The 2nd NCTU Conference on
Advanced Organic Synthesis

Room 210, Science Building II
National Chiao Tung University
December 12-13, 2019

Plenary Speakers

FUKASE, Kochi (Osaka University, Japan)
KIM, Dong-Pyo (POSTECH, South Korea)
ZARD, Samir (École Polytechnique, France)

Invited Speakers

AKITA, Munetaka (Tokyo Institute of Technology, Japan)
KWON, Yonghoon (Seoul National University, South Korea)
NAKADA, Masahisa (Waseda University, Japan)
OKANO, Kentaro (Kobe University, Japan)
PENTZER, Emily (Texas A&M University, United States)
SAKURAI, Hidehiro (Osaka University, Japan)

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Department of Applied Chemistry and Center for Emergent Functional Matter Science, NCTU
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The 2nd NCTU Conference on Advanced Organic Synthesis

December 12–13, 2019; Lecture Hall (R210), Science Building II, National Chiao Tung University

Chairmen: Prof. Ilhyong Ryu and Prof. Chung-Ming Sun

December 12 (Thursday)		
15:30 – 16:00	Registration	
16:00 – 16:10	Ilhyong Ryu (National Chiao Tung University)	Opening Remark
Plenary Lecture 16:10 – 17:00	***Reversible Reservoirs for Radicals. New Perspectives for Organic Synthesis and for Polymer Chemistry*** Samir Zard (École Polytechnique, France)	*Chair: Ilhyong Ryu*
Lecture 1 17:00 – 17:30	***Substitution at the Aromatic Periphery of Sumanene: A Gateway to the Supramolecular Chemistry of Buckybowls*** Hidehiro Sakurai (Osaka University, Japan)	*Chair: Yoshito Tobe*
Lecture 2 17:30 – 18:00	***Supramolecular Photoredox Catalysis in Water*** Munetaka Akita (Tokyo Institute of Technology, Japan)	*Chair: Chung-Ming Sun*
18:30 – 20:00	Reception	
December 13 (Friday)		
Plenary Lecture 09:00 – 09:50	***Microfluidic Approaches for Scale-up Production of Drug Chemicals: Numbering-up & Ultrafast Chemistry*** Dong-Pyo Kim (POSTECH, South Korea)	*Chair: Ilhyong Ryu*
Lecture 3 09:50 – 10:20	***Enantioselective Total Synthesis of Cotylenin A*** Masahisa Nakada (Waseda University, Japan)	*Chair: Yen-Ju Cheng*
10:20 – 10:40	Coffee Break	
Plenary Lecture 10:40 – 11:30	***Acid-Mediated Reactions under Microfluidic Conditions: Application to Synthesis of Bioactive Glycans*** Koichi Fukase (Osaka University, Japan)	*Chair: Kwok-Kong Mong*
Lecture 4 11:30 – 12:00	***Trapping of Transient Aryllithium in Halogen Dance*** Kentaro Okano (Kobe University, Japan)	*Chair: Yen-Ku Wu*
12:00 – 14:00	Lunch	
Special Topic 14:00 – 15:00	***Using Organic Chemistry and the Fluid-Fluid Interface to Tailor the Morphology of Materials for Advanced Applications*** Emily Pentzer (Texas A&M University, United States)	*Chair: Chia-Chih Chang*
Lecture 5 15:00 – 15:30	***Total Synthesis of 12-Membered Macrolide Glycoside Antibiotics, Disciformycin A and B*** Yonghoon Kwon (Seoul National University, South Korea)	*Chair: Yen-Ku Wu*
15:30 – 15:40	Wen-Sheng Chung	Closing Remark
15:40 – 17:00	Discussion with NCTU Students/Faculties (R323, SBII)	*Organized by Yi-Ching Lin*

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Reversible Reservoirs for Radicals. New Perspectives for Organic Synthesis and for Polymer Chemistry

Samir Z. Zard
Laboratoire de Synthèse Organique, CNRS UMR 7652, Ecole Polytechnique, 91128 Palaiseau, France
E-mail: samir.zard@polytechnique.edu

Radical reactions offer many of the properties desired by synthetic organic chemists, in terms of variety, mildness of conditions, and a selectivity that is often complementary to that of ionic chemistry, making many protection steps superfluous. There is however one major difficulty, which derives from the propensity of radicals to interact with themselves (dimerisation, disproportionation) with extremely fast rates that are close to diffusion. In order to overcome this complication, it is essential to keep the steady-state concentration of radical species very low. This can be accomplished for example by contriving a chain reaction where the propagating steps are themselves quite fast, as for example in the typical, and now extremely popular, stannane based processes. While various *unimolecular* cyclisation and fragmentation steps can be efficiently incorporated into the radical sequence, kinetically slower *bimolecular* transformations, and in particular *intermolecular* additions to un-activated alkenes, have proven more difficult to implement. In the case of stannanes, the relatively slow addition to the alkene has to compete with premature hydrogen atom abstraction from the organotin hydride, a step that is usually thousands of times faster.

Over the years, we have shown that xanthates and related thiocarbonylthio derivatives allow the generation of radicals under conditions where the radicals possess a considerably increased effective lifetime, even in a concentrated medium. Intermolecular additions to un-activated alkenes, as well as a variety of reputedly difficult radical transformations can now be easily accomplished. No metals, heavy or otherwise, are required, and the starting materials and reagents are cheap and readily available. Complex, densely functionalized structures can be constructed in a convergent, modular fashion. This chemistry has also proved to be applicable to the synthesis of block polymers and for exploiting bio-sourced raw materials. Recent results and some mechanistic aspects will be presented and discussed briefly.

Samir Z. Zard (Professor)
Laboratoire de Synthèse Organique, Ecole Polytechnique, 91128 Palaiseau, France.
E-mail: samir.zard@polytechnique.edu
Education:
1978 BSc Imperial College of Science and Technology
1983 PhD Université Paris-Sud, Orsay, France (supervisor: Professor Sir Derek Barton).
Academic Background:
CNRS: 1981, Attaché de Recherche; 1983, Chargé de Recherche;

1989, Directeur de Recherche (2nd Class); 1996, Directeur de Recherche (1st Class); 2003, Directeur de Recherche (Exceptional Class).
Ecole Polytechnique: 1986, Maître de Conférences (part-time); 2000, Full Professor (part-time).

Awards

1992 Prize of the Organic Chemistry Division of the French Chemical Society.
1995 Clavel-Lespiau Prize of the French Academy of Science.
1997 Chemistry Research Promotion Center of the National Science Council Fellow (Taiwan)
2000 Rhodia Prize
2006 Prix Dargelos
2007 Silver Medal CNRS
2007 Croix de Chevalier dans l'Ordre de la Légion d'Honneur
2008 Grignard-Wittig Award of the German Chemical Society
2010 Woodward Lecturer, Harvard University
2012 Grand Prix Joseph-Achille Le Bel of the French Chemical Society
2015 Birch Lecturer, Australia National University
2015 Liversidge Lecturer, University of Sydney
2020 Hungarian Academy of Science – Servier Lecturer

Substitution at the Aromatic Periphery of Sumanene: A Gateway to the Supramolecular Chemistry of Buckybowls

Hidehiro Sakurai
Division of Applied Chemistry, Graduate School of Engineering, Osaka University
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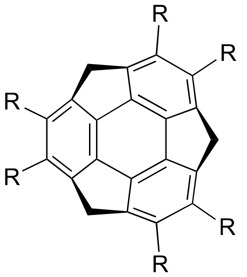
Sumanene (**1**) is one of the pristine buckybowl frameworks, a partial structure of fullerenes, having C_3 symmetry [1]. Sumanene possesses three different substitutional positions, benzylic, aromatic, and internal carbons. On the contrary to the benzylic position, which is unique only in the sumanene system in comparison with the corannulene system, substitution at the peripheral aromatic position of sumanene has not paid much attentions partly due to the poor and non-regioselective reactivity [2,3].

Recently, we finally succeeded in optimizing the preparation of hexabromosumanene (**2**) at the aromatic periphery [4], which opened the door to derivatize various hexa-substituted derivatives. In this presentation, I demonstrate the preparation of various sumanene derivatives (**3**-**5**), and their application to the supramolecular chemistry such as liquid crystalline materials [5], hydrogen-bonded organic frameworks [6], and metal organic frameworks [7].



1: R = H
2: R = Br
3: R = SR
4: R = 4-$C_6H_4CO_2H$
5: R = 4-Py

[1] H. Sakurai, T. Daiko, T. Hirao, *Science* **2003**, *301*, 1878.

[2] S. Higashibayashi, H. Sakurai, *J. Am. Chem. Soc*. **2008**, *130*, 8592.

[3] S. Higashibayashi, Nasir Baig R. B., Y. Morita, H. Sakurai, *Chem. Lett.* **2012**, *41*, 84.

[4] H. Toda, Y. Yakiyama, Y. Shoji, F. Ishiwari, T. Fukushima, H. Sakurai, *Chem. Lett.* **2017**, *46*, 1368.

[5] Y. Shoji, T. Kajitani, F. Ishiwari, Q. Ding, H. Sato, H. Anetai, T. Akutagawa, H. Sakurai, T. Fukushima, *Chem. Sci.* **2017**, *8*, 8405.

[6] I. Hisaki, H. Toda, H. Sato, N. Tohnai, H. Sakurai, *Angew. Chem. Int. Ed.* **2017**, *56*, 15294.

[7] Y. Yakiyama, T. Hasegawa, H. Sakurai, *J. Am. Chem. Soc.* **2019**, *141*, 18099.

Hidehiro Sakurai

Ph.D. (1994, The University of Tokyo, supervisor: Koichi Narasaka), Assistant Professor (1994–1996, 1998–2000, The Univ. Tokyo), JSPS Postdoctoral fellow (1996-1998, University of Wisconsin–Madison, supervisor: Charles P. Casey), Associate Professor (2000–2004, Osaka University), Associate Professor (2004-2014, Institute for Molecular Science and SOKENDAI), PRESTO (2007-2011), Professor (2014-, Osaka University)

Supramolecular photoredox catalysis in water

Munetaka Akita
Laboratory for Chemistry and Life Science (CLS), Tokyo Institute of Technology
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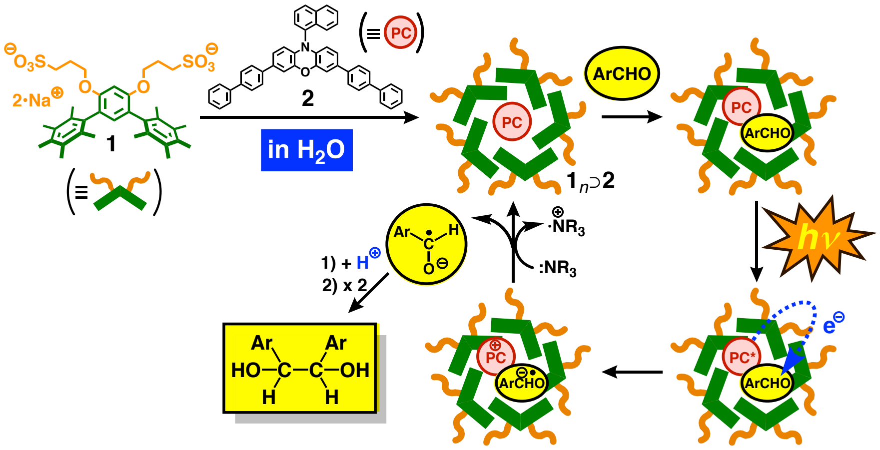
Visible-light photoredox catalysis has become a popular redox chemical tool over the last decade. But there is still demand for catalysts with more unique chemical features, and we have developed strongly reducing organic photoredox catalysts (e.g. bis(diarylamino)arenes [1]) for fluoroalkylation [2]. Herein presented is supramolecular photoredox catalysis resulting from combining two research subjects of our group.

We recently developed V-shaped amphiphile **1**, in which two pentamethylphenyl panels are bridged by a *m*-phenylene unit bearing two hydrophilic tethers. Amphiphile **1** assembled in water to produce the capsule-like supramolecular micellar host $\mathbf{1}_n$, which encapsulated bis(biphenylyl)-*N*-naphthylphenoxazine **2**, a photoredox catalyst, upon grinding followed by extraction with water to give supramolecular micellar catalyst $\mathbf{1}_n\supset\mathbf{2}$.



Micellar catalyst $\mathbf{1}_n\supset\mathbf{2}$ turned out to catalyze pinacol coupling of carbonyl compounds under visible-light irradiation in water in the presence of sacrificial electron donor (NEt_3).

[1] Noto, N.; Koike, T.; Akita, M. *Chem. Sci.* **2017**, *8*, 6375; *ACS Catalysis* **2018**, *8*, 9408; *idem* **2019**, *9*, 4382.

[2] Koike, T.; Akita, M. *Acc. Chem. Res.* **2016**, *49*, 1937; *Chem* **2018**, *4*, 409.

[3] M. Yoshizawa, M.; Catti, L. *Acc. Chem. Res.* **2019**, *52*, 2392.

MA, born in Fukuoka in 1957, received his Master's and Ph.D. degrees from Kyoto University (with Prof. Makoto Kumada) and Osaka University (with Prof. Akira Nakamura), respectively. In 1984, he moved to the CLS at TokyoTech as a research associate and, during 1989–1990, he worked with Prof. J. Shapley (UIUC) as a postdoctoral fellow. He was appointed as a professor in 2002 and had been director of the CLS for 2012–2018. His research interests involve photoredox catalysis, carbon-rich organometallic molecular devices, and supramolecular systems based on aromatics.

Microfluidic Approaches for Scale-up Production of Drug Chemicals: Numbering-up & Ultrafast Chemistry

Dong-Pyo Kim, Yonsan Chaired Professor
Center for Intelligent Microprocess of Pharmaceutical Synthesis,
Department of Chemical Engineering, POSTECH, Pohang, Korea
E-mail: dpkim@postech.ac.kr

Continuous-flow technology is emerging for efficient, sustainable and safe synthesis of drug and the precursors. Scale-up production approaches are generally achieved by numbering-up microreactors and ultrafast chemical synthesis at high flow rates. Firstly, we present various numbering-up microreactor systems with robustness for scale-up production of several drug compounds. The stacked stainless steel metal microreactors and portable polymer pad are developed to demonstrate a drug via azide-alkyne reaction, fast synthesis of organophosphates in a cost-effective and single-step manner. Moreover, an upscaling photocatalysis in flow is also performed in a multi-capillary assembly system for synthesis of indazoles with improved productivity. Alternatively, ultrafast syntheses of biologically active thioquinazolinones, ipbuprofen, anti-malarial drugs were performed by taming the lithiated flash chemistry in unique microreactors at high flow rates, which envisions facile scale-up production of drugs.

[1] Numbering-up Metal Microreactor for High-Throughput Production of Commercial Drug by Copper Catalysis, *Lab on a Chip,* 19, 3535, 2019

[2] Continuous-Flow Visible Light Organophotocatalysis for Direct Arylation of 2H-Indazoles, *ChemSusChem,* 10, 1002, 2019

[3] Submillisecond organic synthesis: Outpacing Fries rearrangement through microfluidic rapid mixing, *Science*, 352, 6286, 2016

2017. 6 – Present	Head, Center for Intelligent Microprocess of Pharm. Synthesis
2012. 3 – Present	Professor, Pohang Univ. of Science & Technology, Chem. Eng.
2008. 10 – 2017. 2	Head, Center of Applied Microfluidic Chemistry
1995. 2 – 2012. 2	Professor, Chungnam National Univ., Applied Chemistry
1995. 2 – 1993. 9	Senior Researcher, Korea Res. Inst. of Chem. Technology, Korea
1993. 8 – 1991. 9	Post-doctor, Univ. of Illinois at U-C, Materials Science and Eng.
1991. 8 - 1986. 8	Temple University (Philadelphia), Ph.D./1991 Chemistry
1985. 2 - 1978. 2	Sogang University (Seoul), B.A./1985 Chemistry

Research Concerns

- Design & fabrication of microrectors: CFD, lithographic & 3D printing
- Microchemical process integration: mixing, separation, catalysis
- Synthesis and manufacturing of chemicals, API, nanomaterials, DDS

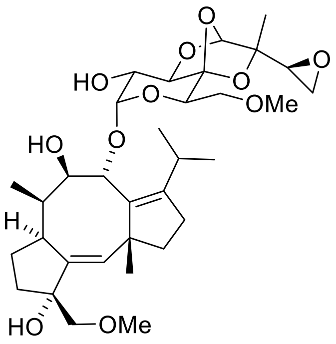
Award

2018 April	Appointed as a Yonsan Chair Professor (POSTECH)
2017 Sep.	Severo Ochoa Visiting Fellowship (IBEC, Spain)
2017 April	Academic Excellence Award by Korean Chemical Society
2016 Dec.	The Postechian Scientist of the Year by POSTECH
2016 Oct.	The Scientist of the Month by National Research Foundation (NRF)
2014/2007 Oct.	The year of Best 100 Scientific Achievement (NRF)
1988 May	Memorial Award for Prof. Daniel Swern (Temple Univ)

Enantioselective Total Synthesis of Cotylenin A

Masahisa Nakada
Department of Chemistry and Biochemistry,
Graduate School of Advanced Science and Engineering, Waseda University
E-mail: mnakada@waseda.jp

Cotylenin A was isolated from *Cladosporium* sp. and initially recognized as a plant growth regulator.[1] However, biological studies later revealed that it induces the differentiation of murine and human myeloid leukemia cells and the apoptosis of a wide range of human cancer cell lines by combined treatment with interferon-α. The crystal structure of cotylenin A in a complex with 14-3-3 protein and a phosphopeptide of H^+-ATPase (QSYpTV-COOH) has been reported to confirm that cotylenin A binds to inhibitory 14-3-3 interaction sites of C-RAF, pSer233, and pSer259 but not the activating interaction site, pSer621.



cotylenin A

Because of the promising bioactivity as an anti-cancer agent and the unique mechanism of action, cotylenin A has attracted considerable attention from the scientific community since the past decades. However, *Cladosporium* sp. 501-7W, the producer of cotylenin A, loses its ability to proliferate during preservation on a slant, thus hampering further biological studies. Hence, a steady supply of cotylenin A is desired. Since the elucidation of its absolute structure by X-ray crystallographic analysis in 1998, the total synthesis of cotylenin A has not yet been reported, and only one total synthesis of its aglycone, cotylenol, has been reported by Kato and co-workers.[2]

The intriguing biological activity and mechanism of action, dearth of supply, and unique structural features make cotylenin A an attractive synthetic target. Therefore, the total synthesis of cotylenin A was initiated, and the successful results will be discussed

[1] Sassa, T.; Tojyo, T.; Munakata, K. *Nature* **1970**, *227*, 379.

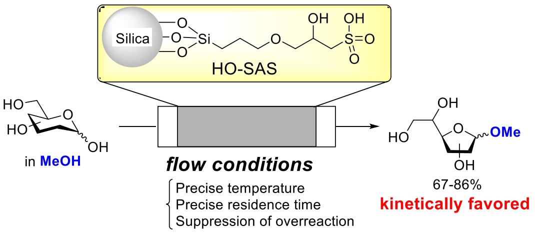
[2] Kato, N.; Okamoto, H.; Takeshita, H. *Tetrahedron* **1996**, *52*, 3921.

Ph.D. (1988) and Assistant Professor (1987-1995) of Faculty and Graduate School of Pharmaceutical Sciences, The University of Tokyo. Postdoctral Fellow of The Scripps Research Institute (1992–1993, Prof. K. C. Nicolaou). Associate Professor (1995–2000) and Professor (2000–*present*) of Department of Chemistry and Biochemistry, Waseda University. The Pharmaceutical Society of Japan Award for Young Scientists (1981). The Society of Synthetic Organic Chemistry, Japan (SSOCJ) Astellas Award for Organic Chemistry in Life Science 2008.

Acid-mediated reactions under microfluidic conditions: application to synthesis of bioactive glycans.

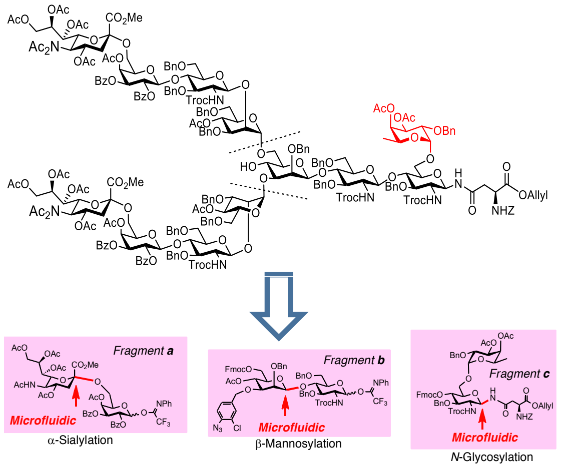
Koichi Fukase
Department of Chemistry, Graduate School of Science, Osaka University
E-mail: koichi@chem.sci.osaka-u.ac.jp

Microfluidic conditions were applied to acid-mediated reactions, namely, glycosylation and dehydration, which are the keys to the synthesis of bioactive glycans. A common feature of microfluidic conditions, i.e., efficient mixing and precise temperature control enables the chemoselective and stereoselective glycosylation under kinetically controlled reactions.



Kinetically controlled Fischer glycosidations were achieved by using β-hydroxy-substituted sulfonic-acid-functionalized silica (HO-SAS) under flow conditions [1]. Kinetically favored furanosides were obtained in good yields under flow conditions.

The key issues for the synthesis of *N*-glycans were stereoselective and efficient glycosylation reactions such as *N*-glycosylation of asparagine, β-selective mannosylation, and α-selective sialylation, for which we developed highly efficient methods by using microfluidic conditions [2].



Sequential glycosylation under flow conditions was applied to the efficient synthesis of glycan antigen α-gal, which was used for the synthesize of α-gal-antibody conjugates that show increased immune response [3].

[1] Masui, S.; Manabe, Y.; Hirao, K.; Shimoyama, A.; Fukuyama, T.; Ryu, I.; Fukase, K. *Synlett*, **2019**, *30*, 397.

[2] Nagasaki, M.; Manabe, Y.; Minamoto, N.; Tanaka, K.; Silipo, A.; Molinaro, A.; Fukase, K. *J. Org. Chem.*, **2016**, *81*, 10600.

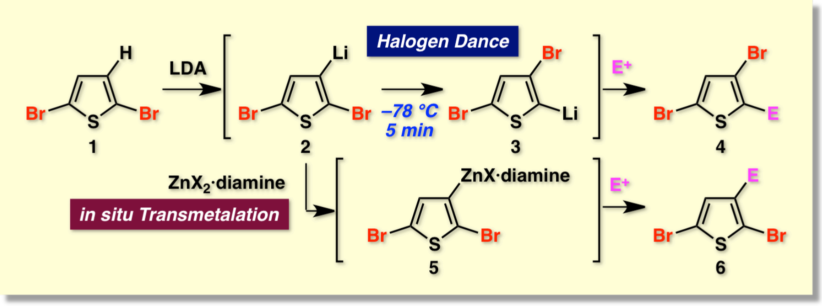
[3] Sianturi, J.; Manabe, Y.; Li, H.S.; Chiu, L.T.; Chang, T.C.; Tokunaga, K.; Kabayama, K.; Tanemura, M.; Takamatsu, S.; Miyoshi, E.; Hung, S.C.; Fukase, K. *Angew. Chem. Int. Ed. Engl.* **2019**, 58, 4526-4530.

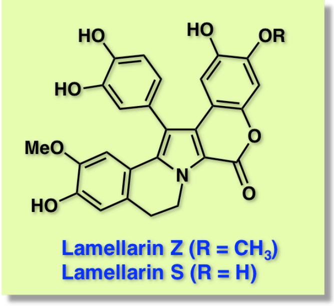
1982 B.A. School of Science, Osaka University
1994 M.S. Graduate School of Science, Osaka University
1987 Ph.D. Graduate School of Science, Osaka University
1987 Research Fellow, Japan Society for the Promotion of Science
1988 Assistant Professor, Graduate School of Science, Osaka University
1994-1995 Ministry of Education Research Fellow, Department of Chemistry, Columbia University
1996 Lecturer, Graduate School of Science, Osaka University
1998 Associate Professor, Graduate School of Science, Osaka University
2004 Full Professor, Graduate School of Science, Osaka University

Trapping of Transient Aryllithium in Halogen Dance

Kentaro Okano
Department of Chemical Science and Engineering, Kobe University
E-mail: okano@harbor.kobe-u.ac.jp

Deprotonative lithiation of a heteroaromatic ring is a reliable method for introducing various functional groups on the aromatic ring, whereas Knochel–Hauser-type magnesium amides and zinc amides lead to the formation of milder organometallic intermediates.[1] In this context, we have synthesized multiply substituted heteroaromatic compounds[2] by utilizing "halogen dance"[3] that is promoted by high reactivity of organolithium species; deprotonative lithiation of dibromothiophene **1** leads to the formation of the transient thienyl lithium **2**, and the halogen–lithium exchange gives the thermodynamically more stable thienyl lithium **3** *within 5 min even at –78 °C* to provide substituted thiophene **4**. In this talk, I will describe the unified synthesis of lamellarins through the unprecedented halogen dance of a bromopyrrole. I will also focus on trapping of short-lived organolithium **2** by developing the finely tuned *in situ* transmetalation with ZnX_2·diamine complexes. The resultant organozinc **5** reacted with an electrophile to provide **6** that is regioisomeric to compound **4**. The effects of diamine and its synthetic application will be presented.





[1] Haag, B.; Mosrin, M.; Ila, H.; Malakhov, V.; Knochel, P., *Angew. Chem. Int. Ed.* **2011**, *50*, 9794.

[2] (a) Okano, K.; Sunahara, K.; Yamane, Y.; Hayashi, Y.; Mori, A. *Chem. Eur. J.* **2016**, *22*, 16450. (b) Hayashi, Y.; Okano, K.; Mori, A. *Org. Lett.* **2018**, *20*, 958. (c) Yamane, Y.; Sunahara, K.; Okano, K.; Mori, A. *Org. Lett.* **2018**, *20*, 1688. (d) Mari, D.; Miyagawa, N.; Okano, K.; Mori, A. *J. Org. Chem.* **2018**, *83*, 14126.

[3] Schnürch, M.; Spina, M.; Khan, A. F.; Mihovilovic, M. D.; Stanetty, P. *Chem. Soc. Rev.* **2007**, *36*, 1046.

Kentaro Okano, Ph.D.

2003	B.Sc. Kyoto University (Prof. Tamejiro Hiyama)
2009	Ph.D. University of Tokyo (Prof. Tohru Fukuyama)
2007–2015	Assistant Professor at Tohoku University (Prof. Hidetoshi Tokuyama)
2014	Postdoctral Study with Prof. Amir Hoveyda at Boston College, USA
2015–2016	Senior Lecturer at Kobe University (Prof. Atsunori Mori)
2016–present	Associate Professor at Kobe University

Using Organic Chemistry and the Fluid-Fluid Interface to Tailor the Morphology of Materials for Advanced Applications

Emily Pentzer
Department of Chemistry; Department of Materials Science and Engineering,
Texas A&M University
E-mail: emilypentzer@tamu.edu

The fluid-fluid interface in emulsions are an ideal platform to connect dislike materials. These systems can be used to prepare hybrid, higher order structures. The Pentzer lab has developed 2D carbon-based nanosheets as particle surfactants and shown that by simple chemical modification, they can be assembled at different fluid-fluid interfaces: oil-water, oil-oil, ionic liquid-water, ionic liquid-oil, gas-water, etc. Further, we have demonstrated the use of these Pickering emulsions to prepare a variety of composite structures based on the location of the reagents (continuous phase only, discontinuous phase only, or both). This presentation will describe the use of graphene oxide (GO) and its functionalized analogues as surfactants, and the use of simple chemical reactions within these systems to access hollow capsules, filled capsules, armored polymer particles, and Janus nanosheets. The range of applications of these diverse structures will also be briefly described, highlighting the power of simple chemical reactions coupled with controlled interfacial area.

Total Synthesis of 12-Membered Macrolide Glycoside Antibiotics, Disciformycin A and B

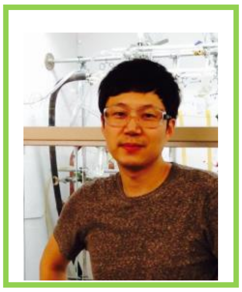
Yonghoon Kwon
Department of Applied Biology and Chemistry, Seoul National University
E-mail: y_kwon@snu.ac.kr

The development of ring closing alkyne metathesis (RCAM) followed by stereoselective reduction of the resulting alkyne has rendered opportunities to access macrolides as well as medium-sized carbocycles bearing *Z*- or *E*-alkenes.[1] Beyond the selective formation of (*Z)*- or (*E)*-disubstituted alkenes, we recently demonstrated that a macrolide having a trisubstituted alkene with well-defined stereochemistry can be prepared by a RCAM/*trans*-selective hydrostannation sequence. This approach is complementary to ring closing alkene metathesis (RCM) since (stereoselective) formation of trisubstituted alkenes by RCM is problematic. Testing this method in the total synthesis of a complex natural product is desirable to broaden the generality of the strategy. Disciformycins A and B, isolated from cultures of *Pyxidicoccus fallax* by the Müller group in 2014,[2] were chosen as our targets as they exhibit considerable antibacterial activity against Gram-positive bacteria. This presentation will describe details of unforeseen synthetic challenges and our endeavors to resolve these problems met along the way.[3]

[1] Fürstner, A. *Angew. Chem. Int. Ed*. **2013**, *52*, 2794–2819.

[2] Surup, F.; Viehrig, K.; Mohr, K. I.; Herrmann, J.; Jansen, R.; Mülller, R. *Angew. Chem. Int. Ed*. **2014**, *53*, 13588–13591.

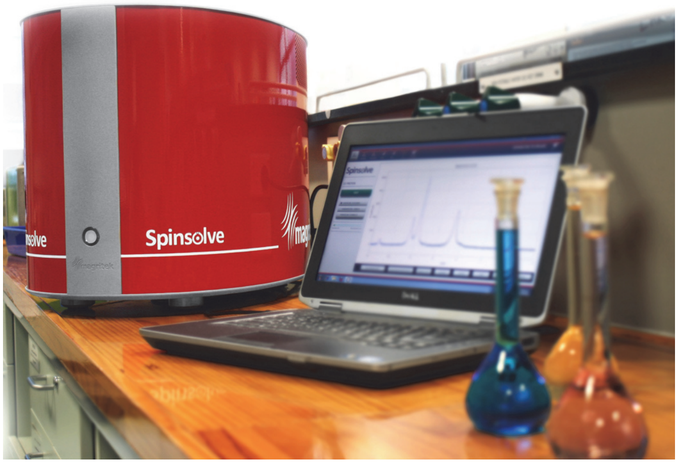
[3] Kwon, Y.; Schulthoff, S.; Dao, Q. M.; Wirtz, C.; Fürstner, A. *Chem. Eur. J*. **2018**, *24*, 109 –114.



Yonghoon Kwon, Ph.D.

2009	BPhEd and BSc in Chemistry, Kyungpook National University, Republic of Korea
2015	PhD in Chemistry, University of Alberta, Canada
2015-2018	Postdoctoral Fellow, Max-Planck-Institute for Kohlenforschung, Germany
2018-current	Assistant Professor, Department of Applied Biology and Chemistry, Seoul National University, Republic of Korea


EcoSEC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氣相層析質譜儀 GCMS-QP2020NX
氣相層析儀 Nexis GC-2030 / GC-2014


三重四極桿液相層析串聯式質譜儀 LCMS-8050
超高效率串聯式液相層析質譜儀 LCMS-8045
高效率液相層析質譜儀 LCMS-2020
液相層析儀 LC-40 series / LC-2030Plus / LC-2040Plus


傅立葉轉換紅外線光譜儀 IRSpirit


紫外/可見光分光光譜儀 UV-1900i


螢光分光光譜儀 RF-6000


感應偶合電漿光譜儀 ICPE-9820

SAN KING TECHNOLOGY

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SOLUTION FOR
FLOW CHEMISTRY / DOSING SYSTEM

Photochemical Flow Reaction Kit

One Set of PYREX-made Photo-Flow Reactor

Total Volume: 12 mL. (option: 6 mL & 3 mL) I.D. 2.4mm

Quartz made Photo-Flow Reactor is available

Five T-5 6W Fluorescent Lamps

254nm, 306nm, 352nm (BLB), 3000K, and 6500K.

One Dual-lamp Electronic Pre-heat Ballast

Customized Flow Chem System

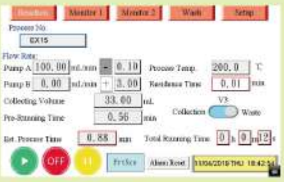
System Design and Intergration

Dosing system, Valves, Pipes, Flow reactor, Mixer, Temperature control system.

Automatic Control system

PLC or PC-based software

Touch Panel User Interface



Process No.: EX15

Flow Rate:

Pump A 100.00 mL/min – 0.10

Pump B 0.00 mL/min + 3.00

Process Temp. 200.0 ℃

Residence Time 0.01 min

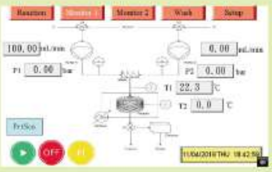
Collecting Volume 33.00 mL

V3 Collection Waste

Pre-Running Time 0.56 min

Est. Process Time 0.88 min

Total Running Time 0 h 0 m 12 s



100.00 mL/min

P1 0.00 bar

0.00 mL/min

P2 0.00 bar

T1 22.3 ℃

T2 0.0 ℃

Precise Pulsation-Less Pumps

Piston / Diaphragm / Syringe / Gear Pumps

Flow rate range: 0.001mL/min ~ 100.0 mL/min

Pressure : Max 35 Mpa

Material: SUS, PTFE, PEEK, PVC

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