INCHEON NATIONAL UNIVERSITY

INU

17th INTERNATIONAL SYMPOSIUM ON NATURAL SCIENCES

2025. 10. 16.-17.

온라인/오프라인 병행개최

QR 코드 및 홈페이지를 통한 사전등록 (http://ribs.inu.ac.kr)

사전등록일정 : 2025. 9. 15. ~ 10. 10.

Bulletin

SCIENCE

수학과 Mathematics

Nathan Kaplan
(University of California, Irvine)

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(Konkuk University)

Jungin Lee
(Ajou University)

Christopher Voll
(Bielefeld University)

Joshua Maglione
(University of Galway)

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(University of Minnesota)

Jieun Lee
(University of Stuttgart)

Dongjin Oh
(Seoul National University)

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(Inha University)

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Joonyoung Joung
(Kookmin University)

Sanghwa Jeong
(Pusan National University)

Yongho Kim
(Sungkyunkwan University)

Niamh Fox
(University of Manchester)

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(Konkuk University)

Sungchil Yang
(City University of Hong Kong)

Hyun-Jung Han
(Konkuk University)

해양학과 Marine Science

Sergey Nuzhdin
(USC Dornsife College of Letters, Arts and Sciences)

Jihun Jung
(Oregon State University)

Seung-Woo Lee
(Korea Institute of Ocean Science & Technology)

Seongbong Seo
(Korea Institute of Ocean Science & Technology)

Jonghyuk Park
(Kookmin University)

포스터 발표(Poster Session)

포스터제출기간 _ 사전등록기간 이내

포스터제출방법 _ 사전등록 페이지 해당칸 업로드

제출파일형식 _ PDF만 접수 가능

원고크기 _ A1(594×841mm) 반드시 준수

인천대학교 재학생 여러분들의 많은 참여바랍니다.

주최 _ INU 인천대학교 기초과학연구소

주관 _ INU 인천대학교 자연과학대학

Research Institute of Basic Sciences
Incheon National University

Bulletin

of the 17th International Symposium on Natural Sciences

Date: October 16th ~ 17st, 2025

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발행일 | 2025년 9월 22일
발행인 | 김태현
편집인 | 강유리, 최규성
발행처 | 인천대학교 기초과학연구소

1
Oral Session (Mathematics)

1-1. Nathan Kaplan (University of California)

[Title] Statistical properties of random sublattices and subrings of Z^n

[Abstract] How many sublattices Z^n have index at most X? If we choose such a sublattice L at random, what is the probability that Z^n/L is cyclic? Now let R be a random subring of Z^n. What is the probability that Z^n/R is cyclic? We explain how to study these questions using tools from the theory of zeta functions of groups and rings. We will see connections to the Cohen-Lenstra heuristics for class groups of number fields and to the study of cokernels of random matrices over the integers.

Date: Oct. 16, 2025
Time: 09:30~10:30 (KST)
Chair: Prof. Seungjai Lee

Location:
Zoom 308 6567 214

C.V. of the speaker:

2015~Present	Associate Professor	University of California, Irvine, USA
2013~2015	Assistant Professor	Yale University, USA
2008~2013	Ph.D. in Mathematics	Havard University, USA
2007~2008	C.A.S.M. Pure Mathematics	Cambridge University, USA
2003~2007	B.S. Mathematics	Princeton University, USA

1-2. Hayan Nam (Konkuk University)

[Title] On the Davenport Constant and Atomic Density of Numerical Semigroups

[Abstract] A numerical semigroup S is a subset of the set of nonnegative integers that includes 0, is closed under addition, and has a finite complement. The Davenport constant \(D(G)\) of a finite group \(G\) is the smallest number \(d\) such that any sequence of length \(\ge d\) contains a non-empty zero-sum subsequence. In other words, \(D(G)-1\) is the maximum length of a zero-sum-free sequence. We define a quotient ring \(\mathcal{Q}_q(S)\) of a numerical semigroup \(S\) and derive a formula for \(D(\mathcal{Q}_q(S))\). Furthermore, we compute the range of the atomic density of \(S\) in terms of \(D(\mathcal{Q}_q(S))\)..

Date: Oct. 16, 2025 Time: 10:45~11:45 (KST) Chair: Prof. Seungjai Lee	Location: Zoom 308 6567 214

C.V. of the speaker:

2025~Present	Assistant Professor	Konkuk University, South Korea
2021~2025	Assistant Professor	Duksung Women's University, South Korea
2020~2021	Research fellow	Korea Institute, South Korea
2014~2019	Ph.D. in Mathematics	University of California, Irvine, USA
2011~2014	M.S. in Mathematics	Yonsei University, South Korea
2007~2011	B.S. in Mathematics	Yonei University, South Korea

1-3. Jungin Lee (Ajou University)

[Title] Probability theory for random p-adic matrices and their arithmetic applications

[Abstract] Motivated by the Cohen–Lenstra heuristics, Friedman and Washington studied the distribution of the cokernels of random matrices over the ring of p-adic integers. This has been generalized in many directions, as well as some applications to the distribution of random algebraic objects. In this talk, first we give an overview of random p-adic matrices and their applications to number theory. After that, we present universality results for random p-adic matrices and explain how these results can be proved using the moments of random groups, which is an analogue of the moments of random variables. We also investigate the distribution of the cokernels of random p-adic matrices with given zero entries, based on the joint work with Dong Yeap Kang and Myungjun Yu.

Date: Oct. 16, 2025 Time: 13:30~14:30 (KST) Chair: Prof. Seungjai Lee	Location: Zoom 308 6567 214

C.V. of the speaker:

2023~Present	Assistant Professor	Ajou University, South Korea
2022~2023	CMC Fellow	KIAS, South Korea
2020~2022	Research fellow	KIAS, South Korea
2017~2020	Ph.D. in Mathematics	POSTECH, South Korea
2014~2017	B.S. in Mathematics	Seoul National University, South Korea

MATHEMATICS

1-4. Christopher Voll (Bielefeld University)

[Title] Hall-Littlewood polynomials, affine Schubert series, and lattice enumeration

[Abstract] In this talk, I would like you to meet Hall-Littlewood-Schubert series, a new class of multivariate generating functions. Their definition features semistandard Young tableaux and polynomials resembling the classical Hall-Littlewood polynomials. Their intrinsic beauty notwithstanding, Hall-Littlewood-Schubert series have many applications to counting problems in algebra, geometry, and number theory. In my talk the spotlight will be on applications to affine Schubert series. These may be seen as an integral analogue of the Poincare polynomials enumerating the rational points over finite fields of classical Schubert varieties. The latter parametrize subspaces of a given vector space by
the intersection dimensions with a fixed flag of reference. This work is joint with Joshua Maglione.

Date: Oct. 16, 2025 Time: 14:45~15:45 (KST) Chair: Prof. Seungjai Lee	Location: Zoom 308 6567 214

C.V. of the speaker:

2011~Present	Professor	Bielefeld University, Germany
2006~2014	Lecturer & Reader	Southampton University, Germany
2006~2006	Research fellow	´Ecole Polytechnique F´ed´erale de Lausanne
2005~2006	Research fellow	Max-Planck-Institut fur Mathematik (MPIfM), Bonn
2004~2005	Research fellow	Heinrich-Heine- Universit¨at D¨usseldorf
2002~2004	Postdoctoral fellow	Oxford University
1999~2002	Ph.D. in Pure Mathematics	University of Cambridge

1-5. Joshua Maglione (University of Galway)

[Title] Symplectic Hecke eigenbases from Ehrhart polynomials

[Abstract] We consider the functions that map a lattice polytope in R^n to the l-th coefficient of its Ehrhart polynomial for l in {0, 1, ..., n}. These functions form a basis for the space of so-called unimodular invariant valuations. We show that, in even dimensions, these functions are in fact simultaneous symplectic Hecke eigenfunctions. We leverage this and apply the theory of spherical functions and their associated zeta functions to prove analytic, asymptotic, and combinatorial results about arithmetic functions averaging l-th Ehrhart coefficients. Joint with Claudia Alfes and Christopher Voll.

Date: Oct. 16, 2025 Time: 16:00~17:00 (KST) Chair: Prof. Changmi Lee	Location: Zoom 308 6567 214

C.V. of the speaker:

2023~Present	Lecturer	University of Galway, Ireland
2022~2023	Postdoctoral Researcher	University Magdeburg
2018~2022	Postdoctoral Researcher	Bielefeld University
2017~2018	Postdoctoral Researcher	Ken State University
2011~2017	Graduate Teaching Assistant	Colorado State University
2017	Ph.D. in Mathematics	Colorado State University
2013	M.S. in Mathemactics	Colorado State University
2011	B.A. in Mathematics	Colorado State University

2
Oral Session (Physics)

2-1. Seunggyo Jeong (University of Minnesota)

[Title] Chiral-Phonon-Mediated Interlayer Exchange Coupling in Atomically Controlled Oxide Heterostructures

[Abstract] *Chiral phonons, lattice vibrations with broken chiral symmetry, have been proposed as a platform to explore exotic spin-related quantum phenomena. However, their role in stabilizing emergent magnetic states with long-range spin ordering has remained largely unexplored. In this talk, we demonstrate a chiral-phonon-mediated interlayer exchange interaction in heterostructures composed of ferromagnetic SrRuO3 and nonmagnetic insulating SrTiO3. We observe oscillations of in-plane magnetization as a function of SrTiO3 spacer thickness, which cannot be explained by conventional Ruderman-Kittel-Kasuya-Yosida coupling due to the insulating nature of SrTiO3 [1,2]. Instead, we attribute this phenomenon to chiral phonons generated in the ferromagnetic SrRuO3 layers, which penetrate the nonmagnetic SrTiO3 spacer and transmit angular momentum across the heterostructure. The structural compatibility of the perovskite layers enables this propagation, allowing the effective exchange to alternate the spin orientation depending on spacer thickness. The phonon Zeeman effect observed in the heterostructure provides direct evidence for the presence of chiral phonons. Finally, we will discuss our recent ultrafast magneto-optical study showing that phonon angular momentum originating in SrRuO3 indeed propagates through SrTiO3 [3].*

Date: Oct. 16, 2025 Time: 10:00~11:00 (KST) Chair: Prof. Young-Mi Bahk	Location: Zoom 814 3991 3379 (P/W:794986)

C.V. of the speaker:

2023~Present	Posdoctoral Researcher	University of Minnesota, USA
2022~2023	Posdoctoral Researcher	Sungkyunkwan University, South Korea
2017~2022	Ph.D. Physics	Sungkyunkwan University, South Korea
2011~2017	B.S. Physics	Incheon National University, South Korea

2-2. Jieun Lee (University of Stuttgart)

[Title] Exploring phonon chirality using terahertz spectroscopy

[Abstract] The phonon chirality has recently attracted growing interest in condensed matter physics because chiral phonons carry angular momentum and lead to unique physical phenomena. Experimental evidence for chiral phonons has been observed using several techniques, including resonant inelastic X-ray scattering and circularly polarized Raman spectroscopy in nonmagnetic or chiral crystals. Moreover, many studies have been suggested that phonon chirality are linked to unusual effects such as the phonon Zeeman effect and phonon induced spin currents.
In this talk, I will present an overview of recent studies on chiral phonons and introduce our approach based on terahertz spectroscopy. In particular, Faraday rotation measurements directly probe the induced magnetic moments associated with chiral phonons. In addition, we can confirm the chirality of phonon by comparing the optical response to left- and right-circular polarized light using a quarter wave plates.

Date: Oct. 16, 2025 Time: 14:00~15:00 (KST) Chair: Prof. Young-Mi Bahk	Location: Zoom 814 3991 3379 (P/W:794986)

C.V. of the speaker:

2022~Present	Posdoctoral Researcher	Physikalisches Institut, University of Stuttgart, Germany
2022~2024	Posdoctoral Researcher	Solid State Spectroscopy Laboratory, Yonsei University
2022	Ph.D. Physics	Yonsei University, South Korea
2016	B.S. Physics	Chung-Ang University, South Korea

2-3. Dongjin Oh (Seoul National University)

[Title] Orbital angular momentum in one-dimensional chiral crystals

[Abstract] *Chirality, the property of an object that cannot be superimposed onto its mirror image, has been drawing increasing attention across the interdisciplinary fields of physics, chemistry, biology, and material science. From the perspective of condensed matter physics, chirality can manifest in the four fundamental degrees of freedom in materials—lattice, charge, spin, and orbital—and is intrinsically connected to the quantum geometrical properties of the Bloch wave functions, giving rise to unique physical phenomena, including orbital and spin transport [1]. In this presentation, I will focus on the simplest chiral lattice structure, the one-dimensional (1D) helical chain, and introduce recent studies on the distinctive physical properties that emerge from the orbital angular momentum (OAM) of electrons in such systems. First, I will discuss our recent experimental observation of a p-wave OAM texture in electronic band structure of (TaSe4)2I revealed by circular-dichroism angle-resolved photoemission spectroscopy (CD-ARPES), and its implications for future spinless orbitronics applications. Secondly, I will present theoretical simulations that propose a novel pathway to realizing helical electric dipole moments in 1D chiral crystals, arising from non-relativistic coupling between local and non-local OAM. Through this presentation, I aim to emphasize that our recent research provides a significant step toward establishing brand new fundamental concepts in OAM physics by showing that unique phenomena in 1D chiral crystals—such as chirality-induced spin selectivity—are intimately intertwined to OAM and open a new opportunity for advancing the field of chiral orbitronics.*

Date: Oct. 16, 2025 Time: 15:00~16:00 (KST) Chair: Prof. Young-Mi Bahk	Location: Building #5 Room #325

C.V. of the speaker:

2025~Present	Posdoctoral Researcher	Seoul National University, South Korea
2022~2025	Posdoctoral Researcher	Department of Physics, Massachusetts Institute of Technology (MIT)
2022~2022	Posdoctoral Researcher	Center for Correlated Electron Systems, Institute for Basic Science (IBS-CCES)
2016	Ph.D. Physics	Seoul National University, South Korea
2010	B.S. Physics	Seoul National University, South Korea

2-4. Seokjae Yoo(Inha University)

[Title] Light at the nanoscale and chiral light-matter interaction
나노스케일 빛의 카이랄성과 물질의 상호작용

[Abstract] Chirality refers to the property of an object that prevents it from being superimposed on its mirror image through translation or rotation. Like chiral objects, light can also exhibit chirality, and research over the past decade has demonstrated that this chirality can be controlled at the nanometer scale. This chiral light possesses the property of selectively interacting with chiral substances. This makes it possible to measure chiral molecules with extremely high sensitivity or optically control the properties of quantum materials. This lecture will cover what chirality of light is, how to create chiral light at the nanoscale, and practical applications of chiral light-matter interactions.

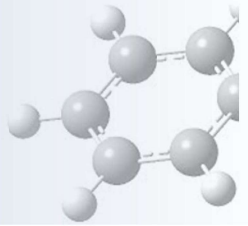
카이랄성이란 물체가 평행이동이나 회전에 의해 자신의 거울상과 겹쳐지지 않는 성질을 뜻한다. 카이랄 물체와 마찬가지로 빛 또한 카이랄성을 가질 수 있는데, 이러한 빛의 카이랄성은 나노미터 스케일에서 제어가 가능하다는 것이 지난 10여년 간 연구되어 왔다. 이러한 카이랄 빛은 카이랄 물질과 선택적으로 상호작용을 할 수 있다는 특성을 가진다. 이를 이용하면 매우 높은 민감도로 카이랄 분자를 측정하거나, 양자 물질의 물성을 광학적으로 제어하는 것이 가능해진다. 이 강연에서는 빛의 카이랄성이란 무엇인지, 나노스케일의 카이랄 빛은 어떻게 만들 수 있는지, 카이랄 빛-물질 상호작용의 실제 응용 사례에 대해서 다루고자 한다.

Date: Oct. 16, 2025 Time: 16:00~17:00 (KST) Chair: Prof. Young-Mi Bahk	Location: Building #5 Room #325

C.V. of the speaker:

2025~Present	Associate Professor	Inha University, South Korea
2018~2021	Visiting Scholar	University California, Berkeley, USA
2016~2021	Research Professor	Korea University, South Korea
2016	Ph.D. Physics	Korea University, South Korea
2011	B.S. Physics	Korea University, South Korea

3
Oral Session (Chemistry)



3-1. Hayoung Song (Gachon University)

[Title] Exploring Coordination Chemistry: From Primary to Secondary Coordination Sphere Interactions

[Abstract] From elucidating the function of metalloenzyme active sites to enhancing the catalytic performance of transition metal complexes, ligand design plays a critical role in modulating the electronic and steric properties of metal centers. Traditionally, ligand design strategies have focused on controlling the ligand field strength of the primary coordination sphere. However, recent advances have extended this concept to include the introduction of ligand-centered reactivity and the modulation of the secondary coordination sphere to stabilize or polarize reaction intermediates. In this presentation, we will discuss a broad range of ligand design strategies, including (1) modulation of the ligand field strength of the primary coordination sphere,[1, 2] (2) utilization of ligand-centered redox reactivity to tune the electronic properties of metal complexes,[3, 4] and (3) incorporation of a Lewis acidic secondary coordination sphere to enhance catalytic performance.[5]

Date: Oct. 16, 2025 Time: 09:55~10:55 (KST) Chair: Prof. Changmi Lee	Location: Zoom 899 3626 7841 (P/W:173754)

C.V. of the speaker:

2025~Present	Assistant Professor	Gachon University, South Korea
2023~2025	Postdoctoral Researcher	University of Michigan, USA
2021~2023	Postdoctoral Researcher	Pohang University, South Korea
2019~2021	Postdoctoral Research	Institute for Basic Science Center, South Korea
2015~2019	Ph.D. in Inorganic and Organometallic Chemistry	Pohang University, South Korea
2011~2015	B.A. in Chemistry	Pohang University, South Korea

3-2. Joonyoung Francis Joung (Kookmin University)

[Title] Curating Novel Datasets for Machine Learning Applications in Organic Optoelectronics and Reaction Mechanism Prediction

[Abstract] In the data-driven paradigm, the importance of high-quality datasets cannot be overstated. While many machine learning researchers rely on well-curated and pre-polished datasets, this often restricts them to addressing only the problems those datasets are designed for. Tackling new and more diverse challenges necessitates the development of novel datasets, making their creation and publication a critical endeavor.
In this presentation, I will introduce two datasets I have developed: (1) a collection of seven experimentally measured optical properties and HOMO-LUMO energy levels of organic molecules, and (2) a dataset for organic reaction mechanisms. These datasets offer new opportunities for advancing machine learning applications. Specifically, the first dataset can accelerate the development of organic optoelectronic devices such as OLEDs, while the second can aid in predicting potential impurities formed during chemical reactions.
Through these contributions, I aim to emphasize the value of creating and sharing new datasets to address emerging challenges in both material science and organic chemistry.

Date: Oct. 16, 2025 Time: 11:00~12:00 (KST) Chair: Prof. Changmi Lee	Location: Zoom 899 3626 7841 (P/W:173754)

C.V. of the speaker:

2025~Present	Assistant Professor	Kookmin University, South Korea
2022~2025	Postdoctoral Researcher	MIT, USA
2020~2022	Postdoctoral Researcher	Korea University, South Korea
2016~2020	Lecturer	General & Physical Chemistry Laboratory
2015~2019	Ph.D. in Chemistry	Korea University, South Korea
2015	B.S. in Chemistry	Inha University, South Korea

3-3. Sanghwa Jeong (Pusan National University)

[Title] Evolution-Based Screening of Fluorescent SWCNT Nanosensors

[Abstract] The functionalization of fluorescent single-walled carbon nanotubes (SWCNTs) with biopolymers has proven to be a versatile platform for the development of biosensors targeting small molecules, proteins, and environmental factors. In this study, we introduce a generic strategy that utilizes random single-stranded DNA (ssDNA) libraries to evolve synthetic molecular recognition moiety on the surface of SWCNTs.

Building upon our previous success[1], we extend the sensor screening for improved sensitivity and selectivity, specifically targeting the neuromodulator serotonin. This evolution is achieved through a combination of directed evolution and machine learning-based prediction, focusing on the iterative optimization process to enhance the sensitivity and selectivity of ssDNA-SWCNT nanosensors. I will introduce how neurotransmitter-responsive SWCNT nanosensors can be applied for spatiotemporal realtime imaging of patient-derived neural cells.

In addition to neurotransmitter sensing, we extend the application of our evolved random ssDNA-SWCNT complexes to the development of cancer cell-targeting biosensors. Through positive selection, these complexes can be tailored to recognize and bind selectively to cancer cells. Simultaneously, negative selection ensures minimal interaction with normal cells. Those results showcase the broad applicability of our approach, suggesting that the elaborate functionalization of SWCNTs with specific ssDNA sequences can be universally employed for the rapid and convenient fabrication of novel biosensors and artificial antibodies. This research represents a significant step towards the development of highly specific and efficient nanosensors for diverse biomedical applications.

Date: Oct. 16, 2025 Time: 13:55~14:55 (KST) Chair: Prof. Changmi Lee	Location: Zoom 899 3626 7841 (P/W:173754)

CHEMISTRY

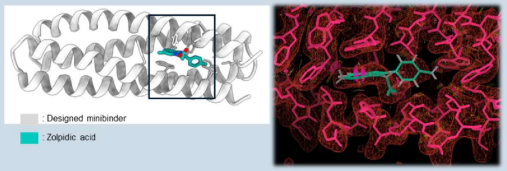
C.V. of the speaker:

2021~Present	Assistant Professor	Pusan National University, South Korea
2017~2021	Postdoctoral Researcher	UC Berkeley, USA
2015~2017	Postdoctoral Researcher	POSTECH, South Korea
2015	Ph.D. in Chemistry	University of Pennsylvania, Philadelphia, Pennsylvania, USA
2003	M.S. in Organic Chemistry and Material Chemistry	KAIST, South Korea
2001	B.S. in Chemistry	Pohang University, South Korea

3-4. Youngho Kim (Sungkyunkwan University)

[Title] Generative AI-Based Protein Design for Therapeutic Protein Development

[Abstract] De novo protein design has enabled the construction of functional proteins with tailored tertiary structures from scratch. Molecular modeling, ranging from simulation-based methods to machine learning (ML)-driven approaches, enables the prediction of proteins' physical and chemical properties. Recently, generative AI models trained on vast sequence and structure databases have demonstrated the ability to design customized proteins for specific target receptors. Alongside the "resolution revolution" in protein structure determination driven by cryo-electron microscopy (Cryo-EM), a "design revolution" is emerging through generative AI. This talk provides an overview of the key computational protein design approaches, bridging both physics-based and AI-driven methodologies. Designing proteins for specific targets requires a fundamental understanding of interdisciplinary collaboration, integrating knowledge of protein structure and function. Following the introduction to computational protein design, two case studies from our research will be presented. Our work focuses on designing functional proteins for target receptors, enzyme, and narcotic drug targets, with potential applications in biosensing and therapeutic development.



Date: Oct. 16, 2025
Time: 15:00~16:00 (KST)
Chair: Prof. Changmi Lee

Location:
Zoom 899 3626 7841 (P/W:173754)

CHEMISTRY

C.V. of the speaker:

2015~Present	Adjunction Professor	GBME, Sungkyunkwan University
2013~Present	Adjunction Professor	Dept. of Chemistry, Sungkyunkwan University
2013~Present	Associate Professor	SAINT, Sungkyunkwan University
2011~2013	Postdoctoral Researcher	Massachusetts Institute of Technology, Cambridge, MA, USA
2005~2011	Ph.D. in Chemistry	University of Pennsylvania, Philadelphia, Pennsylvania, USA
2004~2005	Researcher	LG Chem, South Korea
2003	M.S. in Organic Chemistry and Material Chemistry	KAIST, South Korea
2001	B.S. in Chemistry	Sungkyunkwan University, South Korea

1-5. Niamh Willis-Fox (University of Manchester)

[Title] Driving polymer mechanochemistry through control of processing conditions

[Abstract] Many techniques for polymer processing have the potential to elongate and stretch polymer chains through the mechanical shear forces inherent within the technique. This talk will discuss how processing conditions can be varied to control the degrative outcome of polymer chain scission brought on by such stretching events. It will discuss the effect of including a mechanophore (mechano-responsive moiety) within the polymer backbone. Mechanophores enable a wide range of functional responses, including colour change, small molecule release, and generation of reactive functional groups, which can be exploited for applications in force sensors, drug delivery, and self-healing materials, respectively. Thus, understanding how polymer mechanochemistry can turn a component of processing from destructive to productive has many implications for sustainability in polymer processing.

Date: Oct. 16, 2025
Time: 16:00~17:00 (KST)
Chair: Prof. Seungjai Lee

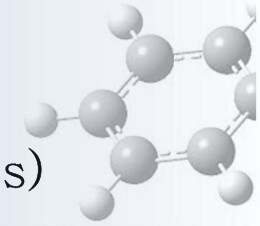
Location:
Zoom 308 6567 214

C.V. of the speaker:

2023~Present	Lecturer	University of Manchester
2018~2023	Research Assiociate	Cambridge University
2016~2018	Research Assiociate	Cambridge University
2011-2015	Ph.D. in Physical Chemistry	Trinity College Dublin
2007~2011	B.A. in Natural Science	Trinity College Dublin

CHEMISTRY

4
Oral Session (Life Sciences)



4-1. Yun Young Go (Kunkuk University)

[Title] Development of Broad-Spectrum Antiviral Compounds Against Emerging and Re-emerging Coronaviruses

[Abstract] The COVID-19 pandemic highlighted the urgent need for broad-spectrum antiviral agents capable of providing rapid and effective responses against emerging and re-emerging viral threats. Novel drug development, however, faces significant limitations, including a narrow spectrum of activity, high costs, and prolonged timelines averaging 8 to 12 years. Drug repurposing offers an alternative strategy, with the advantages of reducing development time and cost, along with lower clinical risk in later stages due to existing safety data.

Acknowledging these limitations, this study focuses on two complementary strategies: drug repurposing and host-targeted antiviral development. In the first part, we describe the identification of broad-spectrum antiviral compounds by screening a repurposed compound library. Among the candidates, TMC353121 and Ziresovir, originally developed as fusion inhibitors for respiratory syncytial virus (RSV), demonstrated antiviral activity against SARS-CoV-2 and other coronaviruses. These compounds inhibited viral entry and membrane fusion by disrupting spike protein-mediated six-helix bundle (6-HB) formation, demonstrating broad-spectrum antiviral activity across multiple alpha- and beta-coronaviruses.

In the second part, we report the identification of a novel antiviral compound, KR-206238, which targets the host lipid biosynthesis pathway essential for coronavirus replication. KR-206238 exhibited robust in vitro antiviral activity against a panel of coronaviruses, particularly MERS-CoV and feline infectious peritonitis virus (FIPV). Metabolomic profiling revealed significant reductions in phosphatidylcholine (PC) and phosphatidylethanolamine (PE) levels in treated cells, supporting its mechanism as a host-directed antiviral. Furthermore, KR-206238 showed antiviral activity against members of other virus families, such as flaviviruses and picornaviruses. Ongoing studies are focused on elucidating the precise mechanism by which KR-206238 modulates lipid biosynthesis.

Taken together, these findings support a dual-path antiviral development strategy that integrates both viral and host-targeted approaches. This paradigm may accelerate the development of broad-spectrum therapeutics and enhance global preparedness for future viral pandemics.

Date: Oct. 16, 2025 Time: 14:30~16:00 (KST) Chair: Prof. Jung-Yong Yeh	Location: Building #41 Room #109

C.V. of the speaker:

2023~Present	Assistant Professor	Konkuk University
2019~2024	Associate Professor	City University of Hongkong, Hongkong
2012~2019	Senior Research Scientist	University of Science and Technology, South Korea
2011	Ph.D. in Veterinary Science	University of Kentucky, Lexington, KY, USA
2002	M.S.	KunKuk University, South Korea
2000	D.V.M	KunKuk University, South Korea

4-2. Sungchil Yang (City University of Hong Kong)

[Title] Cortical surface stimulation corrects auditory perception: Cortical ear

[Abstract] Senses involve the generation of electrical impulses in the peripheral nervous system and their transmission to the sensory cortices in the central nervous system. In hearing, auditory signals, which are electrically converted from the peripheral organ of the hair cells, are encoded in the auditory cortex for sound perception and learning. Cortical encoding converts sensory information into a readable code in the brain, enabling people to sense and respond to the world. However, auditory encoding can be disrupted due to hearing loss. The abnormal hearing of tinnitus, a phantom perception of sound, is believed to be perceived in the auditory cortex, primarily due to hearing loss. Due to its accessibility and significance in cognition, the auditory cortex is an ideal target for brain-machine interfaces to modulate sound perception. We have developed a nanomaterial-based surface electrode array, called a "cortical encoding implant," that allows both recording and stimulation of the auditory cortex. Our recent findings demonstrated that the encoding implant could assess cortical maps on demand and stimulate the auditory cortex to attenuate tinnitus and alter sound perception. Our study will facilitate the development of an advanced neural interface, enabling high-quality communication for people with hearing loss.

Date: Oct. 16, 2025 Time: 14:30~16:00 (KST) Chair: Prof. Jung-Yong Yeh	Location: Building #41 Room #109

C.V. of the speaker:

2025~Present	Associate Head	City University of Hongkong, Hongkong
2015~2021	Associate Professor	City University of Hongkong, Hongkong
2012~2015	Research Assosicate	University of California, Sanfransisco, USA
1998~2012	Posdoctoral Researcher	University of California, Berkeley, USA
2008	Ph.D.	University of Illinois, Urbana & Champaign, USA
1996	B.S.	Incheon National University, South Korea

LIFE SCIENCES

4-3. Hyun-Jung Han (Konkuk University)

[Title] Veterinary Emergency and Critical Care: Transfusion medicine in companion animals

[Abstract] Veterinary Emergency and Critical Care Medicine is a discipline that focuses on the treatment of critically ill and emergency cases in companion animals, as well as the operation of emergency rooms and intensive care units (ICUs). This presentation introduces the field of veterinary emergency and critical care, with a particular focus on the current state and future prospects of transfusion medicine in companion animals.

Date: Oct. 16, 2025 Time: 14:30~16:00 (KST) Chair: Prof. Jung-Yong Yeh	Location: Building #41 Room #109

C.V. of the speaker:

2021~Present	Associate Professor	Konkuk University, South Korea
2016~2021	Clinical Professor	Konkuk Veterinary Medical Teaching Hospital
2012~2016	Director	VIP referral Veterinary Hospital
2011~2012	Postdoctoral Fellow	University of Missouri, USA
2007~2010	Postdoctoral Researcher	Seoul National University
2006~2007	Postdoctoral Researcher	Chungbuk National University
2003~2006	Ph.D.	Konkuk University, South Korea
2001~2003	M.S.	Konkuk University, South Korea
1997~2001	DVM	Konkuk University, South Korea

5
Oral Session (Marine Science)

5-1. Sergey Nuzhdin (USC Dornsife College of Letters, Arts and Sciences)

[Title] 7 years and $12M for the USA Kelp research

[Abstract] Kelp is one of the few remaining clades where basic biology knowledge and applied insights inspire remarkable discovered due to severe shortage of modern-style data. Over the past seven years, ARPA-E and NOAA have invested more than $12M to decipher kelp systems in support of sustainable ocean farming. Through this support, members of our team have cultured thousands of biodiverse kelps of unicellular origin, along with hundreds of bacterial and dozens of fungal species sampled from kelps (now preserved in Kelp Ark - a nonprofit public seed bank funded by Grantham Environmental Trust). The team has also assembled and annotated high-quality genomes of kelps and associated microorganisms. In addition, we have developed methods to culture kelps on agar plates, reducing the complexity of 3D interactions to 2D and enabling easier microbial and media manipulations. We have genetically transformed kelps with GFP using agrobacteria and established microscopy approaches to analyze kelp subcellular structures and their responses to environmental and microbial manipulations. We have also engineered a large-scale “brown-house”, where macroscopic kelps and organisms associated with them can be maintained in controlled environment recirculation tank systems, where we have closed a reproduction cycle. While these advances were originally driven by the applied goal of harnessing kelp farming to address human challenges—a noble pursuit—they now provide a foundation for advancing the basic science underlying these practical achievements. .

Date: Oct. 16, 2025 Time: 10:00~11:00 (KST) Chair: Prof. Jangkyun Kim	Location: Building #5 Room #527

C.V. of the speaker:

2022~present	Co-Founder and CEO	501(c)3 Kelp Ark, San Pedro, USA
2007~present	Full Professor	University of Southern California, USA
2004 – 2007	Full Professor	University of California, Davis, USA
1997 – 2005	Assistant Professor	University of California, Davis, USA
1993 – 1997	Postdoctoral position	North Carolina State University, Raleigh, USA
1989 – 1993	Ph.D.	Institute of Molecular Genetics, Moscow, Russia

BLUE CARBON * MARINE SCIENCE

5-2. Jihun Jung(Oregon State University)

[Title] Sea Surface Salinity Variability in the Gulf of Anadyr

[Abstract] Analysis of satellite-derived sea surface salinity (SSS) from SMAP and SMOS between 2015-2023 reveals distinct patterns of spatial and temporal variability in the Gulf of Anadyr (GA), in the northwestern Bering Sea. In particular, both products consistently capture anomalously fresher SSS patterns in summer 2021. Similar patterns are reproduced in a 2-km resolution coupled ice-ocean model simulation of the Bering Sea using the Regional Ocean Modeling System (ROMS). The model is analyzed to understand mechanisms driving SSS variability in the GA. In 2021, ice persists in the GA into June, leading to the anomalously fresher surface condition. The gulf-averaged sea ice volume equation term balance analysis is performed to understand mechanisms driving changes in the sea ice volume that in turn drive SSS anomalies. On the seasonal time scale, during the freezing season, sea ice volume in the GA increases primarily due to thermodynamic processes. Transport in and out of the GA is a substantial contributor to shorter term variability. Large ice production and less ice export result in persistent ice in 2021. Melting this ice in the GA creates the SSS anomaly pattern detected from space. Model results show that area-averaged SSS and volume-averaged salinity anomalies vary similarly during the freezing season but decouple during the melt season. Ice freeze/melt, boundary transport, and Anadyr River discharge are of comparable importance for the volume-averaged salinity budget in the GA.

Date: Oct. 16, 2025 Time: 11:00~12:00 (KST) Chair: Prof. Kyungjae Lee	Location: Building #5 Room #527

C.V. of the speaker:

2023~2024	Research Associate	Oregon State University
2023	Ph.D. in Earth and Environmental Sciences	Seroul National University, South Korea
2014	B.S. in Earth and Environmental Sciences	Seroul National University, South Korea

5-3. Seung-Woo Lee (Korea Institute of Ocean Science & Technology)

[Title] Sequential Evolution of Changjiang Diluted Water and Its Impact on Stratification and Phytoplankton Blooms in the East China Sea during Summer 2020

[Abstract] The Changjiang Diluted Water (CDW) plays a crucial role in shaping the hydrography and ecosystem dynamics of the East China Sea (ECS), particularly during summer when freshwater discharge enhances stratification and modulates biogeochemical processes. Despite its importance, the detailed progression of CDW and its short-term impacts remain poorly understood due to the limited availability of high-resolution observations. Using high-resolution in situ observations from the Ieodo Ocean Research Station in summer 2020, we examined the sequential evolution of CDW and its effects on the upper-ocean structure and phytoplankton blooms. CDW evolution was categorized into six distinct phases, characterized by abrupt shifts in salinity and stratification, driven by monsoonal winds, tides, and typhoon-induced mixing. CDW intrusion formed a persistent barrier layer that suppressed vertical mixing and trapped surface heat, leading to increased sea surface temperatures. Nutrient influx from CDW, enriched in nitrate and phosphate, promoted the proliferation of diatoms relative to picoplankton and dinoflagellates, although all groups increased during the CDW-influenced period. Internal wave-induced mixing facilitated nutrient replenishment from deeper layers, partially alleviating phosphate deficiency inherent in CDW and enhancing phytoplankton productivity. Typhoon Bavi disrupted stratification through strong vertical mixing, resulting in a high-salinity state that differed from pre-intrusion hydrography. This study provides a time-resolved view of CDW-driven variability and demonstrates how episodic freshwater inputs, coupled with physical forcing, regulate stratification, nutrient supply, and ecosystem response in the ECS.

Date: Oct. 16, 2025 Time: 13:00~14:00 (KST) Chair: Prof. Kyungjae Lee	Location: ZOOM 993 817 2080 (P/W:inu251016)

C.V. of the speaker:

2022~Present	Senior Research Scientist	Korea Institute of Ocean Science & Technology
2023	Ph.D. in Physical Oceanography	Seoul National University, South Korea
2009	B.S. in Marine Science	Pusan National University, South Korea

BLUE CARBON*MARINE SCIENCE

5-4. Seongbong Seo (Korea Institute of Ocean Science & Technology)

[Title] Origins and pathways of the floating Sargassum in the Yellow and East China Seas

[Abstract] Using particle tracking modeling, the origins and pathways of floating Sargassum horneri reaching southwestern Korea were investigated. Sargassum that originated from both the Zhejiang coast of China and the northern Yellow Sea (YS) could reach Korea. Sargassum released from Zhejiang between November and February reaches Korea via the Kuroshio Current in about five months. Sargassum from the northern YS moves southward due to the northwesterly winter monsoon. In years with strong anomalous westerly winds, the floating Sargassum could reach Korea within two months. In other years, Sargassum continued to move southward toward the central East China Sea (ECS) and then to southwestern Korea in three to five months. Comparisons with the Geostationary Ocean Colour Imager showed that Sargassum found in the central ECS was mainly of northern origin. Global warming must have enhanced the northern origin to trigger the recent Sargassum blooms in the central ECS.

Date: Oct. 16, 2025 Time: 14:00~15:00 (KST) Chair: Prof. Kyungjae Lee	Location: Building #5 Room #527

C.V. of the speaker:

2023~Present	Senior Research Scientist	Korea Institute of Ocean Science and Technology(KIOST)
2022~2023	Researcher	National Institute of Fisheries Science(NIFS)
2021~2022	Assistant Manager	Korea Marine Environment Management Corporation(KOEM)
2019 – 2021	Postdoctoral Researcher	Korea Institute of Ocean Science and Technology(KIOST)
2019	Ph.D. in Ocean Science	University of Science and Technology
2023	M.S. in Integrated Ocean Sciences	University of Science and Technology
2010	B.S. in Marine Environmental Science	Korea Maritime and Ocean University

5-5. Jonghyuk Park (Kookmin University)

[Title] Basic Concepts and Use Cases of Deep Learning

[Abstract] Deep learning, founded on the hierarchical architecture of artificial neural networks, is a machine learning methodology that enables the automatic extraction of high-level representations from data. It has emerged as a central paradigm in both artificial intelligence research and diverse industrial applications. This lecture first provides a systematic overview of the fundamental structures and mechanisms of deep learning, including Perceptron and Multi-Layer Perceptrons (MLPs). Core components such as backpropagation algorithms, optimization techniques, regularization strategies to mitigate overfitting, and the role of large-scale datasets and computational resources in performance advancement will also be discussed.

Furthermore, the lecture examines representative application domains of deep learning. In computer vision, the focus will be on image recognition, object detection, and generative models, while in natural language processing, it will cover language models, machine translation, and conversational AI. By presenting applications across both industrial and academic contexts, the lecture will explore the transformative impact and potential ripple effects of deep learning on society and scholarship at large.

The overarching aim of this lecture is to equip participants with a comprehensive understanding of the basic concepts and underlying mechanisms of deep learning, while fostering insights into its academic significance and practical applicability. For researchers in artificial intelligence and related fields, the lecture will serve as an opportunity to re-examine the theoretical and practical implications of deep learning within the context of ongoing advancements.

Date: Oct. 16, 2025 Time: 15:10~16:10 (KST) Chair: Prof. Kyungjae Lee	Location: Building #5 Room #527

C.V. of the speaker:

2022~2025	Senior Researcher	National Research Foundation of Korea
2020	Research Assistant	Kakao and Kakao Brain Corporatins
2023	Ph.D. in Industrial Engineering	Seoul National University, South Korea
2008~2015	B.S. in Industrial Engineering	Seoul National University, South Korea

BLUE CARBON*MARINE SCIENCE

17th INTERNATIONAL SYMPOSIUM ON NATURAL SCIENCES

2025. 10. 16.-17.

온라인/오프라인 병행개최

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사전등록일정 : 2025. 9. 15. ~ 10. 10.

Bulletin

수학과 Mathematics

Nathan Kaplan
(University of California, Irvine)
Hayan Nam
(Konkuk University)
Jungin Lee
(Ajou University)
Christopher Voll
(Bielefeld University)
Joshua Maglione
(University of Galway)

물리학과 Physics

Seung Gyo Jeong
(University of Minnesota)
Jieun Lee
(University of Stuttgart)
Dongjin Oh
(Seoul National University)
SeokJae Yoo
(Inha University)

화학과 Chemistry

Hayoung Song
(Gachon University)
Joonyoung Joung
(Kookmin University)
Sanghwa Jeong
(Pusan National University)
Yongho Kim
(Sungkyunkwan University)
Niamh Fox
(University of Manchester)

생명과학 Life Sciences

Yun Young Go
(Konkuk University)
Sungchil Yang
(City University of Hong Kong)
Hyun-Jung Han
(Konkuk University)

해양학과 Marine Science

Sergey Nuzhdin
(USC Dornsife College of Letters, Arts and Sciences)
Jihun Jung
(Oregon State University)
Seung-Woo Lee
(Korea Institute of Ocean Science & Technology)
Seongbong Seo
(Korea Institute of Ocean Science & Technology)
Jonghyuk Park
(Kookmin University)

포스터 발표(Poster Session)

포스터제출기간 _ 사전등록기간 이내
포스터제출방법 _ 사전등록 페이지 해당칸 업로드
제출파일형식 _ PDF만 접수 가능
원고크기 _ A1(594×841mm) 반드시 준수

인천대학교 재학생 여러분들의 많은 참여바랍니다.

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주관 _ 인천대학교 자연과학대학

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