

# SPRING SYMPOSIUM 2018

 **LG화학**

**TORAY**  
도레이첨단소재

 **GS칼텍스**

 **롯데케미칼**

 **SK이노베이션**

 **LG하우시스**



**April 25 (Wed) ~ 27 (Fri)**  
**CECO, CHANGWON**



**대한화학공학회**  
**THE KOREAN INSTITUTE OF CHEMICAL ENGINEERS**

SINCE 1962

## “Chemical Engineering for Clean Energy and Environment”



**Woo-Sik Kim**  
President

In recent years, environmental regulations have become intensified all around the world to diminish climate changes caused by the burning of fossil fuel. Scientific research and industrial developments for clean energy systems have become critical issues. Also, the techniques for the reduction of particulate matter emitted from various industrial activities have attracted great interest.


Over the past 50 years, the Korean Institute of Chemical Engineers (KICHE) has been continuously trying to demonstrate the technical perspectives and leading the way in the chemical engineering society through cooperation with academia, institutes, and industries. To satisfy the social need for the clean environment and renewable energy, KICHE will devote much of its efforts to improving the conference quality and close cooperation with industrial and international partners.

I am pleased to announce that the 2018 Spring General Meeting and Conference will be held under the theme of “Chemical Engineering for Clean Energy and Environment” in Changwon, a frontier-city among Korean industrial complexes. The conference will include regular scientific program, a series of special symposiums on energy and environment, and symposiums on a particular theme organized by Division Committees. Also, several new programs will be introduced such as “Chem-Tech-Biz Symposium” for the successful commercialization of industrial companies, “Basic Research Education Session” for graduate students and “Meet the Young Researcher Poster Session” for young researchers.


Members and staffs of KICHE have prepared the 2018 Spring General Meeting and Conference with sincere and continuous efforts for the creative innovations. I hope such changes will become the driving force for the development of KICHE. I wish to encourage scientists, engineers, and students in the field of Chemical Engineering to participate the symposium and enjoy the new program.

# Plenary Talk / Basic Research Education Session / Keynote Lecture






## Plenary Talk

Name / Affiliation		Short Bio.	Topic
	<b>Jinwon Lee</b> Professor, Chemical and Biomolecular Engineering Sogang Univ. / Director, C1 Gas Refinery R&D Center	1993 Ph.D. in Chemical Engineering, Carnegie Mellon Univ. 1994 Researcher, Univ. of Virginia 2005 Professor, Chemical Engineering, Kwangwoon Univ.	C1 Gas Conversion Technology

## Basic Research Education Session

Name / Affiliation		Short Bio.	Topic
	<b>Hyungsun Kim</b> Professor, School of Materials Engineering, Inha Univ. / President, Korean Council of Science Editors	1989 Ph.D. in Materials Engineering, Imperial College London 2008 Metal and Materials International Editor 2010 How to Write Correctly Scientific Papers? SNU Press	How to Write Correctly Scientific Papers

## Keynote Lecture

Name / Affiliation		Session	Topic
	<b>Junguk Choi</b> LG Chemical	(Special Symposium) 2018 Chem-Tech-Biz Symposium: Successful commercialization case and its process of domestic research and development for chemical catalyst	Commercialization of high value added innovative catalyst and process development
	<b>Sehyun Shin</b> Korea Univ.	(Symposium on Biochemical Engineering) Symposium on the innovation and future of <i>in vitro</i> diagnostic chip	Development of liquid biopsy technology for precision medicine
	<b>Jae Sung Lee</b> UNIST	(Symposium on Catalysis and Reaction Engineering) Frontiers in next-generation catalysis symposium	Solar hydrogen: Current status and prospect
	<b>Wonyong Choi</b> POSTECH	(Symposium on Catalysis and Reaction Engineering) Frontiers in next-generation catalysis symposium	Photofunctional catalysts for solar energy utilization and conversion
	<b>Yung-Eun Sung</b> Seoul Nat'l Univ.	(Symposium on Catalysis and Reaction Engineering) Frontiers in next-generation catalysis symposium	Next-generation electrocatalyst design for energy devices



# 2018 KICChE Spring Meeting Time Schedule **1**

## April 25(Wed.): CECO

13:00~17:00	Onsite Registration
13:00~16:50	Tutorial: Basics of molecular modeling and simulation(3F 301)
13:00~18:30	Tutorial: Introduction to chemical process design(3F 302)

## April 25(Wed.): Pullman Ambassador Changwon 2F 'Grand Ballroom'

15:30~16:30	Chair Meeting of Operational Committees/Regional Sections/Divisions
16:00~17:50	Young Researcher Workshop
16:30~17:00	Councilor Registration
17:00~17:50	Councilor Meeting
18:00~20:00	Councilor Dinner(Joined by Young Researcher)

## April 26(Thu.): CECO

	Room A (Convention Hall II)	Room B (Convention Hall III)	Room C (301)	Room D (302)	Room E (601)	Room F (602)	Room G (603)	Room H (604)	Room I (605)	Room J (606)	Room K (607)	Room L (600A)	Room M (600B)
08:00~18:00	Pre Registration(Lifetime/Annual MemberA-100,000Won, Annual MemberB-150,000Won(Annual fee(1yr) waived), Student MemberA- 40,000Won, Student MemberB-70,000Won(Annual fee(1yr) waived), Nonmember: 150,000Won) Onsite Registration(Lifetime/Annual MemberA-110,000Won, Annual MemberB-160,000Won(Annual fee(1yr) waived), Student MemberA- 45,000Won, Student MemberB-75,000Won(Annual fee(1yr) waived), Nonmember: 160,000Won)												
	Registration(Doughnuts & Coffee Service)												
08:30~11:00		Basic Research Education Session (09:00~11:00)	Polymer Oral Presentation I (09:00~11:00)	Energy and Environment Oral Presentation I (Student Oral) (08:20~11:00)				Thermodynamics Oral Presentation (09:00~10:30)	[Women's Initiatives Committee] Women Chemical Engineer's Networking Meeting (09:30~11:00)	[Symposium by the Division 1] Symposium on the functional coatings technology (08:30~11:00)  Industrial Chemistry	Process Systems Engineering Oral Presentation I (Student Oral) (08:30~11:00)	Materials Oral Presentation I (Student Oral) (08:30~11:00)	Catalysis and Reaction Engineering Oral Presentation I (08:30~11:00)
11:00~11:10	Coffee Break												
11:10~12:00	Plenary Talk: C1 Gas Conversion Technology [Jinwon Lee, Chemical and Biomolecular Engineering, Sogang Univ. / C1 Gas Refinery R&D Center] (Room A (Convention Hall II))												
12:00~14:00	General Assembly(Room A(Convention Hall II), Reception(Convention Hall I), (Attendees: Only for regular members pre-registered for General Assembly)												
14:00~17:40	[Symposium by the Division 2] Symposium on applications of molecular simulation in new and renewable energy fields (14:00~16:50)  Thermodynamics	[Special Symposium 1] 2018 Chem- Tech-Biz Symposium: Successful com- mercialization case and its process of domestic research and development for chemical catalyst (14:00~17:40)	[Special Symposium 2] Symposium on polymeric materials for next generation energy technology (14:00~17:30)  Polymer	Energy and Environment  [Special Symposium 3] Electrochemical and chemical storage of renewable energy symposium (14:00~17:40)	Fine Particles Technology Oral Presentation (14:00~15:40)  Fine Particles Technology	[Symposium by the Division 3] Symposium on separation technologies for C1 chemistry (14:00~17:10)  Separation Technology	Fluidization Oral Presentation (14:00~16:20)  Fluidization	[Symposium by the Division 4] Intelligent safety software in the era of Industry 4.0 symposium (14:00~17:20)  Process Safety	Transport Phenomena Oral Presentation (14:00~16:20)  Transport Phenomena	Process Systems Engineering Oral Presentation II (14:00~17:30)  Process Systems Engineering	[Symposium by the Division 5] Symposium on the innovation and future of <i>in vivo</i> diagnostic chip (14:00~17:00)  Biochemical Engineering	Materials Oral Presentation II (14:00~16:50)  Materials	Catalysis and Reaction Engineering Oral Presentation II (14:00~17:00)  Catalysis and Reaction Engineering
17:40~18:00	Free Gift by Lot(3F Exhibition Hall I)												
3F Exhibition Hall 1	Poster Posting I (09:00~11:00): Polymer, Separation Technology, Biochemical Engineering												
	Poster Posting II (16:00~17:40): Industrial Chemistry, Fine Particles Technology, Energy and Environment												
	Promotion & Exhibition												



# 2018 KIChE Spring Meeting Time Schedule **2**

**April 26(Thu.): Pullman Ambassador Changwon 2F 'Grand Ballroom A'**

The 6th CEO Forum(Attendees: Pre Registration CEO Club Members)		
16:00~16:20	Registration and welcome	Young Seop Kim(Vice President of Industry Affairs of KIChE)
16:20~16:30	Opening remarks	Jang Soo Oh(Chairperson of CEO Club )
16:30~18:00	Mega-Change of Energy, Chemical, and 4th Industrial Revolution	Jiwoo Shon(Senior Analyst of SK Securities Research Center)
18:00~18:10	Celebratory photography	
18:10~20:00	Banquet	

**April 27(Fri.): CECO**

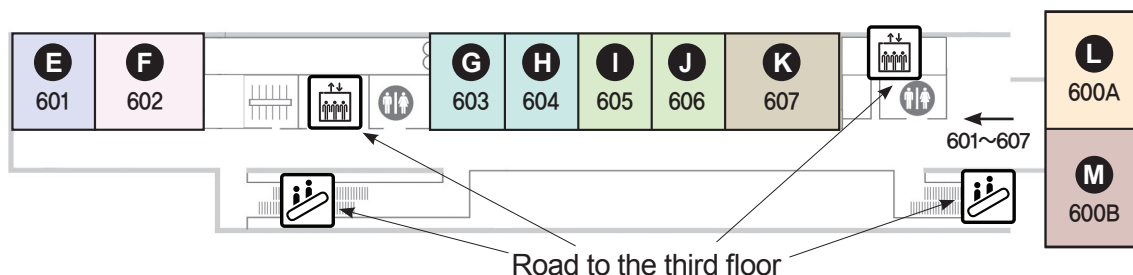
	Room B (Convention Hall III)	Room C (301)	Room D (302)	Room E (601)	Room F (602)	Room G (603)	Room H (604)	Room I (605)	Room J (606)	Room K (607)	Room L (600A)	Room M (600B)
08:00~16:30	Registration(Doughnuts & Coffee Service)											
09:00~12:00	[Special Symposium 4] Symposium on direct non-oxidative conversion of methane (09:00~12:00)	KIChE young investigators symposium I (09:00~11:40)	Meet the Young Researcher Poster Session (10:00~12:00)	Polymer Oral Presentation II (09:00~12:05)	[Symposium by the Division 6] International symposium on the fluidized beds and multi-phase flow reactors (09:30~12:00)	Separation Technology Oral Presentation (09:00~12:00)	Processe Safety Oral Presentation (09:00~12:00)	Energy and Environment Oral Presentation II (09:00~11:40)	[Symposium by the Division 7] Symposium on applications of fine particles in energy and environment (09:00~11:30)	Biochemical Engineering Oral Presentation I (Student Oral) (09:00~11:00)	[Symposium by the Division 8] Symposium on fine dust reducing technology and material (09:00~12:00)	[Symposium by the Division 9] Frontiers in next-generation catalysis symposium (09:10~11:50)
12:00~13:00	Lunch											
13:00~16:00		KIChE young investigators symposium II (14:00~16:00)								Biochemical Engineering Oral Presentation II (13:00~16:00)	Materials Oral Presentation III (13:00~15:20)	[Symposium by the Division 9] Frontiers in next-generation catalysis symposium (13:30~15:40)
16:00~16:30	Closing ceremony(Free Gift by Lot and Awards) (3F Exhibition Hall 1)											
3F Exhibition Hall I	Poster Posting III (09:00~11:00): Process Systems Engineering, Materials											
	Poster Posting IV (13:00~15:00): Thermodynamics, Fluidization, Transport Phenomena, Catalysis and Reaction Engineering, Processe Safety											
	Promotion & Exhibition											

## Division General Meeting Time Schedule (April 26(Thu.))

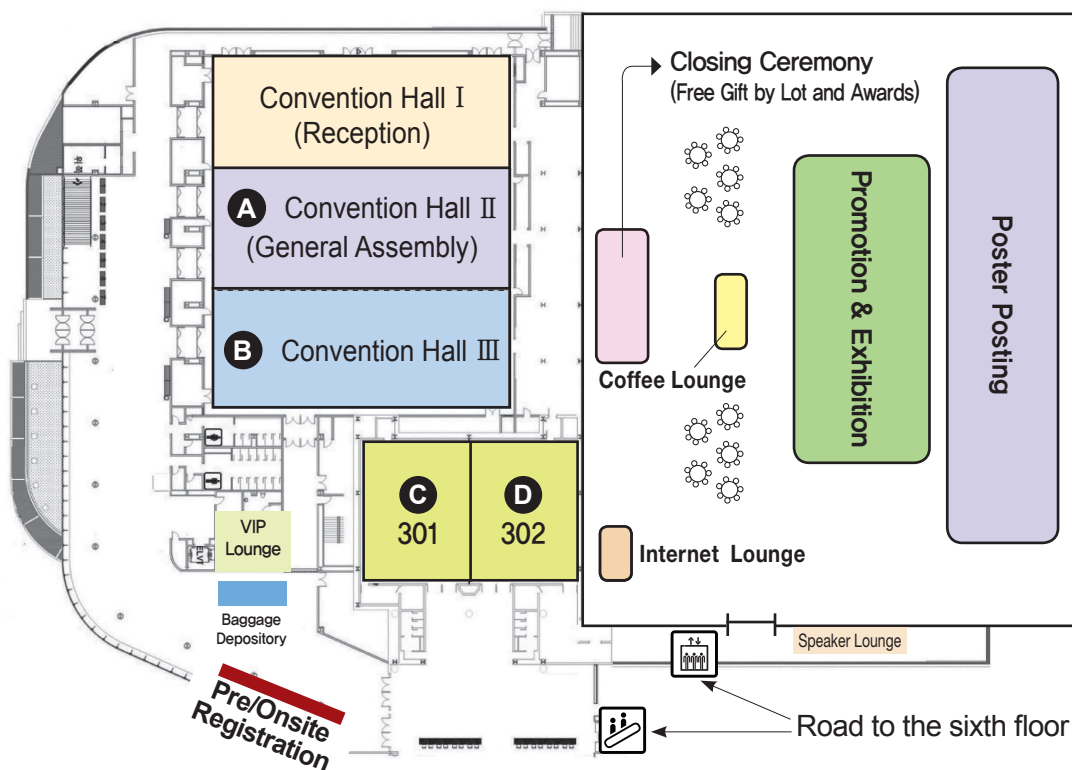
Division of Polymer	Room C (301)	17:30~17:50
Division of Industrial Chemistry	Room I (605)	11:00~11:10
Division of Process Systems Engineering	Room J (606)	17:30~17:50
Division of Fine Particles Technology	Room E (601)	15:40~16:10
Division of Separation Technology	Room F (602)	17:10~17:40
Division of Biochemical Engineering	Room K (607)	17:00~17:30
Division of Energy and Environment	Room D (302)	13:30~14:00
Division of Thermodynamics	Room A (Convention Hall II)	16:50~17:20
Division of Fluidization	Room G (603)	16:20~16:50
Division of Transport Phenomena	Room I (605)	16:20~16:50
Division of Materials	Room L (600A)	16:50~17:20
Division of Catalysis and Reaction Engineering	Room M (600B)	17:00~17:30
Division of Processe Safety	Room H (604)	17:20~17:30

# Facility Introduction by CECO

6F



3F



- Plenary Talk·General Assembly: Room A(3F Convention Hall II), Reception(3F Convention Hall I)
- Pre/Onsite Registration, Baggage Depository: 3F Lobby
- Symposium-Oral Presentation: Room A~D(3F), Room E~M(6F)
- Poster Posting, Coffee Lounge, Closing Ceremony, Promotion & Exhibition, Internet Lounge: 3F Exhibition Hall 1
- VIP Lounge: 3F
- Speaker Lounge: 3F Entrance to the Exhibition Hall 1

*\* Free wireless access at the convention center*

# 2018 Chem-Tech-Biz Symposium: Successful commercialization case and its process of domestic research and development for chemical catalyst

Co-host: Industry-Academia-Government Partnership Committee,  
Division of Catalysis and Reaction Engineering

CECO Room B(Convention Hall III)

April 26(Thu.) 2018, 14:00~17:40

Chairman: **Woo Kyoung Kim**, Yeungnam Univ.  
**Eun Woo Shin**, Univ. of Ulsan

14:00	<b>[Keynote Lecture]</b> Commercialization of high value added innovative catalyst and process development	<b>Junguk Choi</b> , LG Chemical
14:30	Hydrocarbon management in SK innovation	<b>Seung Hoon Oh</b> , SK Innovation
15:00	Naphtha catalytic cracking for production of light olefins	<b>Yong-Ki Park</b> , KRICT
15:30	Development and commercialization of propane dehydrogenation catalyst	<b>Young Gyo Choi</b> , Hyosung
16:00	Coffee break	
16:10	Dehydrogenation of C3~C13 paraffins over Pt-Sn/Alumina catalyst	<b>Young San Yoo</b> , HEESUNG CATALYSTS CORP.
16:40	KIER SponCat technology for Fischer-Tropsch synthesis and its potential application	<b>Dong Hyun Chun</b> , KIER
17:10	Commercialization process and field applications of environmental catalyst	<b>Heakyung Park</b> , Hanseo Univ.

## Speaker



**Junguk Choi**  
LG Chemical



**Seung Hoon Oh**  
SK Innovation



**Yong-Ki Park**  
KRICT



**Young Gyo Choi**  
Hyosung



**Young San Yoo**  
HEESUNG CATALYSTS  
CORP.



**Dong Hyun Chun**  
KIER



**Heakyung Park**  
Hanseo Univ.



**Oh Shim Joo**  
KIST

## Organizer/Speaker

## Organizer

## Chairman



**Woo Kyoung Kim**  
Yeungnam Univ.



**Eun Woo Shin**  
Univ. of Ulsan



# Symposium on polymeric materials for next generation energy technology

Host: Division of Polymer

CECO Room C(301)

April 26(Thu.) 2018, 14:00~17:30

Chairman: **Pil Jin Yoo**, SKKU

- |       |  |                                     |
|-------|--|-------------------------------------|
| 14:00 | Advanced materials and devices for the flexible perovskite photovoltaics on polymer substrates           | <b>Min Jae Ko</b> , Hanyang Univ.   |
| 14:25 | Development of polymer donors and small-molecule acceptors for high-efficiency organic solar cells       | <b>In Hwan Jung</b> , Kookmin Univ. |
| 14:50 | Form factor-free, printed rechargeable power sources   | <b>Sang-Young Lee</b> , UNIST       |
| 15:15 | Interlocking interfaces: Bi-layered membrane for polymer electrolyte fuel cells and redox flow batteries | <b>Hee-Tak Kim</b> , KAIST          |

Chairman: **Felix Sunjoo Kim**, Chung-Ang Univ.

- |       |  |                                     |
|-------|--|-------------------------------------|
| 15:50 | Conjugated polymer films for flexible thermoelectric generator                               | <b>Eunkyoung Kim</b> , Yonsei Univ. |
| 16:15 | Flexible thermoelectric generators using organic materials by printing process               | <b>Song Yun Cho</b> , KRICT         |
| 16:40 | Rational design of nanocarbon materials for enhanced thermoelectric performance              | <b>Heesuk Kim</b> , KIST            |
| 17:05 | Triboelectric nanogenerators based on multifunctional materials for self-powered electronics | <b>Sang-Woo Kim</b> , SKKU          |

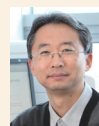
## Speaker



**Min Jae Ko**  
Hanyang Univ.



**In Hwan Jung**  
Kookmin Univ.



**Sang-Young Lee**  
UNIST



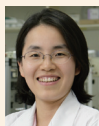
**Hee-Tak Kim**  
KAIST



**Eunkyoung Kim**  
Yonsei Univ.



**Song Yun Cho**  
KRICT



**Heesuk Kim**  
KIST



**Sang-Woo Kim**  
SKKU

## Organizer/Chairman



**Pil Jin Yoo**  
SKKU



**Felix Sunjoo Kim**  
Chung-Ang Univ.

# Electrochemical and chemical storage of renewable energy symposium

Host: Division of Energy and Environment

CECO Room D(302)

April 26(Thu.) 2018, 14:00~17:40

Chairman: **Moon Sang Jung**, Chungbuk Nat'l Univ.

- |       |  |                                   |
|-------|--|-----------------------------------|
| 14:00 | Designing redox-stable cobalt-polypyridyl complexes for redox flow batteries                 | <b>Hye Ryung Byon</b> , KAIST     |
| 14:30 | Development of vanadium redox flow battery electrodes for large scale energy storage systems | <b>Hansung Kim</b> , Yonsei Univ. |
| 15:00 | Performance enhancement of felt electrode and electrolyte in vanadium redox flow batteries   | <b>Jung Hoon Yang</b> , KIER      |
| 15:30 | Coffee break   |                                   |

Chairman: **Jun Young Kim**, Kolon Industry

- |       |  |                                       |
|-------|--|---------------------------------------|
| 15:40 | d-orbital manifold controlled electrocatalyst for solar fuel   | <b>Ki Tae Nam</b> , Seoul Nat'l Univ. |
| 16:10 | Small molecules for hydrogen based energy storage systems( $H_2$ -ESS)                                     | <b>Chang Won Yoon</b> , KIST          |
| 16:40 | Atomically thin graphene oxide encapsulation of Mg nanocrystals for safe and high density hydrogen storage | <b>Eun Seon Cho</b> , KAIST           |
| 17:10 | Hydrogen production from ammonia via complete electrolytic process   | <b>Jaeyoung Lee</b> , GIST            |

## Speaker



**Hye Ryung Byon**  
KAIST



**Hansung Kim**  
Yonsei Univ.



**Jung Hoon Yang**  
KIER



**Ki Tae Nam**  
Seoul Nat'l Univ.



**Chang Won Yoon**  
KIST

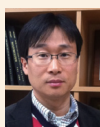


**Eun Seon Cho**  
KAIST

## Chairman



**Jaeyoung Lee**  
GIST



**Moon Sang Jung**  
Chungbuk Nat'l Univ.



**Jun Young Kim**  
Kolon Industry

## Organizer



**Hee-Tak Kim**  
KAIST



**Young-Kwon Park**  
Univ. of Seoul



**Tak Hyoung Lim**  
KIER

# Symposium on direct non-oxidative conversion of methane

Co-host: KICHe, SK Innovation, C1 Gas Refinery R&D Center  
Support: SK Innovation

CECO Room A(Convention Hall II)

April 27(Fri.) 2018, 09:00~12:00

Chairman: **Hyunjoo Lee**, KAIST

09:00 Industrial perspectives on methane conversion technology

**Seung Hoon Oh**, SK Innovation

09:30 Non-oxidative conversion of methane for production of  
olefins and aromatics

**Yong Tae Kim**, KRICT

10:00 Direct catalytic methane conversion into ethylene

**Minkee Choi**, KAIST

10:30 Membrane separation technology for recovery of high-purity  
olefin

**Jeong-Hoon Kim**, KRICT

11:00 Aromatization of methane over metal-loaded zeolites

**Do Heui Kim**, Seoul Nat'l Univ.

11:30 Valuable hydrocarbons from methane via catalytic &  
noncatalytic ways

**Kyoung-Su Ha**, Sogang Univ.

## Speaker



**Seung Hoon Oh**  
SK Innovation



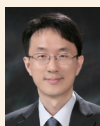
**Yong Tae Kim**  
KRICT



**Minkee Choi**  
KAIST



**Jeong-Hoon Kim**  
KRICT



**Do Heui Kim**  
Seoul Nat'l Univ.



**Kyoung-Su Ha**  
Sogang Univ.

## Organizer/Chairman



**Hyunjoon Lee**  
KAIST



# Symposium on the functional coatings technology

Co-host: Division of Industrial Chemistry, Division of Transport Phenomena

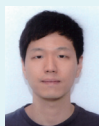
CECO Room I(605)

April 26(Thu.) 2018, 08:30~11:00

Chairman: **Kyung Hyun Ahn**, Seoul Nat'l Univ.

- |       |   |  |
|-------|---|--|
| 08:30 | Thermal capillary flow in a liquid film coated on a substrate with a geometric pattern  | <b>Jaehyun Yoo</b> , Seoul Nat'l Univ.         |
| 08:50 | Effect of latex binder on the microstructure and adhesion properties of battery slurry based on capillary suspensions                                     | <b>Ji Eun Park</b> , Seoul Nat'l Univ.         |
| 09:10 | Application of image analysis in coating process  | <b>Dong Jae Kim</b> , SKKU                     |
|       |   | Chairman: <b>Ki Chang Song</b> , Konyang Univ. |
| 09:40 | <b>[Keynote Lecture]</b> Coating materials for next generation display  | <b>Young Rae Jang</b> , LG Chemical            |
| 10:00 | Influence of material properties on scratch-healing performance of polyacrylate-graft-polyurethane network that undergo thermally reversible crosslinking | <b>Jin Chul Kim</b> , KRICT                    |
| 10:20 | Eco-friendly surface treatment agent for cold-rolled steel sheet  | <b>Byoung Hwa Lee</b> , Daeheung Chemical      |
| 10:40 | UV curable functional coatings using polysilazane   | <b>Ki Chang Song</b> , Konyang Univ.           |

## Speaker



**Jaehyun Yoo**  
Seoul Nat'l Univ.



**Ji Eun Park**  
Seoul Nat'l Univ.



**Dong Jae Kim**  
SKKU



**Young Rae Jang**  
LG Chemical



**Jin Chul Kim**  
KRICT



**Byoung Hwa Lee**  
Daeheung Chemical

## Organizer/Chairman/Speaker



**Ki Chang Song**  
Konyang Univ.



**Kyung Hyun Ahn**  
Seoul Nat'l Univ.

## Organizer/Chairman

# Symposium on applications of molecular simulation in new and renewable energy fields

Co-host: Division of Separation Technology, Division of Thermodynamics

CECO Room A(Convention Hall II)

April 26(Thu.) 2018, 14:00~16:50

Chairman: **Sang Kyu Kwak**, UNIST

- |       |   |  |
|-------|---|--|
| 14:00 | DFT-thermodynamics guided nanomaterials design for highefficiency light energy conversion and advances in manufacturing economy   | <b>Heechae Choi</b> , Virtual Lab Inc.       |
| 14:30 | High performance computing for nanomaterials and artificial intelligence driven materials data platform                           | <b>Min Sun Yeom</b> , KISTI                  |
| 15:00 | Computational materials design for energy and environmental applications  | <b>Ki Chul Kim</b> , Konkuk Univ.            |
| 15:30 | Coffee break  |  |
| 15:50 | Fuel cell technology and molecular modeling   | <b>Chi Hoon Park</b> , GNTech                |
| 16:20 | Development of a general evaluation metric for rapid screening of adsorbent materials for post-combustion CO <sub>2</sub> capture | <b>Yongchul G. Chung</b> , Pusan Nat'l Univ. |

## Speaker



**Heechae Choi**  
Virtual Lab Inc.



**Min Sun Yeom**  
KISTI



**Ki Chul Kim**  
Konkuk Univ.



**Chi Hoon Park**  
GNTech



**Yongchul G. Chung**  
Pusan Nat'l Univ.

## Organizer



**Yongwon Seo**  
UNIST



**Hun Yong Shin**  
Seoul Nat'l Univ. of Sci. Tech.

## Chairman



**Sang Kyu Kwak**  
UNIST

# Symposium on separation technologies for C1 chemistry

Host: Division of Separation Technology

CECO Room F(602)

April 26(Thu.) 2018, 14:00~17:10

Chairman: **Jung-Hyun Lee**, Korea Univ.

14:00	C1 gas separation technology for utilization of carbon resources	<b>Jeong-Hoon Kim</b> , KRICT
14:25	Enabling molecular sieving behaviors of advanced membranes for efficient C1 separations	<b>Jong Suk Lee</b> , Sogang Univ.
14:50	Development of the adsorbent for CO from the off-gases of the Steel Works	<b>Dong Jun Koh</b> , RISTI
15:15	Microstructural optimization of carbon molecular sieve membrane for gas separations	<b>Pyung Soo Lee</b> , Chung-Ang Univ.
15:40	Coffee break	
15:55	Opportunities in Iran's natural gas industry and challenges in natural gas sweetening process	<b>Masoud Mofarahi</b> , Persian Gulf Univ.
16:20	Evaluating performance limits of methane storage /separations of porous materials using artificial neural network	<b>Jihan Kim</b> , KAIST
16:45	PEG-containing surface-attached polymeric separation membranes for carbon dioxide separation	<b>Bong Jun Chang</b> , KRICT

## Speaker



**Jeong-Hoon Kim**  
KRICT



**Pyung Soo Lee**  
Chung-Ang Univ.



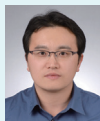
**Bong Jun Chang**  
KRICT



**Jong Suk Lee**  
Sogang Univ.



**Masoud Mofarahi**  
Persian Gulf Univ.



**Jung-Hyun Lee**  
Korea Univ.



**Dong Jun Koh**  
RISTI



**Jihan Kim**  
KAIST



**Jong Hak Kim**  
Yonsei Univ.

## Organizer/Chairman

## Organizer



# Intelligent safety software in the era of Industry 4.0 symposium

Host: Division of Process Systems Engineering

Support: MUSST

CECO Room H(604)

April 26(Thu.) 2018, 14:00~17:20

Chairmen: **Keun Won Lee**, KOSHA

**Wonhee Cho**, Samsung Engineering

14:00	Opening remarks	<b>Dongil Shin</b> , Chair of KICHe Safety Division
14:10	DNV GL's plant ecosystem to prepare for Industry 4.0	<b>Ky Soo Kim</b> , DNV GL
14:40	Safety enhancement by integrated alarm and operation managemen	<b>JinKyu Yoon</b> , Honeywell Korea
15:10	Risk assessment and artificial intelligence	<b>Soo Hyoung Choi</b> , Chonbuk Nat'l Univ.
15:40	Coffee break	
15:50	Research related to safety software and Industry 4.0 and application tools	<b>Jongmin Kim</b> , UIT Inc.
16:20	Performance standards for safety critical elements and a guide to industrial applications	<b>Wonhee Cho</b> , Samsung Engineering
16:50	Intelligent safety technology and safety systems in the era of Industry 4.0	<b>Dongil Shin</b> , Myongji Univ.

## Speaker



**Ky Soo Kim**  
DNV GL



**JinKyu Yoon**  
Honeywell Korea



**Soo Hyoung Choi**  
Chonbuk Nat'l Univ.



**Jongmin Kim**  
UIT Inc.



## Organizer/Chairman/Speaker

**Wonhee Cho**  
Samsung Engineering



## Organizer/Speaker

**Dongil Shin**  
Myongji Univ.

## Chairman



**Keun Won Lee**  
KOSHA

# Symposium on the innovation and future of *in vitro* diagnostic chip

Host: Division of Biochemical Engineering  
Support: CELAGNOSYS

CECO Room K(607)

April 26(Thu.) 2018, 14:00~17:00

Chairman: **Shin Sik Choi**, Myongji Univ.

- |       |   |  |
|-------|---|--|
| 14:00 | <b>[Keynote Lecture]</b> Development of liquid biopsy technology for precision medicine           | <b>Sehyun Shin</b> , Korea Univ.                   |
| 14:40 | Biochip for selective isolation of heterogenic circulating tumor cell using magnetic nanoparticle | <b>Bong Seop Kwak</b> , KIMM                       |
| 15:10 | Coffee break  |  |
| 15:30 | <i>In vitro</i> diagnosis market trend and biochip based diagnostic test                          | <b>Jae-Ho Lee</b> , Boditech Med Inc.              |
| 16:00 | Surface engineered nanocrystals for lateral flow assay  | <b>Jongnam Park</b> , UNIST                        |
| 16:30 | C. elegans-on-a-chip for diagnosis and detection  | <b>Shin Sik Choi</b> ,<br>Myongji Univ./CELAGNOSYS |

## Speaker



**Sehyun Shin**  
Korea Univ.



**Bong Seop Kwak**  
KIMM



**Jae-Ho Lee**  
Boditech Med Inc.

## Organizer/Chairman/Speaker



**Jongnam Park**  
UNIST



**Shin Sik Choi**  
Myongji Univ./CELAGNOSYS

# International symposium on the fluidized beds and multi-phase flow reactors

Co-host: Division of Fluidization, SKKU Institute of Convergent Chemical Engineering and Technology,  
Forum of Multi-phase Flow Reactor Technology

CECO Room F(602)

April 27(Fri.) 2018, 09:30~12:00

Chairman: **Myeongwon Seo**, KIER

- |       |   |  |
|-------|---|--|
| 09:30 | Analysis of interfacial mass transfer rate in microchannels   | <b>Ken-Ichiro Sotowa</b> , Tokushima Univ. |
| 10:00 | Ethanol synthesis from syngas via DME carbonylation:<br>Catalysts and fluidized-bed reactor application | <b>Jong Wook Bae</b> , SKKU                |
| 10:30 | Global industrialized strategy from R&D for Hwajin<br>Cosmetics   | <b>Jeageun Lee</b> , Hwajin Cosmetics      |
| 11:00 | Thermochemical conversion technology using<br>liquid metal  | <b>Uendo Lee</b> , KITECH                  |
| 11:30 | Ceremony in honor of professor Jea-Keun Lee   |  |

## Speaker



**Ken-Ichiro Sotowa**  
Tokushima Univ.



**Jong Wook Bae**  
SKKU



**Jeageun Lee**  
Hwajin Cosmetics



**Uendo Lee**  
KITECH



**Dong Hyun Lee**  
SKKU



## Chairman

**Myeongwon Seo**  
KIER

## Organizer



# Symposium on applications of fine particles in energy and environment

Host: Division of Fine Particles Technology

CECO Room J(606)

April 27(Fri.) 2018, 09:00~11:30

Chairman: **Jung Hyeun Kim**, Univ. of Seoul

- |       |   |   |
|-------|---|---|
| 09:00 | Nano composite fabrication for saving energy by dry ball milling process                                    | <b>Heekyu Choi</b> , Changwon Nat'l Univ. |
| 09:30 | Conductive unwoven filter with low pressure drop and high removal efficiency for fine particulate pollutant | <b>Hyemoon Lee</b> , Alink Ltd.           |
| 10:00 | Removal of tar(aerosols) by activated carbon in staged gasification processes                               | <b>Joosik Kim</b> , Univ. of Seoul        |
| 10:30 | Particulate matter emissions and advanced high-efficiency LPG engine development                            | <b>Junghwan Kim</b> , Chung-Ang Univ.     |
| 11:00 | Synthesis of 2D/3D graphene based composites by aerosol process for energy materials                        | <b>Eunhee Cho</b> , Polypia               |

## Speaker



**Heekyu Choi**  
Changwon Nat'l Univ.



**Hyemoon Lee**  
Alink Ltd.



**Joosik Kim**  
Univ. of Seoul



**Junghwan Kim**  
Chung-Ang Univ.



**Eunhee Cho**  
Polypia



## Organizer/Chairman

**Jung Hyeun Kim**  
Univ. of Seoul

# Symposium on fine dust reducing technology and material

Host: Division of Materials

CECO Room L(600A)

April 27(Fri.) 2018, 09:00~12:00

Chairman: **Yeon Ho Im**, Chonbuk Nat'l Univ.

**Chang Won Yoon**, KIST

09:00	Introduction to measurement methods of atmospheric precursor gases and fine particle and their tracking method	<b>Jinsang Jung</b> , KRISS
09:30	Deactivation of CHA based urea/SCR catalyst in automotive exhaust	<b>Iljeong Heo</b> , KRICT
10:00	Catalytic technology for abatement of diesel particulate matter	<b>Sung June Cho</b> , Chonnam Nat'l Univ.
10:30	Coffee break	
10:50	Applications of plasma technology to reduce fine dust	<b>Dae Hoon Lee</b> , KIMM/UST
11:20	Reversible absorption media for the removal of SO <sub>2</sub> from flue gas	<b>Hyun Joo Lee</b> , KIST/UST

## Speaker



**Jinsang Jung**  
KRISS



**Iljeong Heo**  
KRICT



**Sung June Cho**,  
Chonnam Nat'l Univ.



**Dae Hoon Lee**  
KIMM/UST



**Hyun Joo Lee**  
KIST/UST

## Organizer/Chairman



**Yeon Ho Im**  
Chonbuk Nat'l Univ.



**Chang Won Yoon**  
KIST

## Organizer



**Won Gyu Lee**  
Kangwon Nat'l Univ.

# Frontiers in next-generation catalysis symposium

Co-host: Division of Catalysis and Reaction Engineering, UNIST Next-Generation Catalysis Center

CECO Room M(600B)

April 27(Fri.) 2018, 09:10~15:40

Chairman: **Ja Hun Kwak**, UNIST

09:10	Opening remarks	<b>Jae Sung Lee</b> , UNIST
09:15	<b>[Keynote Lecture]</b> Solar hydrogen: Current status and prospect	<b>Jae Sung Lee</b> , UNIST
09:55	Optimization of photoelectrochemical cells for solar water splitting	<b>Jong Hyeok Park</b> , Yonsei Univ.
10:25	Coffee break	

Chairman: **Ji-Wook Jang**, UNIST

10:40	<b>[Keynote Lecture]</b> Photofunctional catalysts for solar energy utilization and conversion	<b>Wonyong Choi</b> , POSTECH
11:20	Power-to-chemicals catalyst for selective conversion	<b>Yun Jeong Hwang</b> , KIST
11:50	Lunch	

Chairman: **Kwangjin An**, UNIST

13:30	<b>[Keynote Lecture]</b> Next-generation electrocatalyst design for energy devices	<b>Yung-Eun Sung</b> , Seoul Nat'l Univ.
14:10	Balancing activity, stability and conductivity of nanoporous core-shell iridium/iridium oxide oxygen evolution catalysts	<b>Yongtae Kim</b> , Pusan Nat'l Univ.
14:40	DFT-based design of nano alloy catalysts: Surface d orbital occupancy and lattice strain engineering	<b>Hyung Chul Ham</b> , KIST
15:10	Catalyzing renewable energy conversion reactions by non-precious metal M-N/C catalysts	<b>Sang Hoon Joo</b> , UNIST

## Speaker



**Jong Hyeok Park**  
Yonsei Univ.



**Wonyong Choi**  
POSTECH



**Yun Jeong Hwang**  
KIST



**Yung-Eun Sung**  
Seoul Nat'l Univ.



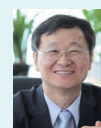
**Yongtae Kim**  
Pusan Nat'l Univ.



**Hyung Chul Ham**  
KIST



**Sang Hoon Joo**  
UNIST



**Jae Sung Lee**  
UNIST

## Organizer/Speaker

## Chairman



**Ja Hun Kwak**  
UNIST



**Ji-Wook Jang**  
UNIST



**Kwangjin An**  
UNIST

# KICHe young investigators symposium I

CECO Room C(301)

April 27(Fri.) 2018, 09:00~11:40

Chairman: **Seung Hyun Hur**, Univ. of Ulsan

## [Polymer]

- 09:00 Study of solution-processed organic light-emitting diodes(OLEDs) **Taeshik Earmme**, Hongik Univ.
- 09:20 Engineered core/shell quantum dots for injection laser diodes **Jaehoon Lim**, Ajou Univ.
- 09:40 Small scale interface and surface engineering **Sanghyuk Wooh**, Chung-Ang Univ.
- 10:00 Coffee break
- 10:20 Site-selective in situ grown calcium carbonate micromodels with tunable geometry, porosity, and wettability **Seung Goo Lee**, Univ. of Ulsan

## [Process Systems Engineering]

- 10:40 Non-aqueous amine CO<sub>2</sub> capture process optimization using machine learning algorithm **Ung Lee**, KIST

## [Separation Technology / Energy and Environment]

- 11:00 Sub-angstrom molecular differentiation using carbon molecular sieve membranes **Dong-Yeun Koh**, KAIST

## [Fluidization]

- 11:20 Thermochemical conversion of biomass wastes into bioenergy and bioproducts **Hyungseok Nam**, KIER

### Speaker



**Taeshik Earmme**  
Hongik Univ.



**Jaehoon Lim**  
Ajou Univ.



**Sanghyuk Wooh**  
Chung-Ang Univ.



**Seung Goo Lee**  
Univ. of Ulsan



**Ung Lee**  
KIST



**Dong-Yeun Koh**  
KAIST



**Hyungseok Nam**  
KIER



### Chairman

**Seung Hyun Hur**  
Univ. of Ulsan

# KICHe young investigators symposium II

CECO Room C(301)

April 27(Fri.) 2018, 14:00~16:00

Chairman: **Jung Min Sohn**, Chonbuk Nat'l Univ.

## [Catalysis and Reaction Engineering]

14:00 Catalytic biomass conversion to fuels &amp; chemicals

**Wonjin Jeon**, KIER

## [Materials]

14:20 Multi-scale simulation framework for solid-liquid interface:  
Applications in energy and environmental systems**Hyung-Kyu Lim**, Kangwon Nat'l Univ.

14:40 Energy storage system for era of smart life

**Inho Nam**, Seoul Women's Univ.15:00 Development of efficient electrocatalysts based on  
Mo-compounds for electrochemical hydrogen production**Duck Hyun Youn**, Kangwon Nat'l Univ.15:20 Intrinsically stretchable healable electronic materials for  
e-skin applications**Jin Young Oh**, Kyung Hee Univ.15:40 Exploiting soft matter at interfaces for functional  
materials production**Hyomin Lee**, POSTECH

### Speaker



**Wonjin Jeon**  
KIER



**Hyung-Kyu Lim**  
Kangwon Nat'l Univ.



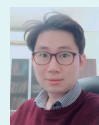
**Inho Nam**  
Seoul Women's Univ.



**Duck Hyun Youn**  
Kangwon Nat'l Univ.



**Jin Young Oh**  
Kyung Hee Univ.



**Hyomin Lee**  
POSTECH

### Organizer



**Young Soo Ko**  
Kongju Nat'l Univ.



**Jin Suk Chung**  
Ulsan of Univ.



### Chairman

**Jung Min Sohn**  
Chonbuk Nat'l Univ.



# Meet the Young Researcher Poster Session

CECO Room D(302)

April 27(Fri.) 2018, 10:00~12:00

- |         |  |   |
|---------|--|---|
| PYRF-1  | Design of FO/crystallization/RO hybrid process for seawater desalination with various operating conditions   | <b>Kiho Park</b> , Korea Univ.            |
| PYRF-2  | Design of steam methane reforming bayonet reactor for hydrogen production from natural gas using CFD model   | <b>Ngo Ich Son</b> , Hankyong Nat'l Univ. |
| PYRF-3  | Investigation on combustion characteristics of sewage sludge solid fuel using lab-scale fluidized bed reactor  | <b>Hyungjun Ahn</b> , KITECH              |
| PYRF-4  | Separation techniques for the production of high-purity hydrogen: development of sorption-enhanced reaction processes and hydrogen selective metal membranes | <b>Chan Hyun Lee</b> , KIST               |
| PYRF-5  | Improvement of Xe/Kr separation performance by functionalization of Zr-based MOF ligand  | <b>Seung-Joon Lee</b> , Yonsei Univ.      |
| PYRF-6  | CO <sub>2</sub> upcycling by mineralization of a carbonate-based cementation material  | <b>Hyuk Min Kweon</b> , UCLA              |
| PYRF-7  | Synthesis of gold nanoparticle stabilized by self-assembled tyrosine-rich peptide for redox catalysts  | <b>Namhun Lee</b> , Kangwon Nat'l Univ.   |
| PYRF-8  | Catalytic hydrogenation of a novel liquid organic hydrogen carrier: Eutectic mixture of biphenyl and diphenylmethane   | <b>Young Suk Jo</b> , KIST                |
| PYRF-9  | Electrochemical CO <sub>2</sub> reduction to formate via oxygen bidentate intermediate on high-index planes of dendritic Bi catalyst                         | <b>Da Hye Won</b> , KIST                  |
| PYRF-10 | Mechanistic study of glycerol dehydration and development of a high-efficient catalyst for acrolein production   | <b>Danim Yun</b> , Seoul Nat'l Univ.      |

## Speaker



**Kiho Park**  
Korea Univ.



**Chan Hyun Lee**  
KIST



**Nam Hoon Lee**  
Kangwon Nat'l Univ.



**Danim Yun**  
Seoul Nat'l Univ.



**Ngo Ich Son**  
Hankyong Nat'l Univ.



**Seung-Joon Lee**  
Yonsei Univ.



**Young Suk Jo**  
KIST



**Ki Bong Lee**  
Korea Univ.



**Hyungjun Ahn**  
KITECH



**Hyuk Min Kweon**  
UCLA



**Da Hye Won**  
KIST

## Organizer

# Meet the Young Researcher Poster Session

CECO Room D(302)

April 27(Fri.) 2018, 10:00~12:00

- |         |   |   |
|---------|---|---|
| PYRF-11 | Development of catalysts for the production of value-added chemicals from biomass-derived material              | <b>Yang Sik Yun</b> , Seoul Nat'l Univ. |
| PYRF-12 | Triglyceride hydroconversion into biojet fuel   | <b>Myoung Yeob Kim</b> , KAIST          |
| PYRF-13 | Highly thermal conductive metal-ceramic core-shell microstructure as catalyst materials                         | <b>Jieun Kim</b> , Ajou Univ.           |
| PYRF-14 | On the use of cooling microchannel for preventing thermal runaways in power battery systems                     | <b>Krishnadas</b> , Chung-Ang Univ.     |
| PYRF-15 | Electrochemical evidence for two sub-families of FeNxCy moieties with concentration-dependent cyanide poisoning | <b>Min Wook Chung</b> , GIST            |
| PYRF-16 | Colloidal growth and self-assembled structures of semiconductor nanorods  | <b>Dahin Kim</b> , KAIST                |
| PYRF-17 | Carrier dynamics in assembled anisotropic semiconductor nanocrystals  | <b>Whidong Kim</b> , KAIST              |
| PYRF-18 | Bioengineered mussel protein-based functional adhesive platform for dental implant applications                 | <b>Yun Kee Jo</b> , POSTECH             |
| PYRF-19 | Development and application of underwater tissue adhesive using coacervated mussel adhesive protein             | <b>Hyo Jeong Kim</b> , POSTECH          |
| PYRF-20 | Modifier adaptation for optimizing chemical and biological processes under model-plant mismatch                 | <b>Dong Hwi Jeong</b> , Korea Univ.     |

## Speaker



**Yang Sik Yun**  
Seoul Nat'l Univ.



**Krishnadas**  
Chung-Ang Univ.



**Whidong Kim**  
KAIST



**Dong Hwi Jeong**  
Korea Univ.



**Myoung Yeob Kim**  
KAIST



**Min Wook Chung**  
GIST



**Yun Kee Jo**  
POSTECH



**Ki Bong Lee**  
Korea Univ.



**Jieun Kim**  
Ajou Univ.



**Dahin Kim**  
KAIST



**Hyo Jeong Kim**  
POSTECH

## Organizer



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