Korean Chemical Society
Division of Organic Chemistry

제 40 회 유기화학분과회 심포지엄 및 정기총회

- 일시: 2021 년 2 월 4 일 (목)
- 장소: 온라인 (Zoom Webinar)
- 주관: 대한화학회 유기화학 분과회
- 공식후원업체: 세진시아이

제 40 회 유기화학분과회 심포지엄 및 정기총회

[프로그램]

13:00-13:10 **인사말** (장석복 대한화학회 유기화학분과회 회장, KAIST)

Session I <좌장: 강은주 (경희대학교)>

13:10-13:40 안교한 (POSTECH 화학과)
Towards Fluorophores and Molecular Probes for Bioimaging Applications

13:40-14:00 윤주영 (이화여자대학교 화학과)
Recent Progress on Activatable Photosensitizers

14:00-14:20 류도현 (성균관대학교 화학과)
Catalytic Enantioselective Radical 1,2-Addition and Tandem Reactions of *ortho*-Quinone methides

14:20-14:40 한순규 (KAIST 화학과)
Bridging Iboga and Post-Iboga Alkaloids by Chemical Synthesis

14:40-15:00 박성준 (한국화학연구원 의약바이오연구본부)
Synthesis and Biological Activities of New Organosulfur(IV) Compounds

15:00-15:15 **휴식/Coffee Break**

Session II <좌장: 천철홍 (고려대학교)>

15:15-15:50 **유기화학학술상 수상 및 강연**
구상호 (명지대학교 화학과)
Total Syntheses of Biologically Active Isoprenoid Natural Products

15:50-16:10 박기덕 (KIST 치매 DTC 융합연구단)
Newly Developed Reversible MAO-B Inhibitor Circumvents the Shortcomings of Irreversible Inhibitors in Alzheimer's Disease

16:10-16:30 장우동 (연세대학교 화학과)
Hydrogen-bonding Mediated Supramolecular Assemblies Using Porphyrin Building Blocks

16:30-16:50 조승환 (POSTECH 화학과)
Catalytic Enantioselective Coupling of Allylic Electrophiles with *gem*-Diborylalkanes

16:50-17:10 이효원 (충북대학교 화학과 명예교수)
Naming of Chemical Compounds in a Nutshell

총회 <진행: 이선우 총무부회장 (전남대학교)>

17:10-18:00 **2020 년도 경과보고, 공로패 및 감사패 증정, 신임 분과회장 선출**

Session I

안 교 한 (Kyo Han Ahn)

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Education

Ph.D. (1985) Department of Chemistry, KAIST (Prof. Sunggak Kim)
B.Sc. (1980) Department of Chemical Education, Seoul National University

Position

1985. 03 – 1986. 06: Group Leader, Central Research Institute, Yuhan Pharmaceutical Co.
1986. 07 – present: Assistant, Associate, Full Professor, Department of Chemistry, POSTECH
1988. 01 – 1988. 12: Research Associate, Dept. of Chemistry, Univ. of Pennsylvania (Prof. K. C. Nicolaou)
1995. 08 – 1996. 08: Visiting Scholar, Dept. of Chemistry & Chemical Biology, Harvard Univ. (Prof. E. J. Corey)
2002. 08 – 2003. 08: Visiting Scholar, Dept. of Chemistry and Biochemistry, UCSD (Prof. Michael J. Sailor)
2009. 01 – 2009.12: President of the Daegu-Gyungbuk Branch of the Korean Chemical Society
2008. 09 – 2015.02: Director, the Center for Electro-Photo Behaviors in Advanced Molecular Systems
2008.12 – 2014.12: Representative of the POSTECH–Tohoku Graduate Student Exchange Program
2009.01 – 2012.12: Representative of the Asian Core Program on Cutting-Edge Organic Chemistry
2011. 11 – 2015.12: Representative of the Campus Asia Program among China, Japan, and Korea
2010. 01 – 2011.12: *The Bulletin Korean Chemical Society* (KCS), Associate Editor
2012. 03 – present: *Asian Journal of Organic Chemistry* (Wiley-VCH), International Advisory Board
2012. 03 – present: *Organic and Biomolecular Chemistry* (RSC), International Advisory Board
2014. 03 – 2015. 02: President of the Korean Chemosensor Society
2015. 01 – 2015. 12: President of the Organic Chemistry Division, Korean Chemical Society
2015. 01 – 2015. 12: Vice President of the Korean Chemical Society
2015.09 – 2019. 08: Director, Basic Science Research Institute at POSTECH
2018.01 – 2018.12: President of the Korean Society of Organic Synthesis
2016. 03 – 2019.03: Seokcheon Chair Professor, POSTECH
2019.01 – present: Fellow of the Korean Academy of Science and Technology

Awards

2020. 11. 19 Academic Excellence Grand Prize, Korean Society of Organic Synthesis
2018. 04. 20 Oder of Science and Technological Merit, Republic of Korea
2015. 10. 26 Academic Excellence Prize, Korean Society of Organic Synthesis
2013. 04. 18 Academic Excellence Prize, Korean Chemical Society
2010. 10 Lectureship Award, 5th International Conference on Cutting-Edge Organic Chemistry in Asia (ICCEOCA-5) by China and Singapore
2008. 10 Lectureship Award, 3rd International Conference on Cutting-Edge Organic Chemistry in Asia by Taiwan.
2006. 10. Lectureship Award, 1st International Conference on Cutting-Edge Organic Chemistry in Asia by Japan.
2003. 10. 'Jang Sehi' Award for Excellent Research, Organic Chemistry Division, Korean Chemical Society
2002. 02. Service Award, Organic Chemistry Division, Korean Chemical Society
1999. 10. Service Award for Chemistry Olympiad Education, Korean Chemical Society

Representative Publications

1. Unprecedented Chiral Molecular recognition in a C_3-Symmetric environment, Kim, S.-G.; Kim, K. H.; Jung, J.; Shin S. K.; Ahn, K. H.* *J. Am. Chem. Soc.* **2002***, 124*, 591.
2. Crucial Role of Three-Centered Hydrogen Bonding in a Challenging Chiral Molecular Recognition, Kim, S. J.; Kim, K. H.; Kim. Y. K.; Shin, S. K.; Ahn, K. H.* *J. Am. Chem. Soc.* **2003***, 125*, 13819.
3. A Rational Approach to Fluorescence "Turn-On" Sensing of α-Amino-carboxylates, Ryu, D.; Park, E.; Kim, D.-S.; Yan, S.; Lee, J. Y.; Chang, B.-Y.; Ahn, K. H.* *J. Am. Chem. Soc.* **2008**, 130, 2394.
4. Selective Fluorogenic and Chromogenic Probe for Detection of Silver Ions and Silver Nanoparticles in Aqueous Media, Chatterjee, A.; Santra, M.; Won, N.; Kim, S.; Kim, J. K.; Kim, S. B.; Ahn, K. H.* *J. Am. Chem. Soc.* **2009**, *131*, 2040.
5. Reaction-Based Fluorescent Sensing of Au(I)/Au(III) Species: Mechanistic Implications on Vinylgold Intermediates, Egorova; O. A.; Seo, H.; Chatterjee, A.; Ahn, K. H.* *Org. Lett.* **2010**, *12*, 401.
6. Fluorescent Detection of Palladium Species with an *O*-Propargylated Fluorescein, Santra, M.; Ko, S.-K.; Shin, I.; Ahn, K. H.* *Chem. Commun.* **2010**, *46*, 3964.
7. "Turn-On" Fluorescent Sensing with "Reactive" Probes*,* Jun, M. E.; Roy, B.; Ahn, K. H.* *Chem. Commun.* **2011**, 47, 7583 (an invited review).
8. Characterization of Vinylgold Intermediates in the Gold-Mediated Cyclization of Acetylenic Amides, Egorova, O. A.; Seo, H.; Kim, Y.; Moon, D.; Min Rhee, Y. M.; Ahn, K. H.* *Angew. Chem. Int. Ed.* **2011***,* 50, 11446.
9. Reaction-based two-photon probes for *in vitro* analysis and cellular imaging of monoamine oxidase activity, Kim, D.; Sambasivan, S.; Nam, H.; Kim, K. H.; Kim, Y. J.; Joo, T.; Lee, K.-H.; Kim, K.-T.; Ahn, K. H.* *Chem. Commun.* **2012**, 48, 6833.
10. Recent development of two-photon fluorescent probes for bioimaging, Kim, D.; Ryu, H. G.; Ahn, K. H.* *Org. Biomol. Chem.* **2014**, *12*, 4550 (an invited review).
11. Toward a Selective, Sensitive, Fast-Responsive, and Biocompatible Two-Photon Probe for Hydrogen Sulfide in Live Cells, Singha, S.; Kim, D.; Moon, H.; Wang, T.; Kim, K. H.; Shin, Y. H.; Jung, J.; Seo, E.; Lee, S.-J.; Ahn, K. H.* *Anal. Chem.* **2015**, *87*, 1188.
12. π-Expanded coumarins: synthesis, optical properties and applications, Tasior, M.; Kim, D.; Singha, S.; Krzeszewski, M.; Ahn, K. H.;* Gryko, D. T.* *J. Mater. Chem. C*, **2015**, 3, 1421 (a review article).
13. Two-Photon Absorbing Dyes with Minimal Autofluorescence in Tissue Imaging: Application to *in vivo* Imaging of Amyloid-β Plaques with a Negligible Background Signal, Kim, D,; Moon, H.; Baik, S. H.; Singha, S.; Wang, T.; Kim, K. H.; Park, B. S.; Jung, J.; Mook-Jung, I.;* Ahn, K. H.* *J. Am. Chem. Soc.* **2015**, 137, 6781.
14. A Structural Remedy toward Bright Dipolar Fluorophores in Aqueous Media, Singha, S.; Kim, D.; Roy, B.; Sambasivan, S.; Moon, H.; Rao, A. S.; Kim, J. Y.; Joo, T.; Park, J. W.; Rhee, Y. M.; Wang, T.; Kim, K. H.; Shin, Y. H.; Jung, J.; Ahn, K. H.* *Chem. Sci.*, **2015**, 6, 4335.
15. Close Correlation of Monoamine Oxidase Activity with Progress of Alzheimer's Disease in Mice, Observed by *in Vivo* Two-Photon Imaging, Kim, D.; Baik, S. H.; Kang, S.; Cho, S. W.; Bae, J.; Cha, M.-Y.; Sailor, M. J.; Mook-Jung, I.;[*] Ahn, K. H.[*] *ACS Cent. Sci.*, **2016**, *2*, 967.
16. Addressing the Autofluorescence Issue in Deep Tissue Imaging by Two-Photon Microscopy: Significance of Far-Red Emitting Dyes, Jun, Y. W.; Kim, H. R.; Reo, Y. J.; Dai, M.; Ahn, K. H.* *Chem. Sci.* **2017**, *8*, 7696.
17. A ratiometric two-photon fluorescent probe for tracking lysosomal ATP: Direct in cellulo observation of lysosomal membrane fusion processes, Jun, Y. W.; Wang, T.; Hwang, S.; Kim, D.; Ma, D.; Kim, K. H.; Kim, S.; Jung, J.; Ahn*,* K. H.* *Angew. Chem. Int. Ed.* **2018**, *57*, 10142.
18. Frontiers in Probing Alzheimer's Disease Biomarkers with Fluorescent Small Molecules, Jun, Y. W.; Cho, S. W.; Jung, J.; Huh, Y.; Kim, Y.;* Kim, D.;* Ahn, K. H.* *ACS Cent. Sci.* **2019**, *5*, 209 (an Outlook).
19. Far-Red/Near-Infrared Emitting, Two-Photon Absorbing, and Bio-Stable Amino-Si-Pyronin Dyes, Kim, K. H.; Singha, S.; Jun, Y. W.; Reo, Y. J.; Kim, H. R.; Ryu, H. G; Bhunia, S.; Ahn, K. H.* *Chem. Sci.* **2019**, *10*, 9028.
20. An Endeavor in the Reaction-Based Approach to Fluorescent Probes for Biorelevant Analytes: Challenges and Achievements, Singha, S.; Jun, Y. W.; Sarkar, S.; Ahn, K. H.* *Acc. Chem. Res.* **2019**, *52*, 2571. (an invited review)
21. Development of Photo- and Chemo-stable Near-Infrared-Emitting Dyes: Linear-Shape Benzo-Rosol and Its Derivatives as Unique Ratiometric Bioimaging Platforms, Dai, M.; Reo, Y. J.; Song, C. W.; Yang, Y. J.; Ahn, K. H.* *Chem. Sci.* **2020**, *11*, 8901.
22. Systematic study on discrepancy of fluorescent properties between in solutions and in cells: Super-bright, environment-insensitive benzocoumarin dyes, Reo, Y. J.; Jun, Y. W.; Cho, S. W.; Jeon, J.; Roh, H.; Singha, S.; Dai, M.; Sarkar, S.; Kim, H. R.; Kim, S.; Jin, Y.; Jung, Y. L.; Yang, Y. J.; Ban, C.; Joo, J.; Ahn, K. H.* *Chem. Commun.* **2020**, *56*, 10556.

Towards Fluorophores and Molecular Probes for Bioimaging Applications

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Fluorescence imaging aided with molecular probes is essential in biomedical research fields. My research efforts during the last two decades or so have been focused on the development of organic fluorescent molecules (fluorophores) and molecular probes for bioimaging applications. In this meeting, I like to present what I have pursued recently towards fluorophores and probes with practicality. I'd like to briefly talk about how I moved into the field, how I evolved from the field, and what I am trying to do at the end of my research career, by choosing some representative works. The topics may include fluorescence sensing of anions and metal cations by the reaction-based approach,[1] understanding and development of one/two-photon dyes,[2] addressing some issues in fluorescent imaging of cells and tissues,[3] and development of fluorescent probes for biomedical imaging of diseases such as Alzheimer's and cancer.[4]

References

1. An Endeavor in the Reaction-Based Approach to Fluorescent Probes for Biorelevant Analytes: Challenges and Achievements, Singha, S.; Jun, Y. W.; Sarkar, S.; Ahn, K. H.* *Acc. Chem. Res.* **2019**, *52*, 2571.
2. (a) Singha, S.; Kim, D.; Roy, B.; Sambasivan, S.; Moon, H.; Rao, A. S.; Kim, J. Y.; Joo, T.; Park, J. W.; Rhee, Y. M.; Wang, T.; Kim, K. H.; Shin, Y. H.; Jung, J.; Ahn, K. H.* *Chem. Sci.*, **2015**, 6, 4335; (b) Jun, Y. W.; Kim, H. R.; Reo, Y. J.; Dai, M.; Ahn, K. H.* *Chem. Sci.* **2017**, *8*, 7696; (c) Kim, K. H.; Singha, S.; Jun, Y. W.; Reo, Y. J.; Kim, H. R.; Ryu, H. G; Bhunia, S.; Ahn, K. H.* *Chem. Sci.* **2019**, *10*, 9028; (d) Dai, M.; Reo, Y. J.; Song, C. W.; Yang, Y. J.; Ahn, K. H.* *Chem. Sci.* **2020**, *11*, 8901.
3. (a) Park, H. J.; Song, C. W.; Sarkar, S.; Jun, Y. W.; Reo, Y. J.; Dai, M.; Ahn, K. H.* *Chem. Commun.* **2020**, *56*, 7025; (b) Reo, Y. J.; Jun, Y. W.; Cho, S. W.; Jeon, J.; Roh, H.; Singha, S.; Dai, M.; Sarkar, S.; Kim, H. R.; Kim, S.; Jin, Y.; Jung, Y. L.; Yang, Y. J.; Ban, C.; Joo, J.; Ahn, K. H.* *Chem. Commun.* **2020**, *56*, 10556.
4. (a) Kim, D,; Moon, H.; Baik, S. H.; Singha, S.; Wang, T.; Kim, K. H.; Park, B. S.; Jung, J.; Mook-Jung, I.;* Ahn, K. H.* *J. Am. Chem. Soc.* **2015**, 137, 6781; (b) Kim, D.; Baik, S. H.; Kang, S.; Cho, S. W.; Bae, J.; Cha, M.-Y.; Sailor, M. J.; Mook-Jung, I.;* Ahn, K. H.* *ACS Cent. Sci.*, **2016**, *2*, 967; (c) Reo, Y. J.; Dai, M.; Yang, Y. J.; Ahn, K. H.* *Anal. Chem.* **2020**, *92*, 12678; (d) *unpublished results.*

윤 주 영 (Juyoung Yoon)

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Education

Ph.D. (1994)	Department of Chemistry, Ohio State University (Prof. Anthony W. Czarnik)
B.Sc. (1987)	Department of Applied Chemistry, Seoul National University

Position

2002 – present	Assistant, Associate, and Full Professor, Ewha Womans University
1998 – 2002	Full Time Lecturer, Assistant Professor, Silla University
1996 – 1998	Postdoctoral Fellow, Scripps Research Institute (Prof. Kim D. Janda)
1994 – 1996	Postdoctoral Fellow, UCLA (Prof. Donald J. Cram)

Representative Publications

1. Li, H.; Yao, Q.; Xu, F.; Li, Y.; Kim, D.; Chung, J.; Baek, G.; Wu, X.; Hillman, P. F.; Lee, E. Y.; Ge, H.; Fan, J.; Wang, J.; Nam, S.-J.; Peng, X.*; **Yoon, J.*** "An Activatable AIEgen Probe for High-Fidelity Monitoring of Overexpressed Tumor Enzyme Activity and Its Application to Surgical Tumor Excision" *Angew. Chem. Int. Ed.* **2020**, *59*, 10186-10195.

2. Nguyen, V.-N.; Yim, Y.; Kim, S.; Ryu, B.; Swamy, K. M. K.; Kim, G.; Kwon, N.; Kim, C-Y.*; Park, S.*; **Yoon, J.*** "Molecular Design of Highly Efficient Heavy-Atom-Free Triplet BODIPYs for Photodynamic Therapy and Bioimaging" *Angew. Chem. Int. Ed.* **2020**, *59*, 8957-8962.

3. Li, X.; Park, E.-Y.; Kang, Y.; Kwon, N.; Yang, M.; Lee, S.; Kim,W. J.*; Kim, C.*; **Yoon, J.*** "Supramolecular Phthalocyanine Assemblies for Improved Photoacoustic Imaging and Photothermal Therapy" *Angew. Chem. Int. Ed.* **2020**, *59*, 8630–8634.

4. Nguyen, V.-N.; Qi, S.; Kim, S.; Kwon, N.; Kim, G.; Yim, Y.; Park, S.*; **Yoon, J.*** "An Emerging Molecular Design Approach to Heavy-Atom-Free Photosensitizers for Enhanced Photodynamic Therapy under Hypoxia" *J. Am. Chem. Soc.* **2019**, *141*, 16243-16248.

5. Li, X.; Yu, S.; Lee, Y.; Guo, T.; Kwon, N.; Lee, D.; Yeom, S. C.; Cho, Y.; Kim, G.; Huang, J.-D.; Choi, S.*; Nam, K. T.*; **Yoon, J.*** "In Vivo Albumin Traps Photosensitizer Monomers from Self-Assembled Phthalocyanine Nanovesicles: A Facile and Switchable Theranostic Approach" *J. Am. Chem. Soc.* **2019**, *141*, 1366–1372. (Cover)

Recent Progress on Activatable Photosensitizers

Juyoung Yoon

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Switchable phototheranostic nanomaterials are of particular interest for specific biosensing, high-quality imaging, and targeted therapy in the field of precision nanomedicine. Here, we develop a "one-for-all" nanomaterial (NanoPcTBs) that self-assembles from flexible and versatile phthalocyanine building blocks. Fluorescence and reactive oxygen species (ROS) generation could be triggered depending on a targeted, protein-induced, partial disassembly mechanism, which creates opportunities for low-background fluorescence imaging and activatable photodynamic therapy (PDT). We also reported a facile strategy to directly assemble a phthalocyanine photosensitizer (PcS) with an anticancer drug mitoxantrone (MA) to form uniform nanostructures (PcS-MA), which have the capability of undergoing nucleic acid-responsive disassembly. On the other hand, the *in vivo* specific binding between albumin and PcS, arising from the disassembly of injected NanoPcS, was recently confirmed using an inducible transgenic mouse system. In a recent investigation, we devised a novel molecular design approach to create heavy-atom-free photosensitizers for enhanced photodynamic therapy under hypoxia conditions. The thionaphthalimides display dramatically enhanced quantum yields for photosensitized singlet oxygen formation ($\Phi_\Delta \sim 1.00$, in air-saturated acetonitrile).

In this talk, I will present our recent research on activatable photosensitizers and heavy atom free photosensitizers.

References

1. Li, X.; Kim, C-y.; Lee, S.; Lee, D.; Chung, H.-M.; Kim, G.; Heo, S.-H.; Kim, C.*; Hong, K.-S.*; **Yoon, J.*** *J. Am. Chem. Soc.* **2017**, *139*, 10880-10886
2. Li, X.; Yu, S.; Lee, Y.; Guo, T.; Kwon, N.; Lee, D.; Yeom, S. C.; Cho, Y.; Kim, G.; Huang, J.-D.; Choi, S.*; Nam, K. T.*; **Yoon, J.*** "In Vivo Albumin Traps Photosensitizer Monomers from Self-Assembled Phthalocyanine Nanovesicles: A Facile and Switchable Theranostic Approach" *J. Am. Chem. Soc.* **2019**, *141*, 1366–1372. (Cover)
3. Nguyen, V.-N.; Yan, Y.; Zhao, J.*; **Yoon, J.*** "Heavy-Atom-Free Photosensitizers: from Molecular Design to Applications in the Photodynamic Therapy of Cancer" *Acc. Chem. Res.* **2021**, 10.1021/acs.accounts.0c00606.
4. Nguyen, V.-N.; Qi, S.; Kim, S.; Kwon, N.; Kim, G.; Yim, Y.; Park, S.*; **Yoon, J.*** "An Emerging Molecular Design Approach to Heavy-Atom-Free Photosensitizers for Enhanced Photodynamic Therapy under Hypoxia" *J. Am. Chem. Soc.* **2019**, *141*, 16243-16248.
5. Nguyen, V.-N.; Yim, Y.; Kim, S.; Ryu, B.; Swamy, K. M. K.; Kim, G.; Kwon, N.; Kim, C-Y.*; Park, S.*; **Yoon, J.*** "Molecular Design of Highly Efficient Heavy-Atom-Free Triplet BODIPYs for Photodynamic Therapy and Bioimaging" *Angew. Chem. Int. Ed.* **2020**, *59*, 8957-8962.

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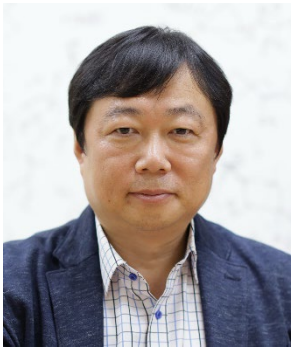

Education

Ph.D. (1997)	Department of Chemistry, KAIST (Prof. Sung Ho Kang)
B.Sc. (1991)	Department of Chemistry, KAIST

Position

2005 – present	Professor, Department of Chemistry, Sungkyunkwan University, Korea
2002 – 2005	Post-doc., Department of Chemistry and Chemical Biology, Harvard University, USA (Prof. E. J. Corey)
2000 – 2002	Post-doc., Department of Biological Chemistry and Molecular Pharmacology, Harvard Medical School, USA (Prof. Robert R. Rando)
1997 – 2001	Associate Researcher, SK Chemicals

Representative Publications

1. Kim, J. Y., Lee, Y. S., Choi, Y. and Ryu, D. H.* "Enantioselective 1,2-Addition of α-Aminoalkyl Radical to Aldehydes via Visible-Light Photoredox Initiated Chiral Oxazaborolidinium Ion Catalysis" *ACS Catal.* **2020**, *10*, 10585.

2. Pandit, R. P.; Kim, S. T. and Ryu, D. H.* "Asymmetric Synthesis of Enantioenriched 2-Aryl-2,3-Dihydrobenzofurans by a Lewis Acid Catalyzed Cyclopropanation/Intramolecular Rearrangement Sequence" *Angew. Chem. Int. Ed.* **2019**, *58*, 13427.

3. Shim, S. Y.; Ryu, D. H.* "Enantioselective Carbonyl 1,2- or 1,4-Addition Reactions of Nucleophilic Silyl and Diazo Compounds Catalyzed by the Chiral Oxazaborolidinium Ion" *Acc. Chem. Res.* **2019**, *52*, 2349.

4. Shim, S. Y.; Choi, Y. and Ryu, D. H.* "Asymmetric Synthesis of Cyclobutanone via Lewis Acid Catalyzed Tandem Cyclopropanation/Semipinacol Rearrangement" *J. Am. Chem. Soc.* **2018**, *140*, 11184.

5. Kang, K.-T., Kim, S. T., Hwang, G.-H. and Ryu, D. H.* "Catalytic Enantioselective Protonation/Nucleophilic Addition of Diazoesters with Chiral Oxazaborolidinium Ion Activated Carboxylic Acids" *Angew. Chem. Int. Ed.* **2017**, *56*, 3977.

Catalytic Enantioselective Radical 1,2-Addition and Tandem Reactions of *ortho*-Quinone methides

Do Hyun Ryu

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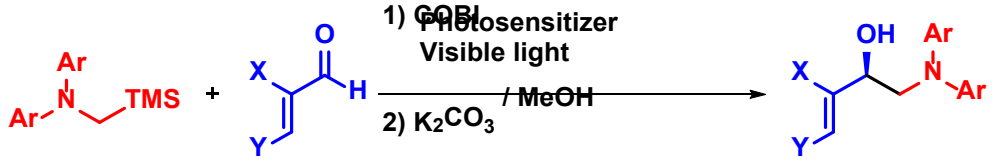
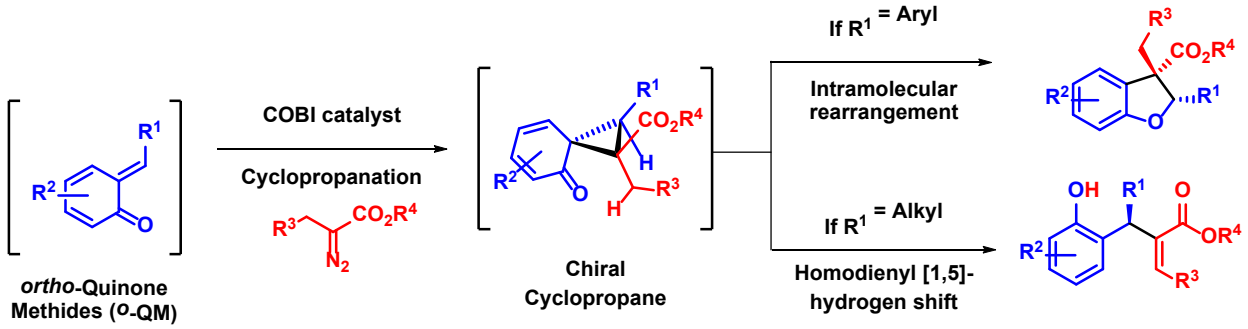
Visible-light induced radical reaction has been regarded as advantageous and attractive approach for the development of efficient and selective synthetic methodology. To develop efficient enantioseletive photoredox catalysis, organocatalyst or chiral Lewis acid catalyst has been used as a cooperative catalyst with photosensitizer.



ortho-Quinone methide (o-QM) has a cyclohexadiene structure with exocyclic alkene and carbonyl group. It has attracted great scientific interests in recent decades and been used as a reactive intermediate for the synthesis of bioactive compounds



In this talk, I will present our recent two research topics on catalytic enantioselective radical 1,2-addition and tandem reactions of ortho-quinone methides. We studied chiral Lewis acid catalyzed visible-light photoredox initiated radical addition to aldehydes. As a second topic, enantioselective synthesis of 2,3-dihydrobenzofurans and α-methylene carbonyl compounds will be discussed.

References

1. Kim, J. Y., Lee, Y. S., Choi, Y. and Ryu, D. H.* "Enantioselective 1,2-Addition of α-Aminoalkyl Radical to Aldehydes via Visible-Light Photoredox Initiated Chiral Oxazaborolidinium Ion Catalysis" *ACS Catal.* **2020**, *10*, 10585.
2. Kim, S. T.; Pandit, R. P.; Yun, J. and Ryu, D. H.* "Enantioselective Cyclopropanation/[1,5]-Hydrogen Shift to Access Rauhut–Currier Product" *Org. Lett.* **2020**, *ASAP*.
3. Pandit, R. P.; Kim, S. T. and Ryu, D. H.* "Asymmetric Synthesis of Enantioenriched 2-Aryl-2,3-Dihydrobenzofurans by a Lewis Acid Catalyzed Cyclopropanation/Intramolecular Rearrangement Sequence" *Angew. Chem. Int. Ed.* **2019**, *58*, 13427.

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Education

Ph.D. (2012)	Department of Chemistry, MIT (Prof. Mo Movassaghi)
B.S. (2006)	Department of Chemistry, KAIST

Position

2014 – present	Assistant/Associate Professor, Department of Chemistry, KAIST
2012 – 2014	Post-doc., Department of Chemistry, Yale University (Prof. Scott J. Miller)

Representative Publications

1. Jeon, S.; Lee, J.; Park, S.; Han, S.* "Total Synthesis of Dimeric Securinega Alkaloids (–)-Flueggenines D and I" *Chem. Sci*. **2020**, *11*, 10928 (selected as ChemSci Pick of the Week and inside back cover).
2. Lee, S.;† Kang, G.;† Chung, G.; Kim, D.; Lee, H.-Y.;* Han, S.* "Biosynthetically Inspired Syntheses of Secu'amamine A and Fluvirosaones A and B" *Angew. Chem. Int. Ed*. **2020**, *59*, 6894 (†These authors contributed equally).
3. Jo, D.; Han, S.* "Total Synthesis of (–)-FD-838 and (–)-Cephalimysin A" *Org. Lett*. **2019**, *21*, 6045.
4. Seong, S.;† Lim, H.;† Han, S.* "Biosynthetically Inspired Transformation of Iboga to Monomeric Post-Iboga Alkaloids" *Chem* **2019**, *5*, 353 (†These authors contributed equally).
5. Jeon, S.; Han, S.* "An Accelerated Intermolecular Rauhut–Currier Reaction Enables the Total Synthesis of (–)-Flueggenine C." *J. Am. Chem. Soc.* **2017**, *139*, 6302 (highlighted in Synfacts).

Bridging Iboga and Post-Iboga Alkaloids by Chemical Synthesis

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Organisms have evolved to produce various natural products from a common precursor as a means to maximize the number of secondary metabolites, and thus acquire selective advantages. Iboga alkaloids which have attracted significant attention due to their intriguing polycyclic structures and potential therapeutic uses against drug addiction are no exception to this biosynthetic logic. In that regard, we coined the term "Post-Iboga" alkaloids to describe the natural products that are biosynthetically downstream of the iboga-type alkaloids with rearranged indole and/or isoquinuclidine scaffolds.

In this presentation, our group's efforts that are centered on the transformation of iboga to post-iboga alkaloids by chemical synthesis will be presented. New synthetic strategies and chemical tactics have enabled the transformation of readily available iboga natural product catharanthine to various post-iboga alkaloids such voatinggine, tabertinggine, dippinines B, C, tronocarpine, and 10,11-demethoxychippiine. While our synthetic endeavors have been inspired by biosynthetic hypotheses, our discoveries en route to the chemical synthesis of post-iboga alkaloids inversely provide insights to the biogenesis of this family of natural products.

References

1. Seong, S.;† Lim, H.;† Han, S.* "Biosynthetically Inspired Transformation of Iboga to Monomeric Post-Iboga Alkaloids" *Chem* **2019**, *5*, 353 (†These authors contributed equally).
2. Lim, H.; Seong, S.; Han, S.* "Syntheses of Post-Iboga Alkaloids" *Synthesis* **2019**, *51*, 2737.
3. Seong, S.; Lim, H.; Han, S.* "Synthesis of Types II and III Post-Iboga Alkaloids" *Strategies and Tactics in Organic Synthesis*; Harmata, M., Ed.; Elsevier; **2019**, *14*, chapter 2, pp 35-59.

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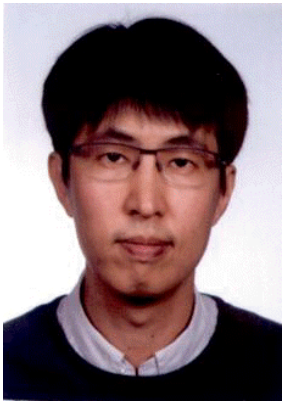

Education

Ph.D. (2013)	Institute of Organic Chemistry, RWTH Aachen University, Germany (Prof. Dr. Carsten Bolm)
M.Sc. (2006)	Department of Chemistry, Korea University, Korea (Prof. Dr. Bong Young Chung)
B.Sc. (2004)	Department of Chemistry, Hankuk University of Foreign Studies, Korea

Position

Mar. 2020 – present	Principal Research Scientist, Therapeutics & Biotechnology Division, Korea Research Institute of Chemical Technology (KRICT), Korea
Oct. 2013 – Feb. 2020	Senior Research Scientist, Therapeutics & Biotechnology Division, Korea Research Institute of Chemical Technology (KRICT), Korea
Jan. 2006 – Sep. 2009	Research Scientist, Information Technology & Electronics Materials R&D, LG Chem / Research Park, Korea

Representative Publications

1. J.G. Kim, O.-Y. Kang, S.M. Kim, G. Issabayeva, I.S. Oh, Y. Lee, W.H. Lee, H.J. Lim,* and **S.J. Park,*** "Synthesis and Properties of Pentafluorosulfanyl Group (SF_5)-Containing *meta*-Diamide Insecticides" *Molecules*, **2020**, *25*, 5536.

2. S.M. Kim, O.-Y. Kang, H.J. Lim,* and **S.J. Park,*** "Selective Synthesis of *N*-Cyano Sulfilimines by Dearomatizing Stable Thionium Ions" *ACS Omega* **2020**, *5*, 10191.

3. H.J. Lim, W.H. Lee and **S.J. Park,*** "Synthesis, Physicochemical Properties, and Biological Activities of 4-(*S*-Methyl-*N*-(2,2,2-Trifluoroacetyl)Sulfilimidoyl) Anthranilic Diamide" *Molecules,* **2019**, *24*, 3451.

4. J.K. Kim, H.J. Lim, K.C. Jeong* and **S.J. Park,*** "One-pot sequential synthesis of tetrasubstituted thiophenes *via* sulfur ylide-like intermediates" *Beilstein J. Org. Chem.* **2018**, *14*, 243.

5. K. Son and **S.J. Park,*** "Synthesis of pyrrolo[2,1-*f*][1,2,4]triazin-4(3*H*)-ones: Rearrangement of pyrrolo[1,2-*d*][1,3,4]oxadiazines and regioselective intramolecular cyclization of 1,2-biscarbamoyl-substituted 1*H*-pyrroles" *Beilstein J. Org. Chem.* **2016**, *12*, 1780

Synthesis and Biological Activities of New Organosulfur (IV) Compounds

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The organosulfur (IV) compounds—namely sulfur ylides, sulfonium salts, sulfoxides, and sulfilimines—have played important roles in a broad range of fields, including synthetic chemistry, catalysis, crop protection, and medicinal chemistry.[1] For applications of these moieties in drug development, the sulfoxide functional group occurs in FDA approved drugs, representatively esomeprazole, omeprazole, and armodafinil. In addition, researchers at AstraZeneca and Bayer demonstrated that one-atom replacement at the sulfur core—from oxygen to nitrogen—led to clinical candidates Ceralasertib (AZD6738) and Roniciclib (BAY1000394), which are selective kinase inhibitors.[2]

For a promising approach to discover new bioactive small molecules, organosulfur (IV) compounds have been newly prepared and evaluated for their biological activities. This presentation will highlight new methods for the formation of S–C and S-N bonds, the synthesis of new heterocycles, and their therapeutic and agricultural applications.[2-5]

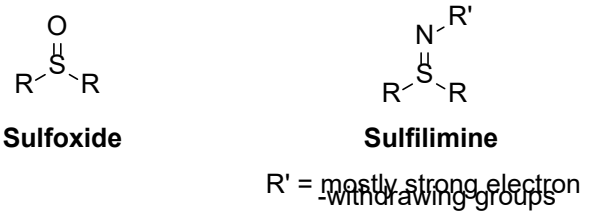

Figure 1. Selected S(IV) functional groups[2]

References

1. D. Kaiser, I. Klose, R. Oost, J. Neuhaus, and N. Maulide, *Chem. Rev.* **2019**, *119*, 8701
2. S.M. Kim, O.-Y. Kang, H.J. Lim, and S.J. Park, *ACS Omega* **2020**, *5*, 10191.
3. O.-Y. Kang, S.J. Park, H. Ahn, K.C. Jeong and H.J. Lim, *Organic Chemistry Frontiers*, **2019**, *6*, 183.
4. H.J. Lim, W.H. Lee and S.J. Park, *Molecules*, **2019**, *24*, 3451.
5. J.K. Kim, H.J. Lim, K.C. Jeong and S.J. Park, *Beilstein J. Org. Chem.* **2018**, *14*, 243.

Session II

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Education

Ph.D. (1992)	Department of Chemistry, The University of Michigan, Ann Arbor (Prof. Masato Koreeda)
M.S. (1987)	Department of Chemistry, The University of Michigan, Ann Arbor
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Position

2020 – present	Regional Chairman, Gyeonggi-Do branch of Korean Chemical Society
2019 – present	Guest Professor, Institute of Traditional Chinese Medicine, Tianjin University of Traditional Chinese Medicine (TUTCM), Tianjin, China
2019 – present	Editor, Journal of Korean Chemical Society
2017 – present	Dean, College of Natural Science, Myongji University
2013 – 2020	Professor, Energy Science and Technology (BK21+), Myongji University
2006 – present	Special Visiting Professor, Chemical Biotechnology, School of Pharmacy, East China University of Science and Technology (ECUST), Shanghai, China
2006 – 2013	Professor, Nano Science and Engineering (BK), Myongji University
1994 – present	Professor, Department of Chemistry, Myongji University
1992 – 1994	Post-Doc. Department of Chemistry, Emory University (Prof. Lanny S. Liebeskind)

Representative Publications

1. Y. Ju, D. Miao, J. G. Seo, S. Koo,* "Catalytic Oxidation of beta-Ketoester by Mn(III)/Co(II) and Consecutive Cyclization to Heterocycles" *Adv. Synth. Catal.* **2014**, *356*, 3059-3066.

2. J. Maeng, S. B. Kim, N. J. Lee, E. Choi, S.-Y. Jung, I. Hong, S.-H. Bae, J. T. Oh, B. Lim, J. W. Kim, C. J. Kang, S. Koo,* "Conductance Control in the Stabilized Carotenoid Wires" *Chem. Eur. J.* **2010**, *16*, 7395-7399.

3. J.-H. Min, S.-Y. Jung, B. Wu, J. T. Oh, M. S. Lah, S. Koo,* "Origin of the Diastereoselection in the Indium-mediated Addition of Haloallylic Sulfones to Aldehydes" *Org. Lett.* **2006**, 8, 1459-1462.

4. J.-E. Yeo, X. Yang, H. J. Kim, S. Koo,* "The intramolecular Baylis-Hillman reaction: easy preparation of versatile substrates, facile reactions, and synthetic applications" *Chem. Commun.* **2004**, 236-237.

5. M. Ji, H. Choi, M. Park, M. Kee, Y. C. Jeong, S. Koo,* "Highly Efficient Chain-extension Process in the Systematic Syntheses of Carotenoid Natural Products" *Angew. Chem., Int. Ed.* **2001**, *40*, 3627-3629.

Total Syntheses of Biologically Active Isoprenoid Natural Products

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Terpenoids and Carotenoids are two important subgroups of isoprenoid natural products which exhibit various biological effects of antioxidant, anticancer, and antibacterial activities. These health-benefit nutraceuticals find wide applications in colorant, food additive, cosmetic and drug industries. Synthesis of the polyene chain of carotenoids mostly relies on the Wittig olefination reaction. Sulfone-mediated method, known as Julia olefination, was applied only to the production of retinol derivatives. We have extended the synthetic repertoires of the carotenoid polyene chains using organo-sulfur chemistry.

Various building blocks containing sulfone groups were devised for efficient construction of the polyene chains of carotenoids. C_5 Benzothiazolyl (BT) sulfone containing an acetal moiety was devised for iterative chain extension of apocarotenoids, and crocetin was efficiently prepared.[1] C_7 BT-sulfone ester was utilized for norbixin ester synthesis.[2] C_5 BT-sulfone with a phosphonate moiety reacted with C_{10} 2,7-dimethylocta-2,4,6-trienedial to produce C_{20} diphosphonate, which expeditiously provided novel carotenoids upon olefination with various aldehydes (R-CHO).[3] High throughput screening and hierarchical clustering analysis were applied to the novel carotenoids for evaluation of their antioxidant activities utilizing DPPH and ABTS assays.[3] Abscisic acid was efficiently prepared by vinylogous diester condensation and selective decarboxylation method.[4] Recent progresses together with our representative carotenoid synthetic methods are to be presented.

References

1. J. Choi, E.-T. Oh, S. Koo,* "A Chain Extension Method for Apocarotenoids; Lycopene and Lycophyll Syntheses" *Arch. Biochem. Biophys.* **2015**, *572*, 142-150
2. D. Kim, M. Alam, W.-J. Chung, S. Koo* "Bromoacetate Olefination Protocol for Norbixin and Julia-Kocienski Olefination for Its Ester Syntheses" *ACS Omega* **2019**, *4*(6), 10019-10024
3. D. Kim, G. Shi, Y. Kim, S. Koo* "Fast Assembly and High-Throughput Screening of Structure and Antioxidant Relationship of Carotenoids" *Org. Lett.* **2019**, *21*, 714-718.
4. D. Kim and S. Koo* "Concise and practical synthesis of (+)-Abscisic acid" *ACS Omega* **2020**, 5(22), 13296-13302.

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Education

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B.Sc. (1999)	Department of Biotechnology, Yonsei University

Position

2011 – present	Principal Researcher, Convergence Research Center for Dementia, Korea Institute of Science & Technology (KIST), Korea
2012 – present	Professor, KIST School, University of Science & Technology (UST), Korea
2006 – 2011	Post-doc., School of Pharmacy, University of North Carolina at Chapel Hill, USA (Prof. Harold Kohn)
2004 – 2006	Post-doc. (Army service), Korea Research Institute of Bioscience & Biotechnology (KRIBB), Korea

Recent Publications

1. Kim H. J. et al, **Park K. D.*** "A novel chalcone derivative as Nrf2 activator attenuates learning and memory impairment in a scopolamine-induced mouse model." *Eur. J. Med. Chem.* **2020**, *185*, 111777.

2. Choi J. W. et al, **Park K. D.*** "Identification and evaluation of a napyradiomycin as a potent Nrf2 activator: antioxidative and anti-inflammatory activities." *Bioorg. Chem.* **2020**, *105*, 104434.

3. Kim S. et al, **Park K. D.*** "Nrf2 activator via interference of Nrf2-Keap1 interaction has antioxidant and anti-inflammatory properties in Parkinson's disease animal model." *Neuropharmacology.* **2020**, *167*, 107989.

4. Park J.-H. et al, **Park K. D.*** "Newly developed reversible MAO-B inhibitor circumvents the shortcomings of irreversible inhibitors in Alzheimer's disease." *Sci. Adv.* **2019**, *5(3)*, eaav0316.

5. Choi J. W. et al, **Park K. D.*** "Optimization of vinyl sulfone derivatives as potent nuclear factor erythroid 2-related factor 2 (Nrf2) activators for Parkinson's disease therapy." *J. Med. Chem.* **2019**, *62*, 811-830.

Newly Developed Reversible MAO-B Inhibitor Circumvents the Shortcomings of Irreversible Inhibitors in Alzheimer's Disease

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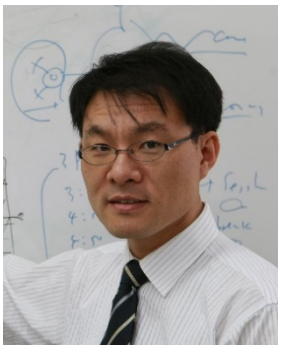
Monoamine oxidase–B (MAO-B) has recently emerged as a potential therapeutic target for Alzheimer's disease (AD) because of its association with aberrant γ-aminobutyric acid (GABA) production in reactive astrocytes. Although short-term treatment with irreversible MAO-B inhibitors, such as selegiline, improves cognitive deficits in AD patients, long-term treatments have shown disappointing results. We show that prolonged treatment with selegiline fails to reduce aberrant astrocytic GABA levels and rescue memory impairment in APP/PS1 mice, an animal model of AD, because of increased activity in compensatory genes for a GABA-synthesizing enzyme, diamine oxidase (DAO). We have developed a potent, highly selective, and reversible MAO-B inhibitor, KDS2010 (IC50 = 7.6 nM; 12,500-fold selectivity over MAO-A), which overcomes the disadvantages of the irreversible MAO-B inhibitor. Long-term treatment with KDS2010 does not induce compensatory mechanisms, thereby significantly attenuating increased astrocytic GABA levels and astrogliosis, enhancing synaptic transmission, and rescuing learning and memory impairments in APP/PS1 mice.

References

1. Park et al. "Newly developed reversible MAO-B inhibitor circumvents the shortcomings of irreversible inhibitors in Alzheimer's disease." *Sci. Adv*. 2019, *5(3)*, eaav0316.
2. Nam et al. "Excessive Astrocytic GABA Causes Cortical Hypometabolism and Impedes Functional Recovery after Subcortical Stroke." *Cell Rep.* **2020***, 32,* 107861.
3. Kim, K. T.; Chang, D.; Winssinger, N.* "GABA from reactive astrocytes impairs memory in mouse models of Alzheimer's disease." *Nat. Med.* **2014**, *20*, 886-896.

장 우 동 (Woo-Dong Jang)



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M.S. (2000)	Department of Chemisty and Biotechnology, Graduate School of Engineering, The University of Tokyo, Japan. (Adviser: Prof. Takuzo Aida)
B.S. (1997)	Department of Polymer Science, Kyungpook National University, Korea.

Position

2015. 3. – Present	Professor, Department of Chemistry, College of Science, Yonsei University, Korea.
2010. 3. – 2015. 2.	Associate Professor, Department of Chemistry, College of Science, Yonsei University, Korea.
2006. 3. – 2010. 2.	Assistant Professor, Department of Chemistry, College of Science, Yonsei University, Korea.
2005. 3. – 2006. 2.	Assistant Professor, Department of Materials Engineering, Graduate School of Engineering, The University of Tokyo, Japan.
2003. 4. – 2005. 2.	Postdoctoral Researcher, Japan Science and Technology Agency. (Adviser: Prof. Kazunori Kataoka)

Representative Publications

1. I. Oh, H. Lee, T. W. Kim, C. W. Kim, S. Jun, C. Kim, E. H. Choi, Y. M. Rhee, J. Kim, W.-D. Jang, H. Ihee "Enhancement of Energy Transfer Efficiency with Structural Control of Multi-Chromophore Light-Harvesting Assembly" *Adv. Sci.* **2020**, *7*, 2001623.
2. M. Park, K.-I. Hong, M. Kang, T.-W. Kim, H. Lee, W.-D. Jang, K.-U. Jeong "Hierarchical Hybrid Nanostructures Constructed by Fullerene and Molecular Tweezer" *ACS Nano.* **2019**, *13*, 6101-6112.
3. W. T. Hadmojo, D. Yim, H. Aqoma, D. Y. Ryu, T. J. Shin, H. W. Kim, E. Hwang, W.-D. Jang, I. H. Jung, S.-Y. Jang "Artificial Light-Harvesting n-type Porphyrin for Panchromatic Organic Photovoltaic Devices" *Chem. Sci.* **2017**, *8*, 5095-5100.
4 D. Yim, J. Sung, S. Kim, J. Oh, H. Yoon, Y. M. Sung, D. Kim, W.-D. Jang "Guest-induced Modulation of Energy Transfer Process in Porphyrin-based Artificial Light Harvesting Dendrimers" *J. Am. Chem. Soc.* **2017**, *139,* 993-1002.
5. J.-H. Kim, Y. Jung, D. Lee, W.-D. Jang "Thermo-responsive polymer and fluorescent dye hybrids for tunable multicolor emission" *Adv. Mater.* **2016**, *28*, 3499-3503.

Hydrogen-bonding Mediated Supramolecular Assemblies Using Porphyrin Building Blocks

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Porphyrins are essential pigments in biological systems. Porphyrins and chlorophylls are often self-assembled into nanoscale superstructures to perform many essential functions, such as light harvesting and electron transport. The crystal structure of the light-harvesting antenna complexes (LHC) in purple photosynthetic bacteria shows the presence of a highly symmetric wheel-like supramolecular architecture involving a large number of bacteriochlorophyll pigments. From the inspiration of the natural light harvesting systems, a variety of porphyrin-based nanoarchitectures, such as nanofibers, nanosheets, nanoparticles, and nanorings have been fabricated for applications in various research fields including photonics, catalysis, and electronics. The mimicry of light harvesting system is a very important subject, not only form a scientific viewpoint, but also for its possible contribution to sustainable utilization of energy resources. As mimic of natural light harvesting system, we recently have designed several porphyrin-based artificial models including porphyrin dendrmers, self-assembled nano-ring, and supramolecular receptors. We are going to report recent advances in our research on the porphyrin-based supramolecular architectures. A series of porphyrin derivatives having multiple carboxylic acid groups was prepared to build up supramolecular architecture through intermolecular hydrogen bonding. The obtained nanostructures were successfully analyzed by X-ray crystallography. The details will be presented in the symposium.

References

1. J. Li, D. Yim, W.-D. Jang, J. Yoon, *Chem. Soc. Rev.* **2017**, *46*, 2437.
2. D. Yim, J. Sung, S. Kim, J. Oh, H. Yoon, Y. M. Sung, D. Kim, W.-D. Jang, *J. Am. Chem. Soc.* **2017**, *139*, 993.
3. W. T. Hadmojo, D. Yim, H. Aqoma, D. Y. Ryu, T. J. Shin, H. W. Kim, E. Hwang, W.-D. Jang, I. H. Jung, S.-Y. Jang, *Chem. Sci.* **2017**, *8*, 5095.
4. H. Lee, Y.-H. Jeong, J.-H. Kim, I. Kim, E. Lee, W.-D. Jang, *J. Am. Chem. Soc.* **2015**, *137*, 12394.
5. H. Yoon, J. M. Lim, H.-C. Gee, C.-H. Lee, Y.-H. Jeong, D. Kim, W.-D. Jang, *J. Am. Chem. Soc.* **2014**, *136*, 1672.

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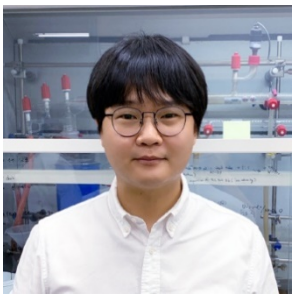

Education

Ph.D. (2011) Department of Chemistry, KAIST (Prof. Sukbok Chang)
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Position

2018 – present Associate Professor, Department of Chemistry, POSTECH, Korea
2014 – 2018 Assistant Professor, Department of Chemistry, POSTECH, Korea
2012 – 2014 Post-doc., Department of Chemistry, UC Berkeley, USA
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2011 – 2012 Post-doc., Department of Chemistry, KAIST, Korea (Prof. Sukbok Chang)

Representative Publications

1. 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**, *in press* (DOI: 10.1021/jacs.0c11750)

2. Jo, W.; Baek, S.; Hwang, C.; Heo, J.; Baik, M.-H.*, **Cho, S. H.*** "$ZnMe_2$-Mediated, Direct Alkylation of Electron Deficient N-Heteroarenes with 1,1-Diborylalkanes: Scope and Mechanism" *J. Am. Chem. Soc.* **2020**, *142*, 13235.

3. Lee, Y.; **Cho, S. H.*** "Generation and Application of (Diborylmethyl)zinc(II) Species: Access to Enantioenriched *gem*-Diborylalkanes by an Asymmetric Allylic Substitution" *Angew. Chem. Int. Ed.,* **2018**, *57*, 12930.

4. Kim, J.; Ko, K.; **Cho, S. H.*** "Diastereo- and Enantioselective Synthesis of β-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.

5. Lee, Y.; Baek, S.; Park, J.; 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.

Catalytic Enantioselective Coupling of Allylic Electrophiles with *gem*-Diborylalkanes

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gem-Diorganometallic reagents are valuable starting materials for the synthesis of multifunctionalized molecules. Among them, *gem*-diborylalkanes, which contain two boryl groups at the same carbon center, are particularly attractive due to their ease of handling, non-toxicity, stability, and propensity to undergo a variety of organic transformations. Since 2014, our group is highly interested in the development of regio-, chemo-, and stereoselective transformations of *gem*-diborylalkanes for the preparation of enantioenriched organoboron compounds.

In this seminar, the details about our recent findings for transition-metal-catalyzed enantioselective couplings of *gem*-diborylalkanes or *gem*-diborylmethyl metallic species with allylic electrophiles will be presented.[1-3]

References

1. Kim, J.; Park, J.; **Cho, S. H.*** "Synthesis of Branched Alkylboronates by Copper-Catalyzed Allylic Substitution Reactions of Allylic Chlorides with 1,1-Diborylalkanes" *Angew. Chem. Int. Ed.,* **2016**, *55*, 1498.
2. Lee, Y.; **Cho, S. H.*** "Generation and Application of (Diborylmethyl)zinc(II) Species: Access to Enantioenriched *gem*-Diborylalkanes by an Asymmetric Allylic Substitution" *Angew. Chem. Int. Ed.,* **2018**, *57*, 12930.
3. 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**, *in press* (DOI: 10.1021/jacs.0c11750)

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Education

Ph.D. (1983)	Department of Chemistry, Louisiana State University (Prof. George R. Newkome) Ph.D. Dissertation: The synthses of the crown ethers possessing 2,6-pyridino
M.S. (1975)	Department of Chemistry, Seoul National University (이윤영 교수)
B.Sc. (1973)	Department of Chemistry, Seoul National University

Position

2015 – present	Emeritus Professor, Department of Chemistry, Chungbuk National University, Korea
1988 – 2015	Professor, Department of Chemistry, Chungbuk National University, Korea
1984 – 1988	Researcher, Korea Research Institute of Chemical Technology
1983 – 1984	Post-doc., Department of Chemistry, Harvard University, USA (Prof. Y. Kishi)

Representative Publications

1. Newkome, G. R.; Lee, H. W. "18((2,6)Pyridino$_6$coronand-6): Sexipyridine" *J. Am. Chem. Soc*., 1983, 105, 5956-5957. *J. Org. Chem.*, **1985,** 5*0*(22), 4402-4404.

2. Lee, H. W.; Kishi, Y. "Synthesis of Mono and Unsymmetrical Bis Ortho Esters of scylio-Inositol" *J. Org. Chem*., **1985,** *50*(22), 4402-4404.

3. Lee, H. W.; Lee, J. H.; Choi, I.Y. "Formal Synthesis of Isocomene" *Bull. Korean Chem. Soc*., **1991,** *12*(4), 392-397.

4. Lee, I.-Y. Choi, J. H. Lee, Lee, H. W. "A convenient Method for the Radical Cyclization of the Aldol Products of Fused Bicyclic Carbocycles" *Tetrahedron Lett.*, **1994**, *35*(24), 4173. 94-1439.

5. Lee, H. W., Y. D. Hong, I.-Y. Choi, "Synthesis toward Epothilone A: Coupling Reaction between the Sulfone of C1-C10 and the Allylic Bromide of C11-C21*", Bull. Korean. Chem. Soc.* **1999**, *20*(4), 403-404.

Naming of Chemical Compounds in a Nutshell

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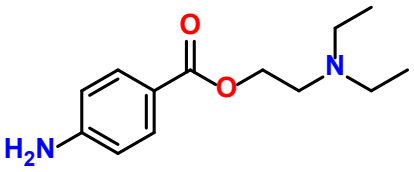
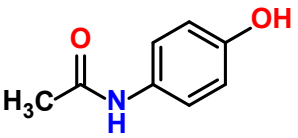
Every chemist encounters enormous number of chemical substances with a diversity of complexity. So far over 175 million chemical substances have been registered in Chemical Abstract Service (CAS). The numbers of new entry are getting bigger every day. And mere counting of numbers of chemical compounds is almost meaningless. Naming of chemical compounds is cumbersome and difficult job. There are several categories of nomenclature: trivial names, proprietary names, nonproprietary names, generic names, IUPAC names. Figure 1 displays examples of international nonproprietary names (INNs) from World Health Organization (WHO). Trivial name is a common, historic, or convenient name for a substance. The trivial name is often derived from the source in which the substance was discovered. It is not systematic and is not used in modern official nomenclature. Trivial names are still used in IUPAC names for fuse-ring system. Furthermore, the names of natural products are closely entwined with trial names. Trivial names are concise and good for oral or written communication.

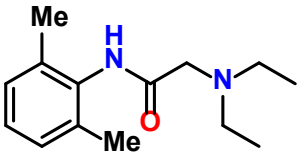


Procaine

IUPAC: 2-(diethylamino)ethyl 4-aminobenzoate



Paracetamol (INN)
Acetaminophen (USP)



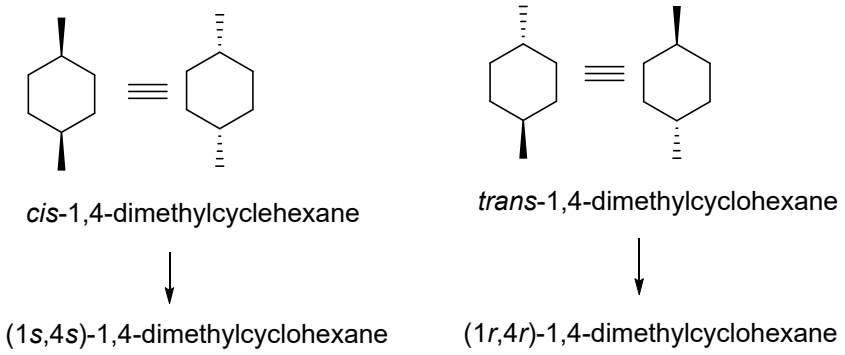
Lidocaine

IUPAC: 2-(diethylamino)-*N*-(2,6-dimethylphenyl)acetamide

Figure1. Examples of INN names.

The Korean Chemical Society is observing the rules of IUPAC. The official language of IUPAC is English, which is non-phonetic in its nature. Setting up naming system in Korean, adapting the rules of IUPAC in our Korean Chemical Society is a challenging task. IUPAC nomenclature is growing and changing through evolution. (See Scheme 1) IUPAC nomenclature does not prescribe single name for each individual compound and insists old IUPAC rules are still legitimately effective. IUPAC suggests Preferred IUPAC Names (PINs) for the priority for IUPAC names to resolve the legal problems. PINs require new sets of rules for priorities of names. In contrast to the diverse IUPAC names, CAS provides unique name for each registry substance. This is the main reason why the CAS names are preferred for pharmaceutical industry.

Scheme1. An Example of Evolution of IUPAC Nomenclature for Stereochemistry



Names of chemical compounds have profound influences in our living field such as food, education, research, legal system, domestic and international commercial trade, and so on. Names can be trivial, systemic, or proprietary. Naming systems evolved so far will be briefly discussed. Also, some of the recommended IUPAC nomenclature will be surveyed.

References

1) 무기화합물 명명법, 대한화학회, 1998.
2) 유기 화합물 명명법 I, II, 대한화학회, 2000.
3) Nomenclature of Organic Chemistry, 1979, IUPAC
4) Nomenclature of Organic Compounds, Recommendation, 1993, IUPAC.
5) R.B. Fox and Warren H. Powell, Nomenclature of Organic Chemistry 2nd edition, Oxford University Press, 2001.
6) G.J. Leigh, H.A. Favre, and W.V. Metanomski, Principles of Chemical Nomenclature: A guide to IUPAC Recommendations, Blackwell Science Ltd., 1998.

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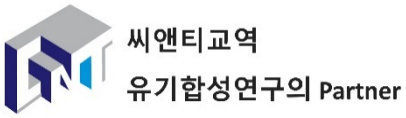
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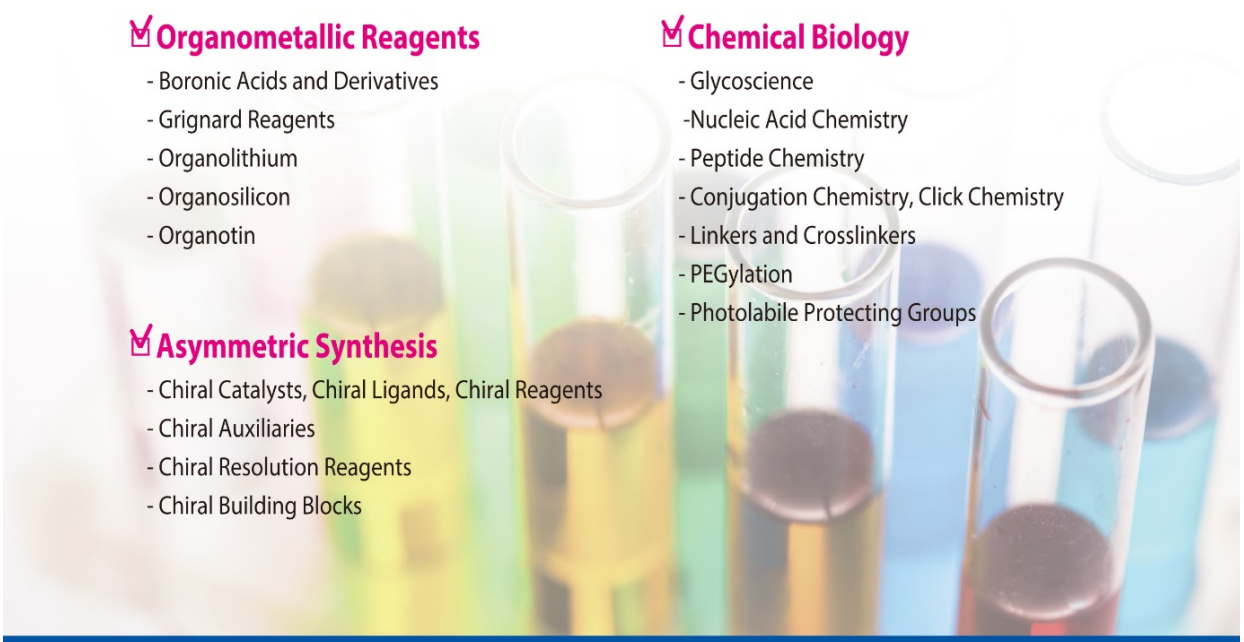

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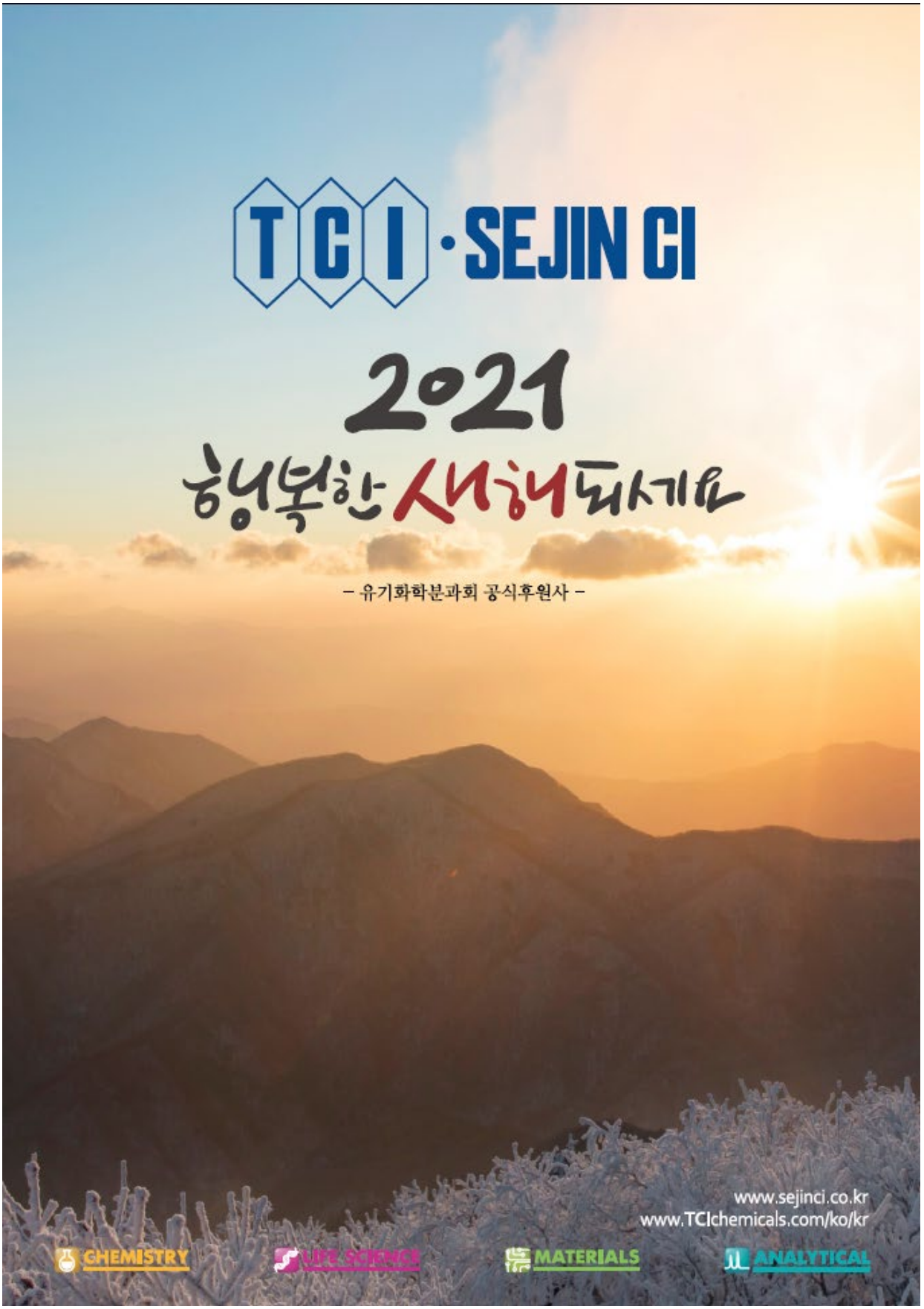
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