using alkynylide as a *C*-nucleophile.[3]



References

1. **Lee, H.-J.**; Cho, C.-W.* "Enantioselective Phase-Transfer-Catalyzed Synthesis of Chiral *N*-Substituted 3,3-Dinitroazetidines by Aza-Michael Reaction**"** *J. Org. Chem.* **2015**, *80*, 11435-11440.

2. **Lee, H.-J.**; Eun, B.; Sung, E.; Hwang, G. T.; Ko, Y. K.; Cho, C.-W.* "Catalytic Enantioselective Synthesis of Carboxy-Substituted 2-Isoxxazolines by Cascade oxa-Michael-Cyclization" *Org. Biomol. Chem.* **2018**, 16, 657-664.

3. Paria, S.; **Lee, H.-J.**; Maruoka, K.* "Enantioselective Alkynylation of Isatin Derivatives Using a Chiral Phase-Transfer/Transition-Metal Hybrid Catalyst System" *ACS Catal.* **2019**, *9*, 2395-2399.

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Education

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Position

2020 – present	Senior Researcher, Agency for Defense Development
2019	Professional Researcher, OLED R&D Center in LG Chem.
2017 – 2019	Post-Doc, Department of Chemistry, Duke University (Prof. Steven J. Malcolmson)

Representative Publications

1. Adamson, N. J.; **Park, S.**; Zhou, P.; Nguyen, A. L.; Malcolmson, S. J. "Enantioselective Construction of Quaternary Stereogenic Center by the Addition of an Acyl Anion Equivalent to 1,3-Dienes" *Org. Lett.* **2020**, *22*, 2032.

2. **Park, S.**; Adamson, N. J.; Malcolmson, S. J. "Brønsted acid and Pd-PHOX Dual-Catalysed Enantioselective Addition of Activated *C*-Pronucleophiles to Internal Dienes" *Chem. Sci.* **2019**, *10*, 5176.

3. **Park, S.**; Malcolmson, S. J. "Development and Mechanistic Investigations of Enantioselective Pd-Catalyzed Intermolecular Hydroaminations of Internal Dienes" *ACS Catal.* **2018**, *8*, 8468.

4. **Park, S.**; Kim, H.; Son, J. Y.; Um, K.; Lee, S.; Baek, Y.; Seo, B.; Lee, P. H. "Synthesis of Imidazopyridines via Copper-Catalyzed, Formal Aza-[3 + 2] Cycloaddition Reaction of Pyridine Derivatives with α-Diazo Oxime Ethers" *J. Org. Chem.* **2017**, *82*, 10209.

5. **Park, S.**; Jeon, W. H.; Yong, W.-S; Lee, P. H. "Synthesis of Azulen-1-yl Ketones *via* Oxidative Cleavage of C−C Multiple Bonds in *N*-Sulfonyl Enamides and 1-Alkynes under Air and Natural Sunlight" *Org. Lett.* **2015**, *17*, 5060.

Catalytic Enantio- and Regioselective Hydrofunctionalization of Dienes

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Development of new catalytic methods that enable important small molecule scaffolds to be constructed from simple, cheap, and abundant precursors is a critical objective in organic synthesis. Catalysts that allow for some aspect of selectivity control—chemo, region, and/or setereoselectivity—are highly sought after. The enantio- and regioselective addition of hydrogen and another element across carbon–carbon multiple bonds, broadly termed hydrofunctionlization is a particularly attractive approach for achieving these goals for several reasons. Alkenes and alkynes are widely available and easily accessible. The ease which transition metal catlaysts can coordinate these functional groups opens up several mechanistic avenues toward their hydrofunctionalizations. Finally, these hydrofunctionalizations often take place with a high degree of atom economy.

Dienes as an olefin class have emerged because the diversity of chemical space that can be garnered is not readily accessed through other transformations. In part, this can be attributed to the variety of reaction mechanisms available in the coupling of numerous reagents with these unsaturated hydrocarbons, often proceeding through a stabilized metal–allyl intermediate. In this perspective, I'll talk about my research results that the new Pd-PHOX catalyzed intermolecular hydrofunctionalization of dienes through stabilized Pd–allyl intermediates.

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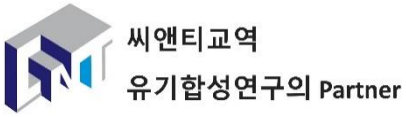
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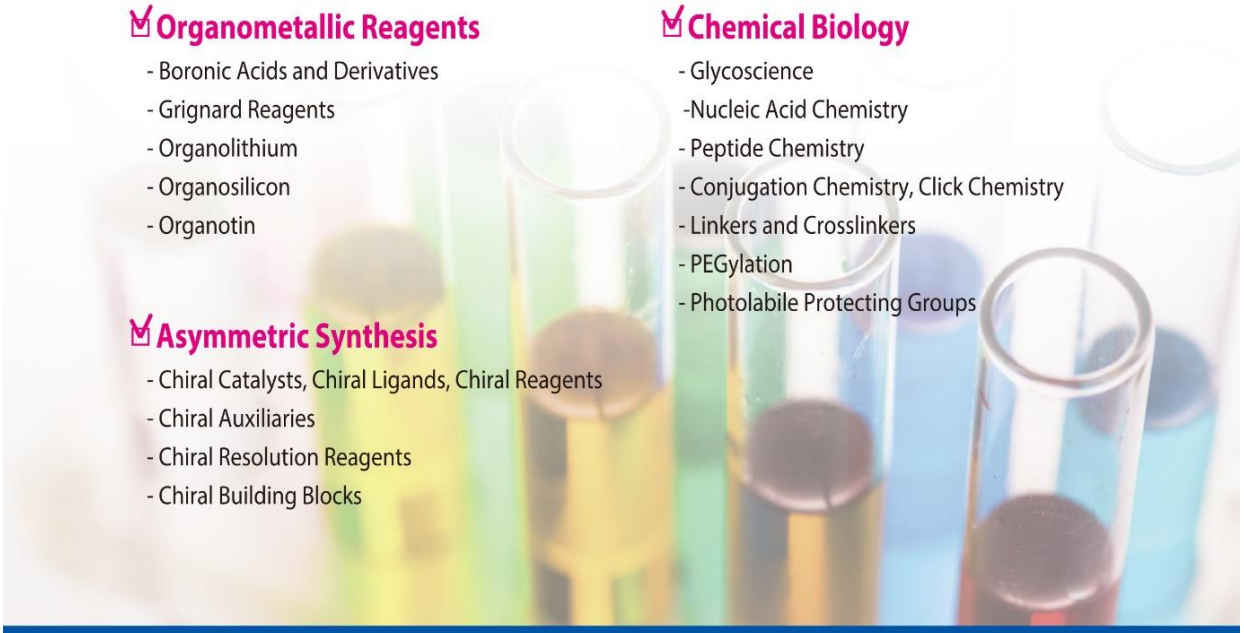

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