

The 4<sup>th</sup> International Conference on Active Materials and Soft Mechatronics

# AMSM2019

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## Program Information

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- ▶ Conference
  - Topics
  - Plenary/ Keynote/ Invited Lectures
  - Session Timetable
  - Technical Program
- ▶ Future Scientist Forum
  - Session Timetable
  - Technical Program

## Program at a Glance

October 16, 2019					
16:00~19:00	Registration (Sheraton Grand Incheon Hotel Lobby, 1F)				
18:00~20:00	Welcome Reception (Invitation Only)				
October 17, 2019					
07:30~	Registration (Grand Ballroom Foyer, 3F)				
08:30~08:45	Opening Ceremony (Grand Ballroom, 3F)				
08:45~09:30	Plenary Lecture 1 (Grand Ballroom, 3F) Zhong Lin Wang (Georgia Institute of Technology)				
09:30~10:15	Plenary Lecture 2 (Grand Ballroom, 3F) Jonh Rogers (Northwestern University)				
10:15~10:25	Group Photo (Grand Ballroom, 3F)				
10:25~10:40	Break (Grand Ballroom, 3F)				
Symposium	Soft Sensors, Actuators and Robotics	Advanced Energy Technology	Functional Materials and Structures	Space Technology	Future Scientist Forum
Room	<b>Ballroom 1</b>	<b>Ballroom 2</b>	<b>Lotus 1</b>	<b>Lotus 5</b>	<b>Lotus 2</b>
10:40~12:30 (110 min)	<b>[ThA1] Ionic Soft Actuators</b>	<b>[ThA2] Thermoelectric Materials and Devices</b>	<b>[ThA3] Soft &amp; Wearable Electronics I</b>	<b>[ThA4] Space Materials I</b>	<b>[ThA5] FSF 1: Soft Sensors, Actuators &amp; Robotics</b>
12:30~13:30	Lunch				
13:30~15:35 (125 min)	<b>[ThB1] Artificial Muscles</b>	<b>[ThB2] Triboelectric Nanogenerator</b>	<b>[ThB3] Functional Composites &amp; Structures I</b>	<b>[ThB4] Honorary Session for Seung-Bok Choi</b>	<b>[ThB5] FSF 2: Soft Sensors, Actuators &amp; Robotics</b>
15:35~15:50	Break				
15:50~18:05 (135 min)	<b>[ThC1] Polymer Actuators</b>	<b>[ThC2] Piezoelectric Energy Harvesting</b>	<b>[ThC3] Soft &amp; Wearable Electronics II</b>	<b>[ThC4] Space Materials II</b>	<b>[ThC5] FSF 3: KIST Activities (Special Session)</b>
18:05~18:20	Break				
18:20~20:30	Poster Session & Standing Buffet (2F Lobby)				

October 18, 2019					
07:30~	Registration (Grand Ballroom Foyer, 3F)				
Symposium	Soft Sensors, Actuators and Robotics	Advanced Energy Technology	Functional Materials and Structures	Space Technology	Future Scientist Forum
Room	<b>Ballroom 1</b>	<b>Ballroom 2</b>	<b>Lotus 1</b>	<b>Lotus 5</b>	<b>Lotus 2</b>
8:10~10:25 (135 min)	[FrA1] New Actuators and Applications	[FrA2] Solar Energy Harvesting	[FrA3] Functional Composites & Structures II	[FrA4] Space Mission	[FrA5] FSF 4: Functional Materials and Structures
10:25~10:40	Break				
10:40~12:10 (90 min)	[FrB1] Soft Robotics	[FrB2] Energy Harvesting Systems and Applications I	[FrB3] 1D and 2D Nanomaterials I	[FrB4] Space Robotics	[FrB5] FSF 5: Functional Materials and Structures
12:10~13:10	Lunch				
13:10~14:35 (85 min)	[FrC1] Soft Sensors and Electronics I	[FrC2] Energy Harvesting Systems and Applications II	[FrC3] Hydrogel & Ionic Gels	[FrC4] Issue on Fine Dust	[FrC5] FSF 6: Advanced Energy Technology
14:35~14:50	Break				
14:50~16:45 (115 min)	[FrD1] Soft Sensors and Electronics II	[FrD2] Energy Storage Materials and Devices	[FrD3] Acoustic Metamaterials & Phononic Crystals	[FrD4] Space Medicine	[FrD5] FSF 7: Advanced Energy Technology
16:45~17:50	Break				
17:50~18:35	Plenary Lecture 3 (Grand Ballroom, 3F) Zhenan Bao (Stanford University)				
18:35~19:20	Plenary Lecture 4 (Grand Ballroom, 3F) Herbert Shea (EPFL)				
19:20~21:00	Banquet (Grand Ballroom, 3F)				
October 19, 2019					
09:30~	Registration (Sheraton Grand Incheon Hotel Lobby, 1F)				
10:00~18:00	Post Conference Tour				

## Conference

### ■ Topics

#### 1. Symposium on Soft Sensors, Actuators and Robotics

- 1.1. Soft Sensors and Electronics
- 1.2. Soft Actuators and Stimuli-Responsive Polymers
- 1.3. Electro-Active Polymers and Artificial Muscles
- 1.4. Soft Robotics and Mechatronics

#### 2. Symposium on Functional Materials and Structures

- 2.1. CNT, Graphene and 2D Materials
- 2.2. Functional Composites and Structures
- 2.3. Hydrogel and Ionic Gels
- 2.4. Stretchable and Flexible Electronics
- 2.5. Multifunctional Fibers and Textiles
- 2.6. Metamaterials
- 2.7. 3D and 4D Printing

#### 3. Symposium on Advanced Energy Technology

- 3.1. Triboelectric Nanogenerators
- 3.2. Piezoelectric Energy Harvesters
- 3.3. Thermoelectric Materials and Devices
- 3.4. Solar Energy Harvesters
- 3.5. Energy Harvesting Systems and Their Applications
- 3.6. Energy Storage Materials and Devices

#### 4. Symposium on Space Technology

- 4.1. Materials and Structures for Space Exploration
- 4.2. Space Mission
- 4.3. Space Robotics
- 4.4. Issues on Fine Dust
- 4.5. Space Medicine

#### 5. Honorary Sessions

- 5.1. Seung-Bok Choi

## ■ Plenary/Keynote/Invited Lectures

### □ Plenary Speakers

October 17, Grand Ballroom



**“Maxwell’s Displacement Current Governed Triboelectric Nanogenerator for Self-powered Systems and Blue Energy”**

Zhong Lin Wang  
Georgia Institute of Technology  
USA



**“Soft Electronic and Microfluidic Systems for the Skin”**

John Rogers  
Northwestern University  
USA

October 18, Grand Ballroom



**“Skin-Inspired Organic Electronics”**

Zhenan Bao  
Stanford University  
USA



**“Elastomer-Based Actuators for Wearable Haptics and Soft Robotics”**

Herbert Shea  
EPFL, STI IMT LMST  
Switzerland

### 1. Symposium on Soft Sensors, Actuators and Robotics

#### □ Keynote Speakers

- Prof. Hani E. Naguib, University of Toronto, Canada
- Prof. Hidenori Okuzaki, University of Yamanashi, Japan
- Prof. Sang-Youn Kim, Korea University of Technology and Education, Korea
- Prof. Christoph Keplinger, University of Colorado Boulder, United States
- Prof. Jee-Hwan Ryu, KAIST, Korea
- Prof. Inkyu Park, KAIST, Korea
- Prof. Frédéric Vidal, University of Cergy-Pontoise, France
- Dr. Kinji Asaka, AIST, Japan
- Dr. Edwin W.H. Jager, Linköping University, Sweden
- Prof. Hyacinthe Randriamahazaka, University de Paris, France
- Prof. Wei Chen, The Hong Kong Polytechnic University, Hong Kong
- Prof. Kwang J. Kim, University of Nevada, Las Vegas, United States
- Prof. Kean C Aw, University of Auckland, New Zealand
- Prof. Ki-Uk Kyung, KAIST, Korea

#### □ Invited Speakers

- Prof. Dongwon Yun, DGIST, Korea
- Prof. Hugo Rodrigue, Sungkyunkwan University, Korea
- Prof. Kentaro Takagi, Nagoya University, Japan
- Dr. Choon-Gi Choi, ETRI, Korea
- Prof. Joon Hak Oh, Seoul National University, Korea
- Prof. Steve Park, KAIST, Korea
- Prof. Myung-Gil Kim, Chung-Ang University, Korea
- Prof. Changhyun Pang, Sungkyunkwan University, Korea
- Prof. Moon Jeong Park, Pohang Univ. Sci. & Tech., Korea
- Dr. Takushi Sugino, AIST, Japan

## 2. Symposium on Functional Materials and Structures

### □ Keynote Speakers

- Dr. Ronan Hinchet, EPFL, Switzerland
- Dr. Fabrice Domingues Dos Santos, Arkema - Piezotech, France
- Prof. Han Gi Chae, UNIST, Korea
- Prof. Jianfeng Zang, Huazhong University of Science and Technology, China
- Prof. Tae-Woo Lee, Seoul National University, Korea
- Prof. Seung-Hwan Chang, Chung-Ang University, Korea
- Dr. Zoubeida Ounaies, The Pennsylvania State University, United States
- Prof. Woong-Ryeol Yu, Seoul National University, Korea
- Prof. Hyunhyub Ko, Ulsan National Institute of Science and Technology, Korea
- Prof. Dae-Hyeong Kim, Seoul National University, Korea

### □ Invited Speakers

- Prof. Sunghan Kim, Chung-Ang University, Korea
- Prof. Seung-Mo Lee, Korea Institute of Machinery & Materials, Korea
- Prof. Simon Park, University of Calgary, Canada
- Dr. Chi Won Ahn, National Nanofab Center, KAIST, Korea
- Dr. Bon-Cheol Ku, KIST, Korea
- Prof. Hong Chul Moon, University of Seoul, Korea
- Prof. Youn Soo Kim, Pohang University of Science and Technology, Korea
- Prof. Wonju Jeon, KAIST, Korea
- Prof. Eunho Kim, Chonbuk National University, Korea
- Prof. JooHwan Oh, Ulsan National Institute of Science and Technology, Korea
- Prof. Sunho Jeong, Kyung Hee University, Korea
- Prof. Soong Ju Oh, Korea University, Korea
- Dr. Tae-Wook Kim, Korea Institute of Science and Technology, Korea
- Prof. Do Hwan Kim, Hanyang University, Korea
- Prof. Jung Bin In, Chung-Ang University, Korea
- Dr. Soo Min Kim, KIST, Korea

### 3. Symposium on Advanced Energy Technology

#### □ Keynote Speakers

- Prof. Hanki Kim, Sungkyunkwan University, Korea
- Prof. Jang-Yeon Kwon, Yonsei University, Korea
- Prof. Zong-Hong Lin, National Tsing Hua University, Taiwan
- Prof. Yoon-Hwae Hwang, Pusan National University, Korea
- Prof. Wenzhuo Wu, Purdue University, United States
- Prof. Seok Woo Lee, Nanyang Technological University, Singapore
- Prof. Sang-Jae Kim, Jeju National University, Korea
- Prof. Choongho Yu, Texas A&M University, United States
- Prof. Ya Yang, Beijing Institute of Nanoenergy and Nanosystems, Chinese Academy of Sciences, China
- Prof. Youfan Hu, Peking University, China
- Prof. Chong-Yun Kang, Korea Institute of Science and Technology, Korea
- Prof. Xudong Wang, University of Wisconsin-Madison, United State

#### □ Invited Speakers

- Prof. Ho-Hsiu Chou, National Tsing Hua University, Taiwan
- Prof. Chia-Chih Chang, National Chiao Tung University, Taiwan
- Prof. Jung-Yong Lee, KAIST, Korea
- Prof. Qijun Sun, Beijing Institute of Nanoenergy and Nanosystems, Chinese Academy of Sciences, China
- Prof. Xiangyu Chen, Chinese Academic of Sciences, China
- Dr. Sangtae Kim, KIST, Korea
- Prof. Ikwhang Chang, Wonkwang University, Korea
- Prof. Seung-Ho Yu, Korea University, Korea
- Dr. Seung-Hyub Baek, KIST, Korea
- Prof. Jong-Soo Rhyee, Kyung Hee University, Korea
- Prof. Yong Tae Park, Myongji University, Korea
- Prof. Hani E. Naguib, University of Toronto, Canada
- Prof. Han-Bo-Ram Lee, Incheon National University, Korea
- Dr. Miso Kim, Korea Research Institute of Standards and Science, Korea
- Prof. Chih-Yen Chen, National Sun Yat-sen University (NSYSU), Taiwan



#### 4. Symposium on Space Technology

##### □ Keynote Speakers

- Prof. M. C. Natori, Institute of Space and Astronautical Science (ISAS)/JAXA, Japan
- Dr. Woosub Lee, KIST, Korea
- Prof. Richard A. Britten, Eastern Virginia Medical School, United States
- Prof. Jaehwan Kim, Inha University, Korea

##### □ Invited Speakers

- Dr. Young-Jun Choi, Korea Astronomy and Space Science Institute, Korea
- Prof. Jeong Jae Wie, Inha University, Korea
- Prof. Nobuyuki Hasebe, Waseda University, Japan
- Dr. Hyu-Soung Shin, KICT, Korea
- Dr. Kyunghwa Lee, National Institute of Environmental Research, Korea
- Dr. Larry Sanford, Eastern Virginia Medical School, United States
- Prof. Hargsoon Yoon, Norfolk State University, United States
- Prof. Jung-Ryul Lee, KAIST, Korea
- Prof. Gun Jin Yun, Seoul National University, Korea
- Prof. Nam Seo Goo, Konkuk University, Korea
- Prof. Jae-Hung Han, KAIST, Korea
- Prof. Jaeyoung Kang, Inha University, Korea
- Prof. SangJoon Shin, Seoul National University, Korea

# Program Information

## ■ Session Timetable – Conference

October 16, 2019				
16:00~19:00	Registration (Sheraton Grand Incheon Hotel Lobby, 1F)			
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10:15~10:25	Group Photo (Grand Ballroom, 3F)			
10:25~10:40	Break (Grand Ballroom, 3F)			
Room	Ballroom 1	Ballroom 2	Lotus 1	Lotus 5
	[ThA1]	[ThA2]	[ThA3]	[ThA4]
10:40~12:30 (110 min)	(280) Frederic Vidal Univ.ersité de Cergy-Pontoise	(107) Choongho Yu Texas A&M	(241) Tae-Woo Lee Seoul Nat'l Univ.	(095) Jaehwan Kim Inha Univ.
	(178) Kinji Asaka AIST	(185) Seung-Hyub Baek KIST	(141) Seung-Hwan Chang Chung-Ang Univ.	(287) Jungryul Lee KAIST
	(017) Moon Jeong Park POSTECH	(170) Jong-Soo Rhyee Kyung Hee Univ.	(225) Sunho Jeong Kyung Hee Univ.	(245) Gunjin Yun Seoul Nat'l Univ.
	(215) Qingsong He NUAA	(256) Yong-Tae Park MyongJi Univ.	(188) Soong Ju Oh Korea Univ.	(003) Namseo Goo Konkuk Univ.
	(234) Rassoul Tabassian KAIST	(022) Chungyeon Cho Won Kwang Univ.		(308) Sarath Kumar KAIST
12:30~13:30	Lunch			
	[ThB1]	[ThB2]	[ThB3]	[ThB4]
13:30~15:35 (125 min)	(194) Edwin Jager Linköping Univ.	(182) Ya Yang CAS	(274) Zoubeida Ounaies Penn State Univ.	(237) Jong-Seok Oh Kong Ju Nat'l Univ.
	(018) Hyachinthe Randriamahazaka Univ.ersité de Paris	(021) Youfan Fu Peking Univ.	(153) Woong-Ryeol Yu Seoul Nat'l Univ.	(239) Gi-Woo Kim Inha Univ.
	(104) Wei Chen HKPU	(129) Hani Naguib Univ. of Toronto	(218) Tae-Wook Kim KIST	(310) Jung Woo Sohn KNIT
	(261) Takushi Sugino AIST	(173) Dongwhi Choi Kyung Hee Univ.	(206) Dongwon Ka ADD	(281) Yi-He Zhang Inha Univ.
	(097) Yeunhee Kim KIST	(073) Araz Rajabi Abhari KAIST	(140) Jongho Kim KIST	(048) Bo Gyu Kim Inha Univ.
		(152) Ahrum Sohn SKKU	(081) Hiroshi Endo Toyama Prefectural Univ.	(031) Byung-Hyuk Kang Inha Univ.
15:35~15:50	Break			
	[ThC1]	[ThC2]	[ThC3]	[ThC4]
15:50~18:05 (135 min)	(093) Kwang J. Kim Univ. of Nevada, Las Vegas	(186) Chong-yun Kang KIST	(189) Hyunhyub Ko UNIST	(208) Jaeheung Han KAIST
	(015) Kean Aw Univ. of Auckland	(169) Xudong Wang Wisconsin-Madison	(004) Dae-Hyeong Kim Seoul Nat'l Univ.	(006) Jaeyong Kang Inha Univ.
	(317) Ki-Uk Kyung KAIST	(198) Han-bo-ram Lee Incheon Nat'l Univ.	(214) Do Hwan Kim Hanyang Univ.	(288) Sang Joon Shin Seoul Nat'l Univ.
	(092) Maurizio Porfiri New York Univ.	(224) Miso Kim KRISS	(190) Jung Bin In Chung-Ang Univ.	(331) Soong-Keun Hyun Inha Univ.
	(086) Manmatha Mahato KAIST	(192) Chih-Yen Chen NSYSU	(151) Ji-Young Hwang KCTECH	(283) Yunshil Choi KAIST
	(014) Zachary Frank UNLV	(111) Hyun-Chel Song KIST		(277) Jihyung An KAIST
			(264) Taeyun Kang CNU	
18:05~18:20	Break			
18:20~20:30	Poster Session & Standing Buffet (2F Lobby)			

The 4<sup>th</sup> International Conference on Active Materials and Soft Mechatronics (AMSM2019)

October 16-19, 2019, Sheraton Grand Incheon Hotel, Incheon, Republic of Korea

October 18, 2019				
07:30~	Registration (Grand Ballroom Foyer, 3F)			
Room	Ballroom 1 [FrA1]	Ballroom 2 [FrA2]	Lotus 1 [FrA3]	Lotus 5 [FrA4]
8:10~10:25 (135 min)	(133) Hani Naguib Univ. of Toronto	(106) Ho-Hsiu Chou Nat'l Tsing Hua Univ.	(222) Ronan Hinchet EPFL	(332) M. C. Natori JAXA
	(012) Hidenori Okuzaki Univ. of Yamanashi	(079) Chia-Chih Chang Nat'l Chiao Tung Univ.	(101) Fabrice Domingues Dos Santos Arkema - Piezotech	(028) Young-jun Choi KASI
		(278) Jung-Yong Lee KAIST		(259) Kyeong Ja Kim KIGAM
	(307) Sang-Youn Kim KoreaTech	(276) Han-Ki Kim SKKU	(070) Sunghan Kim Chung-Ang Univ.	(134) Young-Jun Lee Inha Univ.
	(155) Dongwon Yun DGIST	(279) Jang-Yeon Kwon Yonsei Univ.	(195) Seung-Mo Lee KIMM	(336) Inhwan Oh Inha Univ.
	(049) Jiyun Kang KIMM		(127) Arturo Reza Ugalde Univ. of Toronto	
		(187) Dong-Won Kang Chung-Ang Univ.	(167) Quang Van Duong Chun-Ang Univ.	
10:25~10:40	Break			
10:40~12:10 (90 min)	[FrB1]	[FrB2]	[FrB3]	[FrB4]
	(160) Christoph Keplinger Univ. of Colorado Boulder	(061) Zong-Hong Lin Nat'l Tsing Hua Univ.	(326) Han Gi Chae UNIST	(244) Woosub Lee KIST
	(025) Jee-Hwan Ryu KAIST	(180) Qijun Sun CAS	(083) Simon Park Univ. of Calgary	(072) Jeong Jae Wie Inha Univ.
	(056) Hugo Rodrigue Sungkyunkwan Univ.	(038) Sangtae Kim KIST	(130) Chi Won Ahn Nat'l Nanofab Center	(105) Hocheol Shin KAERI
(030) Siyeon Baik Korea Univ.	(175) Xiangyu Chen CAS	(330) Bon-Cheol Ku KIST	(340) Dong-Hoon Lee Inha Univ.	
12:10~13:10	Lunch			
13:10~14:35 (85 min)	[FrC1]	[FrC2]	[FrC3]	[FrC4]
	(324) Inkyu Park KAIST	(176) Yoon-Hwae Hwang Pusan Univ.	(020) Hong Chul Moon Univ. of Seoul	(197) Nobuyuki Hasebe Waseda Univ.
	(236) Kentaro Takagi Nagoya Univ.	(090) Wenzhuo Wu Purdue Univ.	(013) Youn Soo Kim POSTECH	(103) Hyu-Soung Shin KICT
	(115) Choon-Gi Choi ETRI		(156) Jin Hyun Lee Inha Univ.	(275) Kyunghwa Lee NIER
(066) Seungmin Hyun KIMM	(199) Sang-Jae Kim Jeju Nat'l Univ.		(211) Wonsu Kim KISTI	
14:35~14:50	Break			
14:50~16:45 (115 min)	[FrD1]	[FrD2]	[FrD3]	[FrD4]
	(183) Joon Hak Oh Seoul Nat'l Univ.	(172) Seok Woo Lee Nanyang Tech	(291) Wonju Jeon KAIST	(251) Richard Britten EVMS
	(223) Steve Park KAIST	(027) Ikwhang Chang Won Kwang Univ.	(052) Eunho Kim Chonbuk Nat'l Univ.	(302) Larry Sanford EVMS
	(258) Myung-Gil Kim SKKU		(058) JooHwan Oh UNIST	(220) Hargsoon Yoon Norfolk State Univ.
	(019) Changhyun Pang SKKU	(136) Seung-Ho Yu Korea Univ.	(260) Yeonuk Seong Hanyang Univ.	(243) Gyutae Kim Inha Univ.
	(084) Xuechen Shen Univ. of Toronto	(075) Duho Kim Kyung Hee Univ.	(272) Jianfeng Zang HUST	(314) Hyelim Park Inha Univ. Hospital
	(202) Sivalingam Ramesh Dongguk Univ.			
16:45~17:50	Break			
17:50~18:35	Plenary Lecture 3 (Grand Ballroom, 3F)   Zhenan Bao (Stanford University)			
18:35~19:20	Plenary Lecture 4 (Grand Ballroom, 3F)   Herbert Shea (EPFL)			
19:20~21:00	Banquet (Grand Ballroom, 3F)			
October 19, 2019				
09:40~	Registration (Sheraton Grand Incheon Hotel Lobby, 1F)			
10:00~18:00	Post Conference Tour			

### ■ Technical Program

#### Oral Session

Thursday, October 17, 2019

#### Grand Ballroom

08:30 ~ 08:45    Opening Ceremony    Grand Ballroom

#### [PL-1]

08:45 ~ 09:30    Plenary Session I    Grand Ballroom  
Session Chairs: Chong-Yun Kang (KIST), Duckhyun Choi (Kyung Hee Univ.)

PL-1-1 P00253    **[Plenary] Maxwell's Displacement Current Governed Triboelectric Nanogenerator for Self-powered Systems and Blue Energy**  
(08:45 ~ 09:30)    \*Zhong Lin Wang (Georgia Institute of Technology, United States)

#### [PL-2]

09:30 ~ 10:15    Plenary Session II    Grand Ballroom  
Session Chair: Joo-Hyung Kim (Inha Univ.)

PL-2-1 P00284    **[Plenary] Soft Electronic and Microfluidic Systems for the Skin**  
(09:30 ~ 10:15)    \*John A. Rogers (Northwestern University, United States)

#### Ballroom 1

#### [ThA1]

10:40 ~ 12:30    Ionic Soft Actuators    Ballroom 1  
Session Chair: Steve Park (KAIST)

ThA1-1 P00280    **[Keynote] PEDOT:PSS Based Ionic Actuator: from Microactuators to All-solid State Ionic Devices**  
(10:40 ~ 11:10)    \*Frédéric Vidal, Kätlin Rohtlaid, Frédéric B. Ribeiro, Giao T. M. Nguyen and Cédric Plesse (University of Cergy-Pontoise, France), Caroline Soyer and Eric Cattan (University de Valenciennes et du Hainaut-Cambresis(UVHC), France), Alexander Shaplov (Luxembourg Institute of Science and Technology, Luxembourg)

ThA1-2 P00178    **[Keynote] Electrochemical Impedance of Electroactive Polymer Actuators**  
(11:10 ~ 11:40)    \*Kinji Asaka (National Institute of Advanced Industrial Science and Technology (AIST), Japan)

**Thursday, October 17, 2019**

- ThA1-3 P00017 **[Invited] Low-Voltage, Low-Power, Fast Switching Soft Actuators**  
(11:40 ~ 12:00) \*[Moon Jeong Park](#) (Pohang University Sci. & Tech., Korea)
- ThA1-4 P00215 **Interface and Material Design, and Bionic Application of Ionic Polymer Metal Composite Artificial Muscle**  
(12:00 ~ 12:15) \*[Qingsong He](#), Min Yu, and Zhendong Dai (Nanjing University of Aeronautics & Astronautics, China), Kwang Jin Kim (University of Nevada Las Vegas, United States)
- ThA1-5 P00234 **Measurement of an Ionic Induced Potential Inside the Polymer Membrane of Soft Ionic Actuators**  
(12:15 ~ 12:30) [Rassoul Tabassian](#), Won-Jun Hwang, and \*[Il-Kwon Oh](#) (KAIST, Korea)
- 12:30 ~ 13:30 Lunch Break

**[ThB1]**

- |               |   |           |
|---------------|---|-----------|
| 13:30 ~ 15:35 | Artificial Muscles<br>Session Chair: <a href="#">Il-kwon Oh</a> (KAIST) | Ballroom1 |
|---------------|---|-----------|
- ThB1-1 P00194 **[Keynote] Soft Actuators for Microrobotics and Textile-based Wearables – from 3D Manufacturing to Biofuel Powered Operation**  
(13:30 ~ 14:00) \*[Edwin W.H. Jager](#) (Linköping University, Sweden)
- ThB1-2 P00018 **[Keynote] From Electrochemical Stress to Electrochemical Actuators**  
(14:00 ~ 14:30) \*[Hyacinthe Randriamahazaka](#) (University de Paris, France)
- ThB1-3 P00104 **[Keynote] Development of Flexible Actuators for Wearable Applications**  
(14:30 ~ 15:00) \*[Wei Chen](#) (The Hong Kong Polytechnic University, Hong Kong)
- ThB1-4 P00261 **[Invited] Electromechanical and Mechanoelectrical Response of Carbon Nanotube-Ionic Liquid Polymer Composites**  
(15:00 ~ 15:20) \*[Takushi Sugino](#) and Kinji Asaka (National Institute of Advanced Industrial Science and Technology (AIST), Japan)
- ThB1-5 P00097 **Tendon Driven Soft Robot Finger with Soft Origami Pump**  
(15:20 ~ 15:35) [Yeunhee Kim](#) and \*[Youngsu Cha](#) (KIST, Korea)
- 15:35 ~ 15:50 Coffee Break

**Thursday, October 17, 2019**

**[ThC1]**

15:50 ~ 18:05	Polymer Actuators Session Chair: Moon Jeong Park (POSTECH)	Ballroom 1
ThC1-1 P00093 (15:50 ~ 16:20)	<b>[Keynote] Last Twenty-five Years of Research in Fabrication and Manufacturing of IPMCs</b> <u>*Kwang J. Kim</u> (University of Nevada, Las Vegas, United States)	
ThC1-2 P00015 (16:20 ~ 16:50)	<b>[Keynote] Soft Actuators and Sensors</b> <u>*Kean C. Aw</u> , Harish Devaraj, Andrew McDaid, and Jonathan Stringer (University of Auckland, New Zealand)	
ThC1-3 P00317 (16:50 ~ 17:20)	<b>[Keynote] Soft Actuators and Applications for New User Experiences</b> <u>*Ki-Uk Kyung</u> (KAIST, Korea)	
ThC1-4 P00092 (17:20 ~ 17:35)	<b>Investigating IPMCs Back-relaxation Through Contactless Actuation of Ionomer Membranes in Salt Solution</b> Alain Boldini and Maxwell Rosen (New York University Tandon School of Engineering, United States), Youngsu Cha (Korea Institute of Science and Technology (KIST), Korea), <u>*Maurizio Porfiri</u> (New York University Tandon School of Engineering, United States)	
ThC1-5 P00086 (17:35 ~ 17:50)	<b>Conductive Electron Rich Metal Free Porous Organic Frameworks for High Performances Ionic Soft Actuators</b> <u>Manmatha Mahato</u> , Rassoul Tabassian, and <u>*Il-Kwon Oh</u> (Korea Advanced Institute of Science and Technology, Korea)	
ThC1-6 P00014 (17:50 ~ 18:05)	<b>Performance-enhanced Polyvinyl Chloride (PVC) Gel Artificial Muscle by Incorporating Graphene Oxide and Plasticizer: Experimental and Modelling Approaches</b> <u>Zachary Frank</u> (Zachary Frank, United States), Taeseon Hwang, Zakai Olsen, and <u>*Kwang J. Kim</u> (University of Nevada, Las Vegas, United States)	
18:20 ~ 20:30	Poster Session	2F, Lobby

## Thursday, October 17, 2019

## Ballroom 2

## [ThA2]

10:40 ~ 12:25	Thermoelectric Materials and Devices Session Chairs: Dongwhi Choi (Kyung Hee Univ.), Sangmin Lee (Chung-Ang Univ.)	Ballroom 2
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ThA2-1 P00107 (10:40 ~ 11:10)	<b>[Keynote] Thermoelectric Energy Conversion and Storage with Graphitic Carbon and Polymers</b> <u>*Choongho Yu</u> (Texas A&M University, United States)
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ThA2-2 P00185 (11:10 ~ 11:30)	<b>[Invited] Impurity-free Doping in n-type Bismuth Telluride Alloys</b> <u>*Seung-Hyub Baek</u> (KIST, Korea)
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ThA2-3 P00170 (11:30 ~ 11:50)	<b>[Invited] Topological and Anderson Transition in Thermoelectricity</b> <u>*Jong-Soo Rhyee</u> , Min Ho Lee, Dianta Ginting, and Chan-Chieh Lin (Kyung Hee University, Korea)
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ThA2-4 P00256 (11:50 ~ 12:10)	<b>[Invited] A Facile Technique for Fabricating n-Type Thermoelectric CNT Nanocomposite Thin Films</b> <u>*Yong Tae Park</u> (Myongji University, Korea)
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ThA2-5 P00022 (12:10 ~ 12:25)	<b>Thermally Enhanced n-Type Thermoelectric Graphene Oxide-Based Thin Films</b> <u>*Chungyeon Cho</u> (Wonkwang University, Korea), Jaime Grunlan (Texas A&M University, United States)
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12:30 ~ 13:30	Lunch Break
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## [ThB2]

13:30 ~ 15:35	Triboelectric Nanogenerator Session Chairs: Seung-Hyub Baek (KIST), Jong-Soo Rhyee (Kyung Hee Univ.)	Ballroom 2
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ThB2-1 P00182 (13:30 ~ 14:00)	<b>[Keynote] Hybridized and Coupled Nanogenerators</b> <u>*Ya Yang</u> (Beijing Institute of Nanoenergy and Nanosystems, Chinese Academy of Sciences, China)
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ThB2-2 P00021 (14:00 ~ 14:30)	<b>[Keynote] Triboelectric Nanogenerator Work with Weak Mechanical Energy Sources</b> <u>*Youfan Hu</u> (Peking University, China)
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### Thursday, October 17, 2019

ThB2-3 P00129 **[Invited] Hierarchical Manufacturing of A Low Frequency Piezoelectric and Triboelectric Hybrid Energy Harvester**  
(14:30 ~ 14:50)

\*Hani E. Naguib, Zhongjie Li, and Zia Saadatnia (University of Toronto, Canada)

ThB2-4 P00173 **Utilization of Discrete Liquid-solid Contact Electrification**

(14:50 ~ 15:05)

\*Dongwhi Choi (Kyung Hee University, Korea)

ThB2-5 P00073 **Cellulose Nanofibril-based Triboelectric Nanogenerator**

(15:05 ~ 15:20)

Araz Rajabi Abhari, Jong Nam Kim, Rassoul Tabassian, Manmatha Mahato, Kwan Woo Han, and \*Il-Kwon Oh (Korea Advanced Institute of Science and Technology (KAIST), Korea)

ThB2-6 P00152 **Enhanced Output Performance of Polyurethane-based TENG Using Wasted Heat Energy**

(15:20 ~ 15:35)

Ahrum Sohn, Jeong Hwan Lee, Hong-Joon Yoon, and \*Sang-Woo Kim (Sungkyunkwan University, Korea)

15:35 ~ 15:50

Coffee Break

### [ThC2]

15:50 ~ 18:05

Piezoelectric Energy Harvesting

Ballroom 2

Session Chairs: Yong Tae Park (Myongji Univ.), Chungyeon Cho (Won Kwang Univ.)

ThC2-1 P00186

(15:50 ~ 16:20)

**[Keynote] Vibration-based Piezoelectric and Electromagnetic Hybrid Energy Harvesting for Efficient Energy Conversion**

Inki Jung and Jaehoon Choi (Korea University, Korea), \*Chong-Yun Kang (Korea Institute of Science and Technology, Korea)

ThC2-2 P00169

(16:20 ~ 16:50)

**[Keynote] Self-Powered Wearable and Implantable Electrical Stimulation Devices for Biomedical Applications**

\*Xudong Wang (University of Wisconsin-Madison, United States)

ThC2-3 P00198

(16:50 ~ 17:10)

**[Invited] Surface Energy Engineering by High & Low Technologies**

\*Han-Bo-Ram Lee (Incheon National University, Korea)

ThC2-4 P00224

(17:10 ~ 17:30)

**[Invited] Tailoring Materials and Structures for Energy Harvesting: From Nanofibers To Metamaterials**

\*Miso Kim (Korea Research Institute of Standards and Science, Korea)



**Thursday, October 17, 2019**

ThC2-5 P00192 **[Invited] Self-powered GaN-based Nanowire LEDs**  
 (17:30 ~ 17:50) \*Chih-Yen Chen (National Sun Yat-sen University (NSYSU), Taiwan)

ThC2-6 P00111 **Automatic Resonance Tuning Mechanism for Ultra-wide Bandwidth Mechanical Energy Harvesting**  
 (17:50 ~ 18:05) Youn-Hwan Shin (Korea Institute of Science and Technology, Korea), Shashank Priya (Pennsylvania State University, United States), Chong-Yun Kang (Korea Institute of Science and Technology, Korea), \*Hyun-Cheol Song (Korea Institute of Science and Technology, Korea)

18:20 ~ 20:30 Poster Session 2F, Lobby

**Lotus 1****[ThA3]**

10:40 ~ 12:20 Soft & Wearable Electronics I Lotus 1  
 Session Chair: Unyong Jeong (POSTECH)

ThA3-1 P00241 **[Keynote] Flexible Bio-Inspired Organic Artificial Sensory Nervous Systems**  
 (10:40 ~ 11:10) \*Tae-Woo Lee (Seoul National University, Korea)

ThA3-2 P00141 **[Keynote] Smart Grid Sensor Made of PVDF for Health Monitoring of Draped Fibrous Composite Structures**  
 (11:10 ~ 11:40) \*Seung-Hwan Chang and Kyung-Chae Jung (Chung-Ang University, Korea)

ThA3-3 P00225 **[Invited] 3D-Printable Stretchable Composite Materials for Sensor Circuit Applications**  
 (11:40 ~ 12:00) \*Sunho Jeong (Kyung Hee University, Korea)

ThA3-4 P00188 **[Invited] Wearable Devices and Sensors based on Nanocrystals**  
 (12:00 ~ 12:20) \*Soong Ju Oh (Korea University, Korea)

12:30 ~ 13:30 Lunch Break

Thursday, October 17, 2019

[ThB3]

13:30 ~ 15:35	Functional Composites & Structures I Session Chair: Seong Su Kim (KAIST)	Lotus 1
ThB3-1 P00274 (13:30 ~ 14:00)	<b>[Keynote] Multi-Field Processing of Anisotropic Nanoparticles for Multifunctional Applications</b> <u>*Zoubeida Ounaies</u> (The Pennsylvania State University, United States)	
ThB3-2 P00153 (14:00 ~ 14:30)	<b>[Keynote] Shape Memory Polymer Composites: Characterization, Modeling, and Applications</b> <u>*Woong-Ryeol Yu</u> , Seok-Bin Hong, Jin-Soo Kim, Yong-San Ahn, Jun-Hyup Jang, and Ji-Hyeon Yoon (Seoul National University, Korea)	
ThB3-3 P00218 (14:30 ~ 14:50)	<b>[Invited] 2D Single-Crystalline Metallic Nanoplates: Synthesis, Dimension control and Applications</b> <u>*Tae-Wook Kim</u> and Ho Kwang Choi (Korea Institute of Science and Technology, Korea), Minji Kang, Dong Su Lee, and Sukang Bae (Korea Institute of Science and Technology (KIST), Korea), Sang Hyun Lee (Chonnam National University, Korea), Seoung-Ki Lee (Korea Institute of Science and Technology (KIST), Korea)	
ThB3-4 P00206 (14:50 ~ 15:05)	<b>Zr-based MOF and GO Composite in Chemical Warfare Agent Degradation</b> <u>Dongwon Ka</u> , Seong-on Jang, Hyunsook Jung, Heesoo Jung, and *Youngho Jin (Agency for Defense Development, Korea)	
ThB3-5 P00140 (15:05 ~ 15:20)	<b>Effect of Catechol Comonomers of Polyacrylonitrile (PAN) and Composites on Stabilization Process and Properties for Carbon Fibers</b> <u>Jongho Kim</u> , Jeong-Un Jin, Nam-Ho You, and *Bon-Cheol Ku (Korea Institute of Science and Technology (KIST), Korea)	
ThB3-6 P00081 (15:20 ~ 15:35)	<b>Capillarity Induced Self-folding 3D Hydrogel Structures of Elastic Wrinkled Sheets Prepared by One-push Stretching Method</b> <u>*Hiroshi Endo</u> and Hiromichi Inokuchi (Toyama Prefectural University, Japan)	
15:35 ~ 15:50	Coffee Break	

**Thursday, October 17, 2019****[ThC3]**

15:50 ~ 17:45 Soft & Wearable Electronics II Lotus 1  
 Session Chair: Unyong Jeong (POSTECH)

ThC3-1 P00189 **[Keynote] Flexible Electronic Skins with Electrical and Colorimetric Pressure Sensing**  
 (15:50 ~ 16:20) \*Hyunhyub Ko (Ulsan National Institute of Science and Technology, Korea)

ThC3-2 P00004 **[Keynote] Stretchable Conductive Nanocomposite for Wearable and Implantable Electronics**  
 (16:20 ~ 16:50) \*Dae-Hyeong Kim (Seoul National University, Korea)

ThC3-3 P00214 **[Invited] A Bioinspired, Synthetic Polymer Ion Pump for Ultrasensitive Mechanotransduction**  
 (16:50 ~ 17:10) \*Do Hwan Kim, Joo Sung Kim, Vipin Amoli, and So Young Kim (Hanyang University, Korea)

ThC3-4 P00190 **[Invited] Laser-Induced Graphene for Supercapacitor Applications**  
 (17:10 ~ 17:30) \*Jung Bin In (Chung-Ang University, Korea)

ThC3-5 P00151 **Fabrication of Highly Conductive Carbon Composites for Stretchable Wearable Electronics**  
 (17:30 ~ 17:45) \*Ji-Young Hwang (Korea Institute of Carbon Convergence Technology, Korea), Jeong Hun Kim and Sang-Hoon Lee (Korea University, Korea), Ueon Sang Shin (Dankook University, Korea), Seung Beom Kang and Young Chul Choi (Korea Institute of Carbon Convergence Technology, Korea)

18:20 ~ 20:30 Poster Session 2F, Lobby

Thursday, October 17, 2019

### Lotus 5

#### [ThA4]

10:40 ~ 12:25	Space Materials I Session Chair: Sarath Kumar (KAIST)	Lotus 5
ThA4-1 P00095 (10:40 ~ 11:10)	<b>[Keynote] Advancement of Nanocellulose Multifunctional Materials and Their Space Application</b> <u>*Jaehwan Kim</u> , Hyun Chan Kim, Lindong Zhai, and Hyun-U Ko (Inha University, Korea)	
ThA4-2 P00287 (11:10 ~ 11:30)	<b>[Invited] Rotational Laser Ultrasonic Propagation Imaging</b> <u>*Jung-Ryul Lee</u> (KAIST, Korea), Young-Jun Lee, Hasan Ahmed, and Seung-Chan Hong (Korea Advanced Institute of Science and Technology, Korea), Sung-Jin Hong (Korea Aerospace Industries, LTD, Korea)	
ThA4-3 P00245 (11:30 ~ 11:50)	<b>[Invited] SiC Oxidation Simulation using Reaxff Molecular Dynamics</b> Taehoon Park, Chanwook Park, Jiwon Jung, and <u>*Gun Jin Yun</u> (Seoul National University, Korea)	
ThA4-4 P00003 (11:50 ~ 12:10)	<b>[Invited] Influence of Vacuum and Low Temperature on Deployment Performance of Shape Memory Polymer Composite Hinges</b> Van Luong Le, Yiyuan Liu, <u>*Nam Seo Goo</u> , and Vinh Tung Le (Konkuk University, Korea)	
ThA4-5 P00308 (12:10 ~ 12:25)	<b>Open Celled Polyurethane Foam as Back Bumper for Hypervelocity Shield</b> <u>Sarath Kumar Sathish Kumar</u> , Yunho Kim, Jihun Cha, and <u>*Chun Gon Kim</u> (KAIST, Korea)	
12:30 ~ 13:30	Lunch Break	

#### [ThB4]

13:30 ~ 15:00	Honorary Session for Seungbok Session Chair: Jong-Seok Oh (Kong Ju Nat'l Univ.)	Lotus 5
ThB4-1 P00237 (13:30 ~ 13:45)	<b>Dynamic Simulation of a Full Car Suspension System with Magnetorheological Shock Absorbers Featuring Very Fast Field-Dependent Damping Forces</b> <u>*Jong-Seok Oh</u> (Kongju National University, Korea), Seung-Bok Choi (Inha University, Korea)	
ThB4-2 P00239 (13:45 ~ 14:00)	<b>Mechanoluminescence ZnS:Cu/PDMS Soft Composite and Its Application to Optomechanical Sensors</b> <u>*Gi-Woo Kim</u> and Kyung-Pyo Min (Inha University, Korea)	

**Thursday, October 17, 2019**

- ThB4-3 P00310 **Magneto-Rheological Elastomer and Its Vehicle Application**  
(14:00 ~ 14:15) Sung Woo Yeom, Jiong Min Park, and \*Jung Woo Sohn (Kumoh National Institute of Technology, Korea)
- ThB4-4 P00281 **Design and Implementation of a Piezoelectric Generator integrated a novel Elastic Energy Storage Module**  
(14:15 ~ 14:30) Yi-He Zhang and \*Chul-Hee Lee (Inha University, Korea)
- ThB4-5 P00048 **Design of a Novel MR Damper Based on Pole Shape Function with Bilinear Damping Characteristics**  
(14:30 ~ 14:45) Bo Gyu Kim, Dal Seong Yoon, and \*Seung Bok Choi (Inha University, Korea)
- ThB4-6 P00031 **Analysis of the Pinch Mode Flow of Magnetorheological Fluid based Valve**  
(14:45 ~ 15:00) Byung-Hyuk Kang (Inha University, Korea), Tae-Hoon Lee (Inha University, Korea), \*Seung-Bok Choi (Inha University, Korea)
- 15:35 ~ 15:50 Coffee Break

**[ThC4]**

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|---------------|---|---------|
| 15:50 ~ 17:50 | Space Materials II<br>Session Chair: Jaeyoung Kang (Inha Univ.) | Lotus 5 |
|---------------|---|---------|
- ThC4-1 P00208 **[Invited] Deployable Structure Studies at KAIST AE**  
(15:50 ~ 16:10) \*Jae-Hung Han, Jong-Eun Suh, and Tae-Hyun Kim (KAIST, Korea)
- ThC4-2 P00006 **[Invited] Flexible Multibody Dynamics of Heliogyro Solar Sail under Space Operation**  
(16:10 ~ 16:30) \*Jaeyoung Kang (Inha University, Korea), K. C. Park (University of Colorado, United States)
- ThC4-3 P00288 **[Invited] Design Optimization of a Pogo Suppression Device for Liquid Propulsion Rockets**  
(16:30 ~ 16:50) \*Sang Joon Shin, Kook Jin Park, Si Hun Lee, and Jeong Uk Yoo (Seoul National University, Korea)
- ThC4-4 P00331 **Effect of Alloying Elements on Porosity of Cu and Al Alloys Evaluated by Accelerated Pore Formation System for Use in Space Structures**  
(16:50 ~ 17:05) \*Soong-Keun Hyun (Inha University, Korea)

### Thursday, October 17, 2019

ThC4-5 P00283 **Visualization of Delamination in Filament Wound High-Pressure Vessel Using High-speed Laser Excitation**  
(17:05 ~ 17:20)

Yunshil Choi (KAIST, Korea), \*Jung-Ryul Lee (Korea Advanced Institute of Science and Technology, Korea)

ThC4-6 P00277 **Visualization of Defects in Cylindrical CFRP Lattice Structure using Rotational Laser Ultrasonic Propagation Imaging**  
(17:20 ~ 17:35)

Ji-Hyung An and \*Jung-Ryul Lee (Korea Advanced Institute of Science and Technology, Korea)

ThC4-7 P00264 **Technical Report on Development for a lunar highland soil simulant at KIGAM**  
(17:35 ~ 17:50)

TaeYun Kang (Chung-nam national university, Korea), \*Kyeong Ja Kim (Korea Institute of Geoscience and Mineral Resources, Korea)

18:20 ~ 20:30

Poster Session

2F, Lobby

## Friday, October 18, 2019

## Grand Ballroom

## [PL-3]

17:50 ~ 18:35	Plenary Session III Session Chair: Steve Park (KAIST)	Grand Ballroom
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PL-3-1 P00116 (17:50 ~ 18:35)	<b>[Plenary] Skin-Inspired Organic Electronics</b> <u>*Zhenan Bao</u> (Stanford University, United States)
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## [PL-4]

18:35 ~ 19:20	Plenary Session IV Session Chair: Ki-Uk Kyung (KAIST)	Grand Ballroom
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PL-4-1 P00221 (18:35 ~ 19:20)	<b>[Plenary] Elastomer-Based Actuators for Wearable Haptics and Soft Robotics</b> <u>*Herbert Shea</u> (EPFL, Switzerland)
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## Ballroom 1

## [FrA1]

08:10 ~ 10:15	New Actuators and Applications Session Chair: Ki-Uk Kyung (KAIST)	Ballroom 1
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FrA1-1 P00133 (08:10 ~ 08:40)	<b>[Keynote] 4D Printed Plasticized PLA Composites for Soft Robotics Applications</b> <u>*Hani E. Naguib</u> , Yu-Chen Sun, Yimei Wan, Ryan Nam, and Marco Chu (University of Toronto, Canada)
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FrA1-2 P00012 (08:40 ~ 09:10)	<b>[Keynote] Electrothermal Polymer Actuators with Stretchable and Highly Conductive PEDOT:PSS Electrodes</b> <u>*Hidenori Okuzaki</u> (University of Yamanashi, Japan)
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FrA1-3 P00307 (09:10 ~ 09:40)	<b>[Keynote] Thin and Soft Haptic Actuator</b> <u>*Sang-Youn Kim</u> (Korea University of Technology and Education, Korea)
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FrA1-4 P00155 (09:40 ~ 10:00)	<b>[Invited] Hot Embossing Technology using Electromagnetic Impact Actuator for Soft Device Manufacturing</b> <u>*Dongwon Yun</u> (DGIST, Korea)
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### Friday, October 18, 2019

FrA1-5 P00049 **Strain Sensor integrated SMA Spring Bundle Actuator**  
(10:00 ~ 10:15) Jiyun Kang (Korea Institute of Machinery & Materials, Korea), Wonsuk Jung (Chungnam National University, Korea), \*Cheol Hoon Park (Korea Institute of Machinery & Materials, Korea)

10:25 ~ 10:40 Coffee Break

#### [FrB1]

10:40 ~ 12:15 Soft Robotics Ballroom 1  
Session Chair: Cheol Hoon Park (KIMM)

FrB1-1 P00160 **[Keynote] HASEL Artificial Muscles**  
(10:40 ~ 11:10) \*Christoph Keplinger (University of Colorado Boulder, United States)

FrB1-2 P00025 **[Keynote] Twisted String Actuator and its Application to Wearable Soft Exosuit**  
(11:10 ~ 11:40) \*Jee-Hwan Ryu (KAIST, Korea)

FrB1-3 P00056 **[Invited] Novel Linear and Bending Negative Pressure Soft Actuators**  
(11:40 ~ 12:00) \*Hugo Rodrigue, Altair Coutinho, Jin-Gyu Lee, and Mohammad Fatahillah (Sungkyunkwan University, Korea)

FrB1-4 P00030 **Haptic Glove Using Tendon-Driven Soft Robotic Mechanism**  
(12:00 ~ 12:15) Siyeon Baik (Korea University, Korea), Ilhwan Han and \*Jaeyoung Park (Korea Institute of Science and Technology, Korea)

12:10 ~ 13:10 Lunch Break

#### [FrC1]

13:10 ~ 14:35 Soft Sensors and Electronics I Ballroom 1  
Session Chair: Hugo Rodrigue (Sungkyunkwan Univ.)

FrC1-1 P00324 **[Keynote] Soft Hierarchical and Nanocomposite Structures for Wearable Sensors**  
(13:10 ~ 13:40) \*Inkyu Park (KAIST, Korea)

FrC1-2 P00236 **[Invited] A Study on the Fast Simulation for A Multi-physics Model of IPMC Sensors**  
(13:40 ~ 14:00) \*Kentaro Takagi, Kota Kondo, and Jun Takeda (Nagoya University, Japan), Zicai Zhu (Xi'an Jiaotong University, China), Kinji Asaka (National Institute of Advanced Industrial Science and Technology (AIST), Japan)



**Friday, October 18, 2019**

FrC1-3 P00115 **[Invited] Highly Sensitive Soft Sensors based on 2D Material Composites**  
(14:00 ~ 14:20) \*Choon-Gi Choi (ETRI, Korea)

FrC1-4 P00066 **Design of Battery Structure for Untethered Soft Robot**  
(14:20 ~ 14:35) \*Seungmin Hyun, Myoung-ho Kim, and Bongkyun Jang (Korea Institute of Machinery and Materials, Korea)

14:35 ~ 14:50 Coffee Break

**[FrD1]**

14:50 ~ 16:25 Soft Sensors and Electronics II Ballroom 1  
Session Chairs: Steve Park (KAIST), Jee-Hwan Ryu (KAIST)

FrD1-1 P00183 **[Invited] Supramolecular Chirality of Organic Semiconductors for High-Performance Chiral Optoelectronics**  
(14:50 ~ 15:10) \*Joon Hak Oh (Seoul National University, Korea)

FrD1-2 P00223 **[Invited] Tactile Sensing Electronic Skin for Wearable and Robotic Applications**  
(15:10 ~ 15:30) \*Steve Park (KAIST, Korea)

FrD1-3 P00258 **[Invited] Solution-Processing of Metal Chalcogenides for High Performance Flexible Electronics**  
(15:30 ~ 15:50) \*Myung-Gil Kim (Chung-Ang University, Korea)

FrD1-4 P00019 **[Invited] Bioinspired Adhesive Architectures for Bioelectronics**  
(15:50 ~ 16:10) \*Changhyun Pang (Sungkyunkwan University (SKKU), Korea)

FrD1-5 P00084 **3D Printing Graphene/Polymer Composites to Build Multi-Material and Functionally Graded Flexible Electronics**  
(16:10 ~ 16:25) Xuechen Shen and \*Hani E. Naguib (University of Toronto, Canada)

17:50 ~ 18:35 Plenary Session III Grand Ballroom

18:35 ~ 19:20 Plenary Session IV Grand Ballroom

Friday, October 18, 2019

### Ballroom 2

#### [FrA2]

09:10 ~ 10:25 Solar Energy Harvesting Ballroom 2  
Session Chairs: Duckhyun Choi (Kyung Hee Univ.), Sangmin Lee (Chung-Ang Univ.)

FrA2-1 P00106 **[Invited] Design and Synthesis of Semiconducting Polymers as Photocatalysts for Solar Hydrogen Evolution**  
(08:10 ~ 08:30)

\*Ho-Hsiu Chou (National Tsing Hua University, Taiwan)

FrA2-2 P00079 **[Invited] Molecular Engineering of (Zwitter)ionic Cathode Interlayer Materials and Non-Fullerene Acceptors for High Performance Organic Photovoltaics**  
(08:30 ~ 08:50)

\*Chia-Chih Chang (National Chiao Tung University, Taiwan)

FrA2-3 P00278 **[Invited] PEDOT-free and ITO-free Transparent Electrodes for Highly Efficient (>10%) Flexible Organic Solar Cells**  
(08:50 ~ 09:10)

\*Jung-Yong Lee (KAIST, Korea)

FrA2-4 P00276 **[Keynote] Transparent Electrode Technologies for Organic Solar Cells and Perovskite Solar Cells**  
(09:10 ~ 09:40)

\*Han-Ki Kim (Sungkyunkwan University, Korea)

FrA2-5 P00279 **[Keynote] Two-dimensional Heterostructure based Electronic and Photovoltaic Devices**  
(09:40 ~ 10:10)

\*Jang-Yeon Kwon and Ah-Jin Cho (Yonsei University, Korea)

FrA2-6 P00187 **Fabrication of Cesium Lead Mixed Halide Perovskites for Efficient and Reliable Photovoltaics**  
(10:10 ~ 10:25)

Bhaskar Parida, Jun Ryu, and \*Dong-Won Kang (Chung-Ang University, Korea)

10:25 ~ 10:40 Coffee Break

#### [FrB2]

10:40 ~ 12:10 Energy Harvesting Systems and Applications I Ballroom 2  
Session Chairs: Han-Ki Kim (SKKU), Jang-Yeon Kwon (Yonsei Univ.)

FrB2-1 P00061 **[Keynote] Triboelectrification as an Efficient Tool for the Development of Self-Powered Sensors and Systems**  
(10:40 ~ 11:10)

\*Zong-Hong Lin (National Tsing Hua University, Taiwan)

**Friday, October 18, 2019**

FrB2-2 P00180 **[Invited] Piezo/Triboelectric Potential Modulated Semiconductor Devices**  
(11:10 ~ 11:30) \*Qijun Sun (Beijing Institute of Nanoenergy and Nanosystems, Chinese Academy of Sciences, China)

FrB2-3 P00038 **[Invited] Energy Harvester Device Concepts Utilizing Stress-Composition Coupling**  
(11:30 ~ 11:50) \*Sangtae Kim (KIST, Korea)

FrB2-4 P00175 **[Invited] The self-powered Nanosystem based on Triboelectric Nanogenerator and Smart Materials**  
(11:50 ~ 12:10) \*Xiangyu Chen (Chinese Academic of Sciences, China)

12:10 ~ 13:10 Lunch Break

**[FrC2]**

13:10 ~ 14:40 Energy Harvesting Systems and Applications II Ballroom 2  
Session Chairs: Duho Kim (Kyung Hee Univ.), Dongwhi Choi (Kyung Hee Univ.)

FrC2-1 P00176 **[Keynote] Aerodynamic/Aeroelastic Flutter and Gore-Tex Fabric Triboelectric Nanogenerators**  
(13:10 ~ 13:40) \*Yoon-Hwae Hwang and Suck Won Hong (Pusan National University, Korea)

FrC2-2 P00090 **[Keynote] Hybrid Nanomanufacturing of Hierarchical Wearable Devices for Smart User Interface**  
(13:40 ~ 14:10) \*Wenzhuo Wu (Purdue University, United States)

FrC2-3 P00199 **[Keynote] New Architecture and Strategy for Understanding the Energy Conversion Mechanism in Piezoelectric Driven Electrochemical Self-charging Supercapacitor Power Cell**  
(14:10 ~ 14:40) Karthikeyan Krishnamoorthy, Parthiban Pazhamalai, and \*Sang-Jae Kim (Jeju National University, Korea)

14:30 ~ 14:50 Coffee Break

**Friday, October 18, 2019**

**[FrD2]**

14:50 ~ 16:30	Energy Storage Materials and Devices Session Chairs: Sangtae Kim (KIST), Yong Tae Park (Myongji Univ.)	Ballroom 2
FrD2-1 P00172 (14:50 ~ 15:20)	<b>[Keynote] Mechanical Perspective for Electrochemical Energy Storage and Harvesting</b> <u>*Seok Woo Lee</u> (Nanyang Technological University, Singapore)	
FrD2-2 P00027 (15:20 ~ 15:40)	<b>[Invited] A Performance Enhancement of Energy Conversion and Storage Devices Through Nano-/Micro-structure Controls</b> <u>*Ikwhang Chang</u> (Wonkwang University, Korea)	
FrD2-3 P00136 (15:40 ~ 16:00)	<b>[Invited] Mechanistic Studies of Sulfur Cathode and Lithium Metal Anode via Operando X-ray Imaging</b> <u>*Seung-Ho Yu</u> (Korea University, Korea)	
FrD2-4 P00075 (16:00 ~ 16:15)	<b>Multiscale Cathode Material Design Using Calculation Science for Rechargeable Batteries</b> <u>*Duho Kim</u> (Kyung Hee University, Korea)	
FrD2-5 P00202 (16:15 ~ 16:30)	<b>Nanostructured Materials of Co<sub>3</sub>O<sub>4</sub>@Nitrogen Doped Graphene Oxide Composite for High Performance Supercapacitor Applications</b> <u>*Sivalingam Ramesh</u> , H.M. Yadav, Heung Soo Kim, and Joo-Hyung Kim (Dongguk University, Korea), Joo-Hyung Kim (Inha University)	
17:50 ~ 18:35	Plenary Session III	Grand Ballroom
18:35 ~ 19:20	Plenary Session IV	Grand Ballroom

## Friday, October 18, 2019

## Lotus 1

## [FrA3]

08:10 ~ 10:20	Functional Composites & Structures II Session Chair: Seung Tae Choi (Chung-Ang University)	Lotus 1
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FrA3-1 P00222 (08:10 ~ 08:40) **[Keynote] High Force Density Flexible Electrostatic Clutch**  
Ronan Hinchet and \*Herbert Shea (EPFL, Switzerland)

FrA3-2 P00101 (08:40 ~ 09:10) **[Keynote] Electroactive Fluorinated Polymers for Organic Electronics**  
\*Fabrice Domingues Dos Santos (Arkema - Piezotech, France)

FrA3-3 P00070 (09:10 ~ 09:30) **[Invited] Interfacial Engineered Mechanically Durable Functional Bionanocomposites**  
\*Sunghan Kim (Chung-Ang University, Korea)

FrA3-4 P00195 (09:30 ~ 09:50) **[Invited] Anomalous Increase in Toughness and Electrochemical Performance of Carbonized Cotton**  
\*Seung-Mo Lee, Do Van Lam, and Jae-Hyun Kim (Korea Institute of Machinery & Materials (KIMM), Korea)

FrA3-5 P00127 (09:50 ~ 10:05) **Catalytic Performance of Ni<sub>3</sub>Sn Supported on CNTs/Silica as Core-Shell Structure for CO Methanation**  
Arturo Reza Ugalde, Olivera Kesler, and \*Hani Naguib (University of Toronto, Canada)

FrA3-6 P00167 (10:05 ~ 10:20) **Highly Piezoelectric Double Ribbon Fibers with Poly (Vinylidene Fluoride)-Based Polymers for Self-Powered Smart Textiles**  
Anh Tuan Luu, Quang Van Duong, Thu Thi Nguyen, and \*Seung Tae Choi (Chung-Ang University, Korea)

10:20 ~ 10:40 Coffee Break

## [FrB3]

10:40 ~ 12:10	1D and 2D Nanomaterials I Session Chair: Young-Bin Park (UNIST)	Lotus 1
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FrB3-1 P00326 (10:40 ~ 11:10) **[Keynote] Effect of Single-walled Carbon Nanotubes (SWNT) Bundles on the Formation of Graphitic Structure upon Carbonization of Polyacrylonitrile (PAN) Nanocomposite Films**  
Jung-Eun Lee and \*Han Gi Chae (UNIST, Korea)

### Friday, October 18, 2019

FrB3-2 P00083 **[Invited] Anatase and Rutile TiO<sub>2</sub>-SnO<sub>2</sub>/MWCNTs/PVB Room Temperature VOCs Sensor Deposited on QCM by Intense Pulsed Light**

(11:10 ~ 11:30)

Danny Wong, \*Simon Park, Osama Abuzalat, Sherif Mostafa, and Seonghwan Kim (University of Calgary, Canada)

FrB3-3 P00130 **[Invited] Oxidation Behaviour of Two-dimensional Ti<sub>3</sub>C<sub>2</sub> MXene**

(11:30 ~ 11:50)

\*Chi Won Ahn (National Nanofab Center, KAIST, Korea), Yonghee Lee and Yoonjeong Chae (KAIST, Korea)

FrB3-4 P00330 **[Invited] Highly Strong and Conductive Carbon Nanotube Fibers**

(11:50 ~ 12:10)

\*Bon-Cheol Ku (KIST, Korea)

12:10 ~ 13:10

Lunch Break

### [FrC3]

13:10 ~ 14:05

Hydrogel & Ionic Gels  
Session Chair: Unyong Jeong (POSTECH)

Lotus 1

FrC3-1 P00020

(13:10 ~ 13:30)

**[Invited] Functional Electrochemical Devices Based on Ion Gels**

\*Hong Chul Moon (University of Seoul, Korea)

FrC3-2 P00013

(13:30 ~ 13:50)

**[Invited] Biomimetic Functional Hydrogels with Anisotropic Structures**

\*Youn Soo Kim (Pohang University of Science and Technology (POSTECH), Korea)

FrC3-3 P00156

(13:50 ~ 14:05)

**Viscoelastic and Magnetic Responses of Tough Nanocomposite Hydrogels**

\*Jin Hyun Lee, Wen Jiao Han, Jin-Kyun Lee, and Hyoung Jin Choi (Inha University, Korea)

14:20 ~ 14:50

Coffee Break

### [FrD3]

14:50 ~ 16:35

Acoustic Metamaterials & Phononic Crystals  
Session Chair: Young-Bin Park (UNIST)

Lotus 1

FrD3-1 P00291

(14:50 ~ 15:10)

**[Invited] Near-perfect Absorption of Acoustic and Elastic Waves using Meta-structures**

\*Wonju Jeon (KAIST, Korea)

**Friday, October 18, 2019**

- FrD3-2 P00052 **[Invited] Wave Propagations in 1D Graded Granular Structures**  
(15:10 ~ 15:30) \*Eunho Kim (Chonbuk National University, Korea), Youngtae Jang (Chonbuk National University, Korea)
- FrD3-3 P00058 **[Invited] Single Unit Elastic Metasurface for Anomalous Refraction**  
(15:30 ~ 15:50) Sungwon Lee and \*Joo-Hwan Oh (Ulsan National Institute of Science and Technology, Korea)
- FrD3-4 P00260 **Efficient Attenuation of Bending Wave of Beam with Acoustic Blakcholes Considering Optimal Mass and Clearance**  
(15:50 ~ 16:05) Yeonuk Seong and \*Junhong Park (Hanyang University, Korea)
- FrD3-5 P00272 **[Keynote] Soft Metamaterials for Acoustics and Phononics**  
(16:05 ~ 16:35) \*Jianfeng Zang (Huazhong University of Science and Technology, China)

17:50 ~ 18:35	Plenary Session III	Grand Ballroom
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18:35 ~ 19:20	Plenary Session IV	Grand Ballroom
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**Lotus 5****[FrA4]**

- |               |   |         |
|---------------|---|---------|
| 08:10 ~ 09:45 | Space Mission<br>Session Chair: Kyeong Ja Kim (KIGAM) | Lotus 5 |
|---------------|---|---------|
- FrA4-1 P00332 **[Keynote] A Conceptual Research on Construction Scenarios of Future Space Structure Systems**  
(08:10 ~ 08:40) \*M. C. Natori (Institute of Space and Astronautical Science (ISAS)/JAXA, Japan)
- FrA4-2 P00028 **[Invited] Enabling Technology of Space Science Missions in KASI**  
(08:40 ~ 09:00) \*Young-Jun Choi (Korea Astronomy and Space Science Institute, Korea)
- FrA4-3 P00259 **An Important Role of Gamma-Ray Spectroscopy for Prospective Lunar In-Situ Resource Utilization (ISRU) Applications**  
(09:00 ~ 09:15) \*Kyeong Ja Kim (Korea Institute of Geoscience and Mineral Resources, Korea)

### Friday, October 18, 2019

- FrA4-4 P00134 **SiGe based Sensor Technology for Space Exploration**  
(09:15 ~ 09:30) Young-Jun Lee (Inha University, Korea), Sang H. Choi (NASA Langley Research Center, United States), \*Joo-Hyung Kim (Inha University, Korea)
- FrA4-5 P00336 **MoS<sub>2</sub> on Carbon Nanotube and Graphene for Chemiresistive Gas Sensor**  
(09:30 ~ 09:45) \*Inhwan Oh, Hari Kang, Sangmin Jeong, Tri Khoa Nguyen, Jong-Sang Youn, and Ki-Joon Jeon (Inha University, Korea)
- 10:20 ~ 10:40 Coffee Break

### [FrB4]

- |               |   |         |
|---------------|---|---------|
| 10:40 ~ 12:00 | Space Robotics<br>Session Chair: Jeong Jae Wie (Inha Univ.) | Lotus 5 |
|---------------|---|---------|
- FrB4-1 P00244 **[Keynote] A Light-weight Rover Prototype with Mechanism to Secure Reliable Actuation for A Long-term Lunar Exploration**  
(10:40 ~ 11:10) \*Woosub Lee (KIST, Korea)
- FrB4-2 P00072 **[Invited] Contactless Manipulation of Soft Robots by Light and Magnetic Field**  
(11:10 ~ 11:30) \*Jeong Jae Wie, Suyoung Won, Jeong Eun Park, Jae Gwang Kim, and Jisoo Jeon (Inha University, Korea)
- FrB4-3 P00105 **Remote Control Robots of KAERI in High Radiation Environments**  
(11:30 ~ 11:45) \*Hocheol Shin, Changhoi Kim, Seungho Jung, Dongseok Ryu, and Jonghui Han (Korea Atomic Energy Research Institute, Korea)
- FrB4-4 P00340 **SMA Wire for Tilting Angle Actuating of Spin-type Helios Solar Sail Spacecraft**  
(11:45 ~ 12:00) Dong-Hoon Lee (University, Korea), Jaeyoung Kang and \*Gi-Woo Kim (Inha University, Korea)
- 12:10 ~ 13:10 Lunch Break



## Friday, October 18, 2019

## [FrC4]

13:10 ~ 14:25	Issue on Fine Dust Session Chair: Hyu-Soung Shin (KICT), Sang-Eui Lee (Inha Univ.)	Lotus 5
FrC4-1 P00197 (13:10 ~ 13:30)	<b>[Invited] Resource Utilization of The Moon, Mars and Asteroids- Concerning Water and Mineral Resources -</b> <u>*Nobuyuki Hasebe</u> (Waseda University, Japan), Kyeong Ja Kim (Korea Institute of Geoscience and Mineral Resources, Korea)	
FrC4-2 P00103 (13:30 ~ 13:50)	<b>[Invited] A New Dusty Thermal Vacuum Chamber (DTVC) with Fine Lunar Soil</b> Taeil Chung, Jangguen Lee, Yongho Yoo, Byung-Hyun Ryu, and <u>*Hyu-Soung Shin</u> (KICT, Korea)	
FrC4-3 P00275 (13:50 ~ 14:10)	<b>[Invited] Overview and Status of the Geostationary Environment Monitoring Spectrometer (GEMS)</b> <u>*Kyunghwa Lee</u> , Won-Jin Lee, Seung-Yeon Kim, Ara Cho, Hae-Jung Lee, Jeonghyeon Seo, Gyo-Hwang Choo, and Dong-Won Lee (National Institute of Environmental Research, Korea)	
FrC4-4 P00211 (14:10 ~ 14:25)	<b>High-resolution Real-time Monitoring System for Fine Dust over the Incheon City</b> <u>Wonsu Kim</u> , *Wonkyun Joo, Yoojin Song, Chang-Hoo Jeong, Dongmin Chang, Minwoo Park, Yong Lee, and Jaesoo Kim (KISTI, Korea)	
14:35 ~ 14:50	Coffee Break	

## [FrD4]

14:50 ~ 16:30	Space Medicine Session Chair: Kyu-Sung Kim (Inha Univ.)	Lotus 5
FrD4-1 P00251 (14:50 ~ 15:20)	<b>[Keynote] The Impact of Space Radiation on Advanced Executive Functions</b> <u>*Richard A. Britten</u> (Eastern Virginia Medical School, United States)	
FrD4-2 P00302 (15:20 ~ 15:40)	<b>[Invited] Modeling Sleep Disturbances and Effects of Stress in Space</b> <u>*Larry Sanford</u> (Eastern Virginia Medical School, United States)	
FrD4-3 P00220 (15:40 ~ 16:00)	<b>[Invited] Neural Sensing and Analysis of Brain Function and Impacts from Cosmic Radiation</b> <u>*Hargsoon Yoon</u> (Norfolk State University, United States)	

### Friday, October 18, 2019

FrD4-4 P00243 **Tracking the Neurotransmitter Receptors for the Neural Plasticity after Exposing Gravity Alteration**  
(16:00 ~ 16:15)

\*Gyutae Kim, Nguyen Nguyen, and Kyu-Sung Kim (Inha University, Korea)

FrD4-5 P00314 **Anti-allergic Effects of Hypergravity are Associated with Restoration of Th1/Th2 Balance and Decrease in Innate Lymphoid Type 2 Cells**  
(16:15 ~ 16:30)

Hyelim Park, Ah-Yeoun Jung, and \*Young Hyo Kim (Inha University Hospital, Korea)

17:50 ~ 18:35 Plenary Session III Grand Ballroom

18:35 ~ 19:20 Plenary Session IV Grand Ballroom

## Future Scientist Forum

### ■ Session Timetable – Future Scientist Forum

October 16, 2019		
16:00~19:00	Registration (Sheraton Grand Incheon Hotel Lobby, 1F)	
18:00~20:00	Welcome Reception (Invitation Only)	
October 17, 2019		
07:30~	Registration (Grand Ballroom Foyer, 3F)	
08:30~08:45	Opening Ceremony (Grand Ballroom, 3F)	
08:45~09:30	Plenary Lecture 1 (Grand Ballroom, 3F) Zhong Lin Wang (Georgia Institute of Technology) "Maxwell's Displacement Current Governed Triboelectric Nanogenerator for Self-powered Systems and Blue Energy"	
09:30~10:15	Plenary Lecture 2 (Grand Ballroom, 3F) Jonh Rogers (Northwestern University) "Soft Electronic and Microfluidic Systems for the Skin"	
10:15~10:25	Group Photo (Grand Ballroom, 3F)	
10:25~10:40	Break (Grand Ballroom, 3F)	
Event	Future Scientist Forum	
Room	Lotus 2	
10:40~12:10	[ThA5] FSF 1: Soft Sensors, Actuators & Robotics	(034) Junghan Kwon / Seoul Nat'l Univ.
		(163) Jaeyeon Jeong / KAIST
		(064) Afaque Soomro / JNU
		(046) Haneol Lee / SKKU
		(137) Jung-Hwan Youn / KAIST
		(102) Dong-Soo Choi / KoreaTech
12:10~13:30	Lunch	
13:30~15:00	[ThB5] FSF 2: Soft Sensors, Actuators & Robotics	(168) Thu Thi NGUYEN / Chung-Ang Univ.
		(162) Seung Mo Jeong / KAIST
		(005) Junseong Ahn / KAIST/KIMM
		(041) Myungsun Park / Seoul Nat'l Univ.
		(076) Geonwoo Hwang / KAIST
		(166) Quang Van DUONG / Chung-Ang Univ.
15:00~15:50	Break	
15:50~17:40	[ThC5] FSF 3: Special Session - KIST Activities	(179) Soo Min Kim / KIST
		(096) Hojoon Kim / KIST
		(118) Byeongkyu Lim / KIST
		(119) Sung-Woo Park / KIST
		(098) Jaehoon Chung / KIST
		(205) Inchan Hwang / KIST
17:40~18:20	Break	
18:20~20:30	Poster Session & Standing Buffet (2F Lobby)	

## Program Information

October 18, 2019		
07:30~	Registration (Grand Ballroom Foyer, 3F)	
Event	Future Scientist Forum	
Room	Lotus 2	
08:10~10:10 (120 min)	[FrA5] FSF 4: Functional Materials and Structures	(024) Tae Yong Yun / Univ. of Seoul
		(074) Ptchai Thangasamy / KAIST
		(252) Seungyoon Oh / KAIST
		(165) Beom-Gon Cho / UNIST
		(286) Dae-Hyun Hwang / KAIST
		(144) Minye Koo / SKKU
		(007) Muhammed Ajmal / SKKU
		(139) Hyung Doh Roh / UNIST
10:10~10:40	Break	
10:40~12:10 (90 min)	[FrB5] FSF 5: Functional Materials and Structures	(148) Jinwoo Lee / SKKU
		(043) Hong-Woo Park / UNIST
		(011) Yoojin Lee / SKKU
		(273) Seung-Jin Han / KAIST
		(053) Jaehwa Lee / UNIST
		(135) Yan Sun / SKKU
12:10~13:10	Lunch	
13:10~14:25 (75 min)	[FrC5] FSF 6: Advanced Energy Technology	(158) M Shahriar / Univ. of Ulsan
		(212) Yong Chang Shin / Seoul Nat'l Univ.
		(213) Soo-Ho Jo / Seoul Nat'l Univ.
		(150) Jihoon Chung / Chung-Ang Univ.
		(088) Hee Jae Hwang / Kyung Hee Univ.
14:25~14:50	Break	
14:50~16:05 (75 min)	[FrD5] FSF 7: Advanced Energy Technology	(233) Youngwon Kim / KITECH
		(149) Tan Ngyen / Univ. of Ulsan
		(091) Jongnam Kim / KAIST
		(159) Seawoong Oh / KAIST
		(164) Kwang Il Jeong / KAIST
16:05~17:50	Break	
17:50~18:35	Plenary Lecture 3 (Grand Ballroom, 3F) Zhenan Bao (Stanford University) "Skin-Inspired Organic Electronics"	
18:35~19:20	Plenary Lecture 4 (Grand Ballroom, 3F) Herbert Shea (EPFL) "Elastomer-Based Actuators for Wearable Haptics and Soft Robotics "	
19:20~21:00	Banquet (Grand Ballroom, 3F)	
October 19, 2019		
09:40~	Registration (Sheraton Grand Incheon Hotel Lobby, 1F)	
10:00~18:00	Post Conference Tour	

## ■ Technical Program

Thursday, October 17, 2019

### Lotus 2

#### [ThA5]

10:40 ~ 12:10	Future Scientist Forum 1: Soft Sensors, Actuators & Robotics Session Chair: Youngsu Cha (KIST)	Lotus 2
ThA5-1 P00034	<b>Flat Inflatable Artificial Muscles with Geometric Constraints for Increased Stroke Length and Adjustable Force-Length Relation</b> <u>Junghan Kwon</u> , Sohee John Yoon, and *Yong-Lae Park (Seoul National University, Korea)	
ThA5-2 P00163	<b>Design of SMA-based Actuator and its Application to a Wearable Robot for Wrist</b> <u>Jaeyeon Jeong</u> (Korea Advanced Institute of Science and Technology, Korea), Ibrahim Bin Yasir (KAIST, Pakistan), Jungwoo Han and *Ki-Uk Kyung (KAIST, Korea)	
ThA5-3 P00064	<b>Frog Inspired Soft Robot based on Shape Memory Alloy-Polyurethan for Underwater Synchronous Swimming</b> <u>Afaque Manzoor Soomro</u> , Young Su Kim, Jong Hwan Lim, and *Kyung Hyun Choi (Jeju National University, Korea)	
ThA5-4 P00046	<b>Film-based Giant Inflatable Soft Gripper</b> <u>Haneol Lee</u> and Namsoo Oh (Sungkyunkwan University, Korea), *Hugo Rodrigue (Sungkyunkwan University, Korea)	
ThA5-5 P00137	<b>A Tunable Lens System with Large Aperture for Eyewear Applications</b> <u>Jung-Hwan Youn</u> , Kyujin Hyeon, Ji Hyeong Ma, and *Ki-Uk Kyung (KAIST, Korea)	
ThA5-6 P00102	<b>Transparent and Soft Vibrotactile Actuator</b> <u>Dong-Soo Choi</u> , Seok-Han Lee, and *Sang-Youn Kim (Korea University of Technology and Education, Korea)	
12:10 ~ 13:10	Lunch Break	

Thursday, October 17, 2019

[ThB5]

13:30 ~ 15:00	Future Scientist Forum 2: Soft Sensors, Actuators & Robotics Session Chair: Sang-Youn Kim (KOREATECH)	Lotus 2
ThB5-1 P00168	<b>Electromechanical Characterization of Various Relaxor Ferroelectric P(VDF-TrFE-CFE) or P(VDF-TrFE-CTFE) Terpolymers and Their Blends with P(VDF-TrFE) Copolymers</b> <u>Thu Thi Nguyen</u> and Quang Van Duong (Chung-Ang University, Korea), Fabrice Domingues Dos Santos (Piezotech Arkema, France), *Seung Tae Choi (Chung-Ang University, Korea)	
ThB5-2 P00162	<b>Modeling of a Spring Roll Dielectric Elastomer Actuator for Pursuing Performance Maximization</b> <u>Seung Mo Jeong</u> and *Ki-Uk Kyung (KAIST, Korea)	
ThB5-3 P00005	<b>Locally Shape-morphable Soft Electrothermal Actuator</b> <u>Junseong Ahn</u> (KAIST, Korea), Yongrok Jeong, Zhi-Jun Zhao, and Soonhyoung Hwang (Korea Institute of Machinery and Materials, Korea), Kyuyoung Kim and Jiwoo Ko (Korea Advanced Institute of Science and Technology, Korea), Sohee Jeon (Korea Institute of Machinery and Materials, Korea), Jaeho Park (Korea Advanced Institute of Science and Technology, Korea), Hyeokjung Kang and Junho Jeong (Korea Institute of Machinery and Materials, Korea), *Inkyu Park (Korea Advanced Institute of Science and Technology, Korea)	
ThB5-4 P00041	<b>Multi-Material Soft Strain Sensors with High Gauge Factors for Shape Sensing of Soft Bending Actuators</b> <u>Myungsun Park</u> and *Yong-Lae Park (Seoul National University, Korea), Yunsik Ohm (Carnegie Mellon University, United States), Dong Wook Kim (Seoul National University, Korea)	
ThB5-5 P00076	<b>Multi-Layered Dielectric Elastomer Unimorph with Electro-adhesion Toward a High-Payload Soft Gripper</b> <u>Geonwoo Hwang</u> (Korea Advanced Institute of Science and Technology, Korea), Jihwan Park (Korea Advanced Institute of Science and Technology, Korea), David Santiago Diaz Cortes and *Ki-Uk Kyung (Korea Advanced Institute of Science and Technology, Korea)	
ThB5-6 P00166	<b>Pressure-Responsive Localized Vibrotactile Sensation for Large-Area Touchscreens via the Fretting Phenomenon of a Relaxor Ferroelectric Polymer Film</b> <u>Quang Van Duong</u> and Vinh Phu Nguyen (Chung-Ang University, Korea), Fabrice Domingues Dos Santos (Piezotech Arkema, France), *Seung Tae Choi (Chung-Ang University, Korea)	
15:35 ~ 15:50	Coffee Break	

**Thursday, October 17, 2019****[ThC5]**

15:50 ~ 17:40	Future Scientist Forum 3: KIST Activities (Special Session) Session Chair: Bon-Cheol Ku (KIST)	Lotus 2
ThC5-1 P00179	<b>[Invited] Single crystal 2D Heterostructure on Wafer Scale</b> <u>*Soo Min Kim</u> (KIST, Korea)	
ThC5-2 P00096	<b>Multi-layer Piezoelectric Beam for Torsion Sensing</b> <u>Hojoon Kim</u> and *Youngsu Cha (KIST, Korea)	
ThC5-3 P00118	<b>A Compact 5-DoF Finger-Wearable Tactile Interface</b> <u>Byeongkyu Lim</u> , Sung-Woo Park, and *Donghyun Hwang (Korea Institute of Science and Technology (KIST), Korea)	
ThC5-4 P00119	<b>Development of a Surgical-Forceps Driver with an Embedded High-precision Soft Force Sensor Module</b> <u>Sung-Woo Park</u> , Namseon Jang, and *Donghyun Hwang (KIST, Korea)	
ThC5-5 P00098	<b>One-layer Piezoelectric Flexible Sensor for Normal and Shear Force</b> <u>Jaehoon Chung</u> , Ye Rim Lee, and *Youngsu Cha (KIST, Korea)	
ThC5-6 P00205	<b>Scalable Robotic Hand Design Using Skin-Mounted Actuators</b> <u>Inchan Hwang</u> (Korea Institute of Science and Technology, Korea), Ilhwan Han (t19151@kist.re.kr, Korea), *Jaeyoung Park (Korea Institute of Science and Technology, Korea)	

Friday, October 18, 2019

### Lotus 2

#### [FrA5]

08:10 ~ 10:10	Future Scientist Forum 4: Functional Materials and Structures Session Chair: Young-Bin Park (UNIST)	Lotus 2
FrA5-1 P00024	<b>Bifunctional Flexible Electrochromic Supercapacitors Displaying Energy Status in Color</b> <u>Tae Yong Yun</u> and *Hong Chul Moon (University of Seoul, Korea)	
FrA5-2 P00074	<b>Simultaneous Exfoliation of WS<sub>2</sub> Nanosheets and Decoration of Interlayer Expanded MoS<sub>2</sub> Nanostructures for Electrochemical Hydrogen Evolution Reaction</b> <u>Pitchai Thangasamy</u> , *Il-Kwon Oh (KAIST, Korea)	
FrA5-3 P00252	<b>Preparation of Core-shell Structured Fiber Sensors by Using Dry-jet Wet Spinning for Structural Health Monitoring of Composite Structures</b> <u>Seungyoon Oh</u> and *Seongsu Kim (KAIST, Korea)	
FrA5-4 P00165	<b>Directly Growth of Thermally Reduced Graphene Oxide on Carbon Fiber for Enhancing the Mechanical Properties of Carbon Fiber Composites</b> <u>Beom-Gon Cho</u> , *Young-Bin Park, Shalik Ram Joshi, Jaekyo Lee, and Gun-Ho Kim (UNIST, Korea)	
FrA5-5 P00286	<b>Manipulating Lamb Wave Propagation on a Plate Structure</b> <u>Dae-Hyun Hwang</u> , Hyun-Su Park, and *Jae-Hung Han (KAIST, Korea)	
FrA5-6 P00144	<b>Mechanical and Electrical Property on the MXene-derived TiO<sub>2</sub>/Epoxy Composites</b> <u>Minye Koo</u> , RuoNan Ding, SungYong Hong, and *Jonghwan Surh (SungKyunkwan University, Korea)	
FrA5-7 P00007	<b>In-situ Reduced Ag Nanoparticles Inside Polymer Matrix for Nanocomposite Fibers with High Conductivity and Flexibility</b> <u>Muhammed Ajmal C</u> , Seonghyun Bae, and *Seunghyun Baik (Sungkyunkwan University, Korea)	
FrA5-8 P00139	<b>Structural Health Monitoring Using Electrical Network of Carbon Fibers and Electrically Equivalent Circuit Modeling</b> <u>Hyung Doh Roh</u> and *Young-Bin Park (UNIST, Korea)	
10:25 ~ 10:40	Coffee Break	



**Friday, October 18, 2019****[FrB5]**

10:40 ~ 12:10	Future Scientist Forum 5: Functional Materials and Structures Session Chair: Jihyun Kim (Inha University)	Lotus 2
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FrB5-1 P00148 **Optimization of 3D Printing Parameters for Fused Deposition Modeling of Short-fiber Composite Filaments**  
Jinwoo Lee, Jeongwook Yoo, and \*Jonghwan Suhr (Sungkyunkwan University, Korea)

FrB5-2 P00043 **Low Frequency Vibration Localization via Flexural Metamaterial**  
Hong-Woo Park and \*Joo-Hwan Oh (Ulsan National Institute of Science and Technology, Korea)

FrB5-3 P00011 **Enhancing Omniphobicity of Conductive Stretchable Fibers by Surface Functionalization**  
Yoojin Lee and Seonghyun Bae (Sungkyunkwan University, Korea), Byungil Hwang (Chung-Ang University, Korea), Marc Schroeder (BASF Electronic Materials R&D Center Asia, Korea), Yongwoo Lee (University of Massachusetts at Lowell, United States), \*Seunghyun Baik (Sungkyunkwan University, Korea)

FrB5-4 P00273 **Numerical Demonstration of Topologically Protected Elastic Waveguide in Hierarchical Hexagonal Lattices**  
Seung-Jin Han and \*Il-Kwon Oh (Korea Advanced Institute of Science and Technology, Korea)

FrB5-5 P00053 **Detachable Metasurface for Virtually Fixed Elastic Surface**  
Jaehwa Lee and \*Joo-Hwan Oh (UNIST, Korea)

FrB5-6 P00135 **Bio-inspired Multiple-stimuli Responsive Porous Materials with Switchable Flexibility and Programmable Shape Morphing Capability**  
Yan Sun and \*Jonghwan Suhr (Sungkyunkwan University, Korea)

12:10 ~ 13:10 Lunch Break

**[FrC5]**

13:10 ~ 14:25	Future Scientist Forum 6: Advanced Energy Technology Session Chairs: Sang-Jae Kim (Jeju Nat'l Univ.), Dong-Won Kang (Chung-Ang Univ.)	Lotus 2
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FrC5-1 P00158 **Triboelectric Detection of Living Organism in the Microfluidic Application**  
M Shahriar and \*Kyoung Kwan Ahn (University of Ulsan, Korea)

FrC5-2 P00212 **Manipulation of Standing Wave Using Metamaterials for Enhanced Piezoelectric Energy Harvesting**  
Yong Chang Shin, Heonjun Yoon, Soo-Ho Jo, and \*Byeng D. Youn (Seoul National University, Korea)

### Friday, October 18, 2019

FrC5-3 P00213 **Multiple Defect Modes of a Phononic Crystal and Its Application to Broadband Piezoelectric Energy Harvesting**  
Soo-Ho Jo, Heonjun Yoon, and Yong Chang Shin (Seoul National University, Korea),  
Wonjae Choi, Choon-Su Park, and Miso Kim (Korea Research Institute of Standard and  
Science, Korea), \*Byeng D. Youn (Seoul National University, Korea)

FrC5-4 P00150 **Output-enhanced Triboelectric Nanogenerator Utilizing Field-emission**  
Jihoon Chung and Deokjae Heo (Chung-Ang University, Korea), Dongseob Kim (Korea  
Institute of Industrial Technology, Korea), \*Sangmin Lee (Chung-Ang University, Korea)

FrC5-5 P00088 **The Wearable Reduced Graphene Oxide for Triboelectric Nanogenerator**  
Hee Jae Hwang (Kyung Hee University, Korea), Dongseop Kim (Aircraft system  
Technology Group, Korea Institute of Industrial Technology, Korea), \*Dukhyun Choi  
(Kyung Hee University, Korea)

14:35 ~ 14:50 Coffee Break

### [FrD5]

14:50 ~ 16:05 Future Scientist Forum 7: Advanced Energy Technology Lotus 2  
Session Chairs: Yoon-Hwae Hwang (Pusan Univ.), Han-bo-ram Lee (Incheon National Univ.)

FrD5-1 P00233 **Development of 3D Curved Triboelectric Generator Working by Combinatory Friction Modes**  
Youngwon Kim, \*Suk hee Part, and Han bit Lee (KITECH, Korea)

FrD5-2 P00149 **A Self-Powered Flow Rate Sensor Based on Liquid-Solid Triboelectric Nanogenerator**  
Tan Quang Nguyen and \*Kyoung Kwan Ahn (University of Ulsan, Korea)

FrD5-3 P00091 **Chitosan-Silica Composite film for Wearable Energy Harvesting**  
Jongnam Kim, Araz Rajabi Abhari, Kwanwoo Han, and \*Il-Kwon Oh (Korea Advanced  
Institute of Science and Technology, Korea)

FrD5-4 P00159 **Directly Grown Nanowires on Carbon Fabric for Flexible Lithium-ion Batteries**  
Saewoong Oh, Ji-Myeong Son, Sanghee Nam, and \*Il-Kwon Oh (KAIST, Korea)

FrD5-5 P00164 **Glucose-based Carbon-coating Layer on Carbon Felt Electrodes of Vanadium Redox Flow Batteries**  
Kwang Il Jeong, \*Seong Su Kim, and Seung A. Song (KAIST, Korea)

## ■ Poster Session

No.	Paper No.	Presenter
<b>Soft Sensors, Actuators and Robotics</b>		
1	P00026	Dong In Kim
2	P00033	Sungwoo Chun
3	P00142	Dong-Gyu Lee
4	P00238	Yoon Sang Jeong
5	P00321	Donghyun Hwang
6	P00328	HyeonSeok Lee
7	P00329	Gun-Hee Lee
8	P00063	Jisoo Jeon
9	P00071	Jeong Eun Park
10	P00171	Seungmin Lee
11	P00196	Seung-Won Kim
12	P00016	Yukino Fujiwara
13	P00050	Sukyoung Won
14	P00060	Jae Gwang Kim
15	P00147	Sung-Hyun Cho
16	P00157	EunSoo Kim
17	P00290	Bhivraj Suthar
18	P00309	Hyesonseok Seong
19	P00305	Muhammad Arshad Khan
20	P00108	Hyunwoo Kim
<b>Functional Materials and Structures</b>		
21	P00131	Chi Won Ahn
22	P00320	Tae Gyeong Lim
23	P00325	Myeong Hee Jeong
24	P00327	Soo Mook Lim
25	P00035	Seong-Geun Jeong
26	P00040	Hanwhuy Lim
27	P00062	Chun Yan Gao
28	P00065	Jung-Hoon Yu
29	P00067	Jaeki Kwon
30	P00068	Jungkyu Shin
31	P00114	Jiseok Kim
32	P00333	Hari Kang
33	P00200	Chan-Hee Lee
34	P00217	Gwang-Wook Hong

No.	Paper No.	Presenter
35	P00219	Young-Jun Lee
36	P00316	Sung Min Moon
37	P00319	Taesik Eom
38	P00023	Yong Min Kim
39	P00077	Yeon Hwa Song
40	P00078	Puji Lestari Handayani
41	P00315	Mirae Kim
42	P00044	Sangki Park
43	P00282	Minsik Kong
44	P00289	Tae Yeong Kim
45	P00300	Sanghoon Baek
46	P00301	Yongwoo Lee
47	P00036	Ayana Tomioka
48	P00082	Danny Wong
49	P00184	Seong-on Jang
50	P00039	Min Soo Kim
51	P00161	Ji-Su Ha
52	P00037	Kazumasa Marumo
53	P00110	Sang-Lok Park
54	P00117	Sang-Lok Park
55	P00121	Sun Kon Lee
56	P00242	Jin Woo Lee
57	P00143	Chanwoo Joung
59	P00047	Seonghwan Lee
60	P00335	Sangmin Jeong
61	P00032	Myung Hwan Bae
62	P00042	Geun Ju Jeon
<b>Advanced Energy Technology</b>		
63	P00009	Younghoon Lee
64	P00029	Yujang Cho
65	P00051	Jiseop Yu
66	P00054	Hakjeong Kim
67	P00055	Divij Bhatia
68	P00057	Wook Kim
69	P00059	Nghia Dinh Huynh
70	P00100	Habtamu Gebeyehu Menge

## Program Information

No.	Paper No.	Presenter
71	P00124	Jihye Kim
72	P00126	Hyoung Taek Kim
73	P00128	Minki Kang
74	P00193	Moonsu Kim
75	P00207	Gyosik Jun
76	P00228	Jun Hyuk Choi
77	P00229	Yoonsang Ra
78	P00230	Sunmin Jang
79	P00231	Sumin Cho
80	P00232	Yeongcheol Yun
81	P00255	Daehwan Choi
82	P00299	Hyeonseong Kim
83	P00318	Ravi Kumar Cheedarala
84	P00113	Jaehoon Choi
85	P00125	Yeon-Jeong Yee
86	P00297	Jae Won Lee
87	P00298	Jae Won Lee
88	P00322	Hyungseok Yong
89	P00323	Hyungseok Yong
90	P00338	Jaehwan Jung
91	P00339	Tae Hyeong Kim
93	P00257	Kyungwho Choi
94	P00270	Yunkyung Min
95	P00306	Wonjun Jang
96	P00174	Jae Yoon Lee
97	P00181	Pramila Patil
98	P00204	Dilpreet Singh Mann
99	P00216	Da Seul Choi
100	P00262	Sang-Hwi Lim
101	P00267	Hae-Jun Seok
102	P00269	Shuai Lan
103	P00313	Dinesh Veeran Ponnuvelu
104	P00069	Yeonseok Jung
105	P00099	Yeunhee Kim
106	P00235	Yoon Sang Jeong
107	P00268	Hyungseok Yong
108	P00271	Wonwoo Lee

No.	Paper No.	Presenter
109	P00094	Sanghee Nam
110	P00201	Sivalingam - Ramesh
111	P00203	Sivalingam - Ramesh
112	P00210	Jangmin Lee
113	P00226	Ghuzanfar Saeed
114	P00227	Jiu Yi Dai
115	P00265	Junhan Park
116	P00266	Woo-Jin Song
117	P00311	Ramkumar Balasubramaniam
118	P00312	Hari Vignesh Ramasamy
Space Technology		
119	P00120	Hyun Chan Kim
120	P00154	WooHyuk Lee
121	P00292	Dong-Yeon Kim
122	P00109	Gwang-Wook Hong
123	P00263	Suyeon Kim
124	P00123	Sun Kon Lee
125	P00250	Kuk Hui Son
126	P00247	Hangil You
127	P00249	Yeeryung Choi
128	P00246	Jihyun Kim

**Poster Session****Thursday, October 17, 2019****[ThPS]**

18:20 ~ 20:30	Poster Session Session Chairs: Joo-Hyung Kim (Inha Univ.), Il-kwon Oh (KAIST), Seung Tae Choi (Chung-Ang University)	2F, Lobby
ThPS-1 P00026	<b>High Sensitive Nerve Agent Detector based on ZnO Nanostructure for Surface Acoustic Wave Sensor</b> <u>Dong In Kim</u> , Seong Park, Rak Hyun Jeong, Ji Won Lee, Jung-Hoon Yu, Yeong Eun Gil, Ju Won Yang, *Jin-Hyo Boo, Hyeon Jin Seo, and Sang-Hun Nam (Sungkyunkwan University, Korea)	
ThPS-2 P00033	<b>Pressure- and Vibration-sensitive Electronic Mechanoreceptor Sensor for Learning Technique-based Neural Finger Skin</b> <u>Sungwoo Chun</u> , Jinho Song, and *Changhyun Pang (Sungkyunkwan University, Korea)	
ThPS-3 P00142	<b>Two-Dimensional Dynamic Strain sensor based on Mechanoluminescence Elastomer: ZnS:Cu/Polydimethylsiloxane(PDMS)</b> <u>Dong-Gyu Lee</u> (Korea University, Korea Institute of Science and Technology, Korea), Yeon-Jeong Yee (Korea University, Korea), Chong-Yun Kang (Korea Institute of Science and Technology, Korea), Sahn Nahm (Korea University, Korea), *Hyun-Cheol Song (Korea Institute of Science and Technology, Korea)	
ThPS-4 P00238	<b>Rectangular Cavity Resonator Sensor for Classification of Variety Driveability Index Gasoline</b> <u>Yoon Sang Jeong</u> , Hina Ashraf and *Chong Hyun Lee (Jeju National University, Korea)	
ThPS-5 P00321	<b>Availability of Wearable Electronics with Micro-current Stimulation for Reduction of Human Body Fat</b> <u>Donghyun Hwang</u> (Yonsei University, Korea), Seung-Kwan Cho and Seong-Guk Kim (CELLOGIN Inc., Korea), Han-A Lee and Seo-Hyun Kim (Yonsei University, Korea), Chang-Yong Ko (CELLOGIN Inc., Korea), *Han-Sung Kim (Yonsei University, Korea)	
ThPS-6 P00328	<b>Effects of Temperature and Coating Speed to Solution-sheared Perovskite Thin Film</b> <u>Hyeon Seok Lee</u> , Minkyu Kim, Byungha Shin, and *Steve Park (KAIST, Korea)	
ThPS-7 P00329	<b>Non-closed Resonator for Biodegradable Wireless Sensing System</b> <u>Gun-Hee Lee</u> and *Steve Park (KAIST, Korea)	

**Thursday, October 17, 2019**

- ThPS-8 P00063 **Programmable Magnetic Actuation of Soft Microarrays**  
Jisoo Jeon, \*Jeong Jae Wie, Sukyoung Won, and Jeong Eun Park (Inha University, Korea), Sei Jin Park (Lawrence Livermore National Laboratory, United States), Hangbo Zhao and Sanha Kim (Massachusetts Institute of Technology, United States), Bong Sup Shim (Inha University, Korea), Augustine Urbas (Air Force Research Laboratory, United States), Anastasios John Hart (Massachusetts Institute of Technology, United States), Zahyun Ku (Air Force Research Laboratory, United States)
- ThPS-9 P00071 **Enhanced Magnetic Actuation of Micropillar Arrays Induced by Asymmetric Geometry**  
Jeong Eun Park, Jisoo Jeon, and Sukyoung Won (Inha University, Korea), Jehwan Hwang and Sang Jun Lee (Korea Research Institute of Standards and Science, Korea), Augustine Urbas and Zahyun Ku (Air Force Research Laboratory, United States), \*Jeong Jae Wie (Inha University, Korea)
- ThPS-10 P00171 **Development of a Flexible Haptic-Feedback Arm Band via Fretting Phenomenon for Wearable Electronics**  
Seungmin Lee, Keunhee Jang, Quang Van Duong, Mijin Kim, and \*Seung Tae Choi (Chung-Ang University, Korea)
- ThPS-11 P00196 **Thermomechanical Characteristics of A Shape Memory Polymer for A Variable Stiffness Mechanism in Medical Applications**  
\*Seung-Won Kim (Korea Institute of Science and Technology, Korea)
- ThPS-12 P00016 **Electrothermal Polymer Actuators Using Elastomer with Stretchable Conducting Polymer Electrode**  
Yukino Fujiwara (University of Yamanashi, Japan), Keisuke Chino (JXTG Nippon Oil & Energy Co., Japan), \*Hidenori Okuzaki (University of Yamanashi, Japan)
- ThPS-13 P00050 **Orbiting Multiple Magnetic Soft Robots**  
Sukyoung Won (Inha University, Korea), Sanha Kim (Korea Advanced Institute of Science and Technology, Korea), Jeong Eun Park, Jisoo Jeon, and \*Jeong Jae Wie (Inha University, Korea)
- ThPS-14 P00060 **Light Fueled Liquid Crystalline Soft Robots: Effects of Molecular Structures on Photomotility**  
Jae Gwang Kim and Jisoo Jeon (Inha University, Korea), Jong Geon Lee (Seoul National University, Korea), Sivakumar Rajamanickam (Inha University, India), Yun Ho Kim (KRICT, Korea), Maenghyo Cho (Seoul National University, Korea), Ji Ho Youk (Inha University, Korea), \*Jeong Jae Wie (Inha University, United States)

## Thursday, October 17, 2019

ThPS-15 P00147 **Tumour-on-a-chip: Multiple Cell Interacting Model with Diffusion Switching System**  
Hyung-Seok Choi and Sung-Hyun Cho (Seoul National University, Korea), \*Seung-Beum Suh (Korea Institute of Science & Technology, Korea)

ThPS-16 P00157 **Optimization Study for Tumor Targeting using Bacterial based Micro/Bio-Robotic platform**  
\*ImHyun Cho and EunSoo Kim (Dongduk Women`s University, Korea), Seung-Beum Suh (Korea Institute of Science and Technology, Korea)

ThPS-17 P00290 **A Study on Guided Twisted String Actuation Systems: Mathematical Model and Experimental Evaluation**  
\*Bhivraj Suthar (Korea University of Technology and Education, Korea), Jee-Hwan Ryu (Korea Advanced Institute of Science and Technology, Korea)

ThPS-18 P00309 **Twisted Strings based Hip Joint Exoskeleton**  
\*Hyesonseok Seong, Muhammad Arshad Khan, and Bhivraj Suthar (Korea University of Technology and Education, Korea), Igor Gaponov (Innopolis University, Russian Federation), Jee-Hwan Ryu (Korea Advanced Institute of Science and Technology, Korea)

ThPS-19 P00305 **Design of Variable Radius Pulley for Linearized Input-Output Transmission Characteristics of Twisted String Actuator**  
\*Muhammad Arshad Khan (Korea University of Technology and Education (Korea Tech), Korea), Bhivraj Suthar (Korea University of Technology and Education, Korea), Igor Gaponov (Innopolis University, Russian Federation), Jee-Hwan Ryu (Korea Advanced Institute of Science and Technology (KAIST), Korea)

ThPS-20 P00108 **Electro-active Polymer (EAP) based Microfluidic Valve for Lab-on-a-chip Devices**  
Hyunwoo Kim and \*Ki-Uk Kyung (KAIST, Korea)

ThPS-21 P00131 **Nanostructure Control of Nanomaterials and Their Applications**  
\*Chi Won Ahn (National Nanofab Center, KAIST, Korea), Yonghee Lee and Hee Han (KAIST, Korea)

ThPS-22 P00320 **Reduced Graphene Oxide Deposited on Copper Wires for Fiber Supercapacitors**  
Tae Gyeong Lim and \*Ji Won Suk (SKKU, Korea)

ThPS-23 P00325 **Facile Fabrication and Mechanical Measurements of Graphene Oxide Fibers**  
Myeong Hee Jeong and \*Ji Won Suk (Sungkyunkwan University, Korea)

### Thursday, October 17, 2019

- ThPS-24 P00327 **Determination of Electrical Conductivity of Reduced Graphene Oxide Powders**  
Soo Mook Lim, Seung-Won Kim, and \*Ji Won Suk (Sungkyunkwan University, Korea)
- ThPS-25 P00035 **Functional 3D Structures in A Porous Media for Automatic Digital Assay**  
Seong-Geun Jeong, Si Hyung Jin, Byungjin Lee, and \*Chang-Soo Lee (Chungnam National University, Korea)
- ThPS-26 P00040 **Electro-adhesive Gripper Fabrication based on Nanoparticle-elastomer Hybrid for the High Dielectric Constant**  
Hanwhuy Lim and \*Baek-Jin Kim (Korea Institute of Industrial Technology, Korea)
- ThPS-27 P00062 **Solution Patterned Hole Transport Layers for High Performance Organic Thin Film Transistors Based on Diketopyrrolopyrrole Copolymer Derivatives**  
Chun Yan Gao and Hyoung Jin Choi (Inha University, Korea), Yun-Hi Kim (Gyeongsang National University, Korea), \*Hoichang Yang (Inha University, Korea)
- ThPS-28 P00065 **Mesoporous Fe-doped NiO/NiO Nanoflake Bi-layers Toward Improved Electrochromic Anode Materials**  
Jung-Hoon Yu, Yeong Eun Gil, Ji Won Lee, Ju Won Yang, Sang-Hun Nam, Dong In Kim, Rak Hyun Jeong, Seong Park, and \*Jin-Hyo Boo (Sungkyunkwan University, Korea)
- ThPS-29 P00067 **Various Tests and Analysis Method for Practical Use of GFRP Coil Spring**  
\*Jaeki Kwon and Minhyuk Kim (Youngheung Iron and Steel, Korea), Jungkyu Shin (NS ENG, Korea)
- ThPS-30 P00068 **Real Development of Glass-Fiber Reinforced Plastic Coil Spring for Automotive Suspension Application**  
\*Jungkyu Shin and Jaeki Kwon (Youngheung Iron and Steel, Korea)
- ThPS-31 P00114 **Development of Shock Absorbing Materials based on Auxetics**  
Jiseok Kim, Jung-Hwan Oh, and \*Il-Kwon Oh (Korea Advanced Institute of Science and Technology, Korea)
- ThPS-32 P00333 **Hydrogen and Oxygen Evolution Reaction using Bifunctional MoO<sub>2</sub>/graphene/SUS under Alkaline Conditions**  
\*Hari Kang, Sangmin Jeong, Inhwan Oh, Tri Khoa Nquyen, Jong-Sang Youn, and Ki-Joon Jeon (Inha University, Korea)



## Thursday, October 17, 2019

- ThPS-33 P00200 **Compression Molding Analysis of the Engine Oil Fan Structures with Long Fiber Prepreg sheet**  
\*Ho-Sang Kim, Chan-Hee Lee, and Won-Gi Lee (Institute for Advanced ENgineering, Korea), Freiji Majd (Ecole Nationale Supérieure des Mines de Saint Etienne, France), Sang-Jae Yoon and Jin-Kyung Choi (Lacomtech, Korea)
- ThPS-34 P00217 **Controlled Synthesis of SnO<sub>2</sub>@NiCo<sub>2</sub>O<sub>4</sub>/Nitrogen Doped Graphene Oxide to Enhance the Electrochemical Properties**  
Gwang-Wook Hong (Inha University, Korea), Sivalingam Ramesh (Dongguk University, Korea), Kyeong-Ho Shin, Eunhyun Kim, and Sang-Lok Park (Inha University, Korea), Heung Soo Kim (Dongguk University, Korea), \*Joo-Hyung Kim (Inha University, Korea)
- ThPS-35 P00219 **Controlled Synthesis of Co<sub>3</sub>O<sub>4</sub>@Nitrogen Doped Graphene Oxide Composite for DMMP Detection Chemical Sensor Application**  
Young-Jun Lee (Inha University, Korea), Sivalingam Ramesh (Dongguk University, Korea), Gwang-Wook Hong, Jun-Soo Lee, Eunhyun Kim, Jinuk Kim and Sanjeeb Lama (Inha University, Korea), Heung Soo Kim (Dongguk University, Korea), \*Joo-Hyung Kim (Inha University, Korea)
- ThPS-36 P00316 **Hierarchically Aligned Structure of CNF-MMT Nanocomposites Inspired by the Nacre and Mechanical Properties**  
Sung Min Moon, Kyeonga Her, and \*Bong Sup Shim (Inha University, Korea)
- ThPS-37 P00319 **Nanostructured and Multifunctional Natural Melanin Composites: Unprecedentedly Unique Electrical, Optical, and Biological Properties**  
Taesik Eom and \*Bong Sup Shim (Inha University, Korea)
- ThPS-38 P00023 **Highly Asymmetric Viologens for Stable Electrochromic Devices**  
Yong Min Kim, Mark Kim, and \*Hong Chul Moon (University of Seoul, Korea)
- ThPS-39 P00077 **High Ion Conducting and Stretchable Hydrogel Polymer Electrolytes via Poly(lithium acrylate) Cross-linked with Silica Nanoparticles**  
Yeon Hwa Song and \*U Hyeok Choi (Pukyong National University, Korea)
- ThPS-40 P00078 **High-Conducting, Stretchable and Transparent Thermoplastic Polyurethane for Energy Storage Application**  
Puji Lestari Handayani and \*U Hyeok Choi (Pukyong National University, Korea)

### Thursday, October 17, 2019

- ThPS-41 P00315 **In Situ Forming Chitosan Hydrogels with Tunable Physicomechanical and Tissue Adhesive Properties**  
Mirae Kim, Yujin Ahn, \*Woonggyu Jung, and Chaenyung Cha (UNIST, Korea)
- ThPS-42 P00044 **All Textile Based Highly Conformable Strain Sensor for Monitoring Diverse Motions of Human Joints**  
Sangki Park, Yujang Cho, Seongcheol Ahn, Junseo Kim, Jingzhe Sun, Minsun Oh, Daeun Kim, and Dahye Ahn (Chonnam National University, Korea), Sanghyun Park (University of Illinois at Urbana-Champaign, Korea), \*Jong-Jin Park (Chonnam National University, Korea)
- ThPS-43 P00282 **All Direction Stretchable Optical Touch Sensor using Electrochemiluminescence (ECL) Gel**  
Min Sik Kong and \*Unyong Jeong (POSTECH, Korea)
- ThPS-44 P00289 **Sweat Permeable Auxetic On-Skin Strain and ECG Sensors**  
Tae Yeong Kim and \*Unyong Jeong (POSTECH, Korea)
- ThPS-45 P00300 **A Wearable Lactate Sensor with Subthreshold Operation of An Inkjet-Printed Dual-Gate Organic Transistor for Low Power Consumption and High Sensitivity**  
Sanghoon Baek, Jimin Kwon, and \*Sungjune Jung (Pohang University of Science and Technology, Korea)
- ThPS-46 P00301 **Reliable Inkjet-Printed Top Contacts for Staggered Bottom-Gate Polymer TFTs**  
Yongwoo Lee, Jimin Kwon, Sungyeop Jung, Sanghoon Baek, Woojo Kim, and \*Sungjune Jung (Pohang University of Science and Technology, Korea)
- ThPS-47 P00036 **Highly Conductive Microfibers for Artificial Muscles**  
Ayana Tomioka and Kazuki Kudo (University of Yamanashi, Japan), Hirokazu Yano (Tosoh Corporation, Japan), \*Hidenori Okuzaki (University of Yamanashi, Japan)
- ThPS-48 P00082 **Multifunctional and Sustainable Carbon Nanofiber Manufacturing from Lignin Electrospinning**  
Danny Wong, Lei Liu, and \*Simon Park (University of Calgary, Canada)
- ThPS-49 P00184 **Graphene Oxide / Zirconium Hydroxide-based Chemical Agent Protective Fabric**  
Seong-on Jang, Dongwon Ka, Heesoo Jung, Hyunsook Jung, and \*Youngho Jin (Agency for Defense Development, Korea)

## Thursday, October 17, 2019

- ThPS-50 P00039 **Effective Elastic Mode Conversion from Longitudinal to Shear Wave by Trans-modal Metasurface**  
Min Soo Kim (UNIST, Korea), Woo Rim Lee and Yoon Young Kim (Seoul National University, Korea), \*Joo-Hwan Oh (UNIST, Korea)
- ThPS-51 P00161 **Elastic Band Gap in Minimal Surface based Lattice Structures**  
Ji-Su Ha, Jin-Young Jung, Ji-Seok Kim, and \*Il-Kwon Oh (KAIST, Korea)
- ThPS-52 P00037 **Stretchable and Highly Conductive Composites for 3D Printing**  
Kazumasa Marumo and Kazuki Kudo (University of Yamanashi, Japan), Hirokazu Yano (Tosoh Corporation, Japan), \*Hidenori Okuzaki (University of Yamanashi, Japan)
- ThPS-53 P00110 **Development of 3D Printing Techniques to Utilize Cellulose**  
Sang-Lok Park, Gwang-Wook Hong, Kyeong-Ho Shin, Jun-Su Lee, and \*Joo-Hyung Kim (Inha University, Korea)
- ThPS-54 P00117 **Development of Thermoelastic Effect for Applying 3D Printed Specimen**  
Sang-Lok Park, Gwang-Wook Hong, and \*Joo-Hyung Kim (Inha University, Korea)
- ThPS-55 P00121 **A Study on the Characteristics Dissimilar Polymer Complex Structure by using Dual Nozzle FDM 3D Printer**  
Sun Kon Lee, Young Chan Oh, Woo-Jong Tak, Ji Hye Park, Gwang-Wook Hong, and \*Joo-Hyung Kim (Inha University, Korea)
- ThPS-56 P00242 **Development of Electrospinning and 3D Printing based Artificial Skin using a Human Hair Keratin**  
\*Jin Woo Lee (Gachon University, Korea), Kuk Hui Son (Gachon Gil Medical Center, Korea), Joo Hyun Kim, Won Seok Choi, Ji-Hyun Lee, Chi Bum Ahn, Young Soo Yu, and Kuk Hui Son (Gachon University, Korea)
- ThPS-57 P00143 **Modeling of Mechanical Properties of xGnP/CNT/Carbon Fiber/PA6 Composites**  
\*Chanwoo Joung and Young-Bin Park (Ulsan National Institute of Science and Technology, Korea)

**Thursday, October 17, 2019**

- ThPS-59 P00047 **Self-power-generating Structural Carbon-fiber-reinforced Composites**  
Seonghwan Lee and \*Young-Bin Park (Ulsan National Institute of Science and Technology, Korea)
- ThPS-60 P00335 **Titanium Carbide on TiO<sub>2</sub> Electrode for Applications in Efficient Catalytic Activities.**  
\*Sangmin Jeong (Inha University, Korea), Inhwan Oh, Hari Kang, Tri Khoa Nquyen, Jong-Sang Youn, and Ki-Joon Jeon (Inha University, Korea)
- ThPS-61 P00032 **Amplitude-induced Bandgap in Nonlinear Metamaterials**  
Myung Hwan Bae and \*Joo-Hwan Oh (Ulsan National Institute of Science and Technology, Korea)
- ThPS-62 P00042 **Nonlinear Acoustic Metamaterial for Efficient Frequency Conversion**  
Geun Ju Jeon and \*Joo-Hwan Oh (UNIST, Korea)
- ThPS-63 P00009 **Ionic Communicators based on Triboelectronics**  
Younghoon Lee and \*Jeong-Yun Sun (Seoul National University, Korea)
- ThPS-64 P00029 **Rotational Wind Power Triboelectric Nanogenerator using the Adsorption Effect of Hematoxylin onto Hyper-Branch Structured Owl Feather**  
Yujang Cho, Sangki Park, Seongcheol Ahn, Junseo Kim, Jingzhe Sun, Minsun Oh, Daeun Kim, and Dahye Ahn (Chonnam National University, Korea), Sanghyun Park (University of Illinois at Urbana-Champaign, Korea), \*Jong-Jin Park (Chonnam National University, Korea)
- ThPS-65 P00051 **Wire-Type Triboelectric Sensor to Detect Natural Frequency for Crack Warning System**  
Jiseop Yu, Yeonseok Jung, Hee Jae Hwang, and Divij Bhatia (Kyung Hee University, Korea), Dongseob Kim (Korea Institute of Industrial Technology, Korea), \*Dukhyun Choi (Kyung Hee University, Korea)
- ThPS-66 P00054 **Discussion about Magnets for Sustainable Triboelectric Nanogenerator System driven by Magnetic Force**  
Hakjeong Kim (Kyung Hee University, Korea), Khanh Duy Pham (Kyung Hee University, Viet Nam), Dongseob Kim (Korea Institute of Industrial Technology, Korea), \*Dukhyun Choi (Kyung Hee University, Korea)
- ThPS-67 P00055 **Multi-purpose Vibration Energy Harvesting using Domino Impact Tandem Triboelectric Nanogenerator**  
Khanh Duy Pham, Divij Bhatia, and \*Dukhyun Choi (Kyung Hee University, Korea)

## Thursday, October 17, 2019

- ThPS-68 P00057 **Neutral Beam Treatment for Enhancing Triboelectric Performance**  
Wook Kim (Kyung Hee University, Korea), Dongseob Kim (Korea Institute of Industrial Technology, Korea), \*Dukhyun Choi (Kyung Hee University, Korea)
- ThPS-69 P00059 **TENG Output Enhancement based Nanopillar PDMS Tribo-material**  
Nghia Dinh Huynh, Wook Kim, and Hee Jae Hwang (Kyung Hee University, Korea), Dongseob Kim (Korea Institute of Industrial Technology, Korea), \*Dukhyun Choi (Kyung Hee University, Korea)
- ThPS-70 P00100 **Multilayered APTES Modified Porous GNP-PDMS Triboelectric Nanogenerators**  
Habtamu Gebeyehu Menge and \*Yong Tae Park (Myongji University, Korea), Dukhyun Choi (Kyung Hee University, Korea), Dongseob Kim (Korea Institute of Industrial Technology, Korea), Jin Ok Kim (Myongji University, Korea)
- ThPS-71 P00124 **Incorporation of High Permittivity  $\text{CaCu}_3\text{Ti}_4\text{O}_{12}$  Particles for Internal Polarization Amplification of Triboelectric Nanogenerators**  
Jihye Kim and \*Sang-Woo Kim (Sungkyunkwan University, Korea)
- ThPS-72 P00126 **Metal Nanowire-polymer Matrix Hybrid Layer for Triboelectric Nanogenerator**  
Hyungseok Kang, Hyoung Taek Kim, Hwi Je Woo, Han Kim, SeongMin Kim, Young Jae Song, and \*Sang-Woo Kim (Sungkyunkwan University, Korea), Jeong Ho Cho (Yonsei University, Korea)
- ThPS-73 P00128 **Triboelectric Direct Current Generator based on Accumulating Charges-driven Microdischarge**  
Minki Kang, Hong-Joon Yoon, and \*Sang-Woo Kim (Sungkyunkwan University, Korea)
- ThPS-74 P00193 **Rotation Type Triboelectric Nanogenerator Driven by Pump Drill**  
Jeong-Won Lee, Moonsu Kim, Jonghyeon Jeong, Kwangseok Lee, Donghyeon Yoo, Seoulmin Lee, Dong Sung Kim, and Jae-Yoon Sim (POSTECH, Korea), Insang Song (ADD, Korea), \*Woonbong Hwang (POSTECH, Korea)
- ThPS-75 P00207 **High Power Triboelectric Nanogenerator through the Storage Layer of Optimized Anodic Aluminum Oxide(AAO)**  
Kwangseok Lee, Gyosik Jun, Jeong-Won Lee, Donghyun Yoo, Dong Sung Kim, and Jae-Yoon Sim (POSTECH, Korea), Insang Song (Agency for Defense Development, Korea), \*Woonbong Hwang (POSTECH, Korea)

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- ThPS-76 P00228 **Self-powered Portable Electrospraying System Using Triboelectric Nanogenerator**  
Jun Hyuk Choi, Yoonsang Ra, Sunmin Jang, Yeongcheol Yun, Sumin Cho, and \*Dongwhi Choi (Kyung Hee University, Korea)
- ThPS-77 P00229 **Self-Powered Plastic Gear Abrasion Sensor based on Triboelectric Effect**  
Yoonsang Ra, JoonHo Lee, Jun Hyuk Choi, Yeongcheol Yun, and Sunmin Jang (Kyung Hee University, Korea), Sumin Cho, Jin-Gyun Kim and \*Dongwhi Choi (Kyung Hee University, Korea)
- ThPS-78 P00230 **Enhanced performance of the Transparent Liquid-Solid Contact Based Triboelectric Nanogenerator by using an Electret**  
Sunmin Jang, Yeongcheol Yun, Sumin Cho, Jun Hyuk Choi, Yoonsang Ra, and \*Dongwhi Choi (Kyung Hee University, Korea)
- ThPS-79 P00231 **Development of Novel Type of the Triboelectric Nanogenerator for Effective Biomechanical Energy Harvesting**  
Sumin Cho, Yeongcheol Yun, Sunmin Jang, Jun Hyuk Choi, Yoonsang Ra, and \*Dongwhi Choi (Kyung Hee University, Korea)
- ThPS-80 P00232 **Highly Charged Electret for Boosted and Stable Electrical Output Performance of the Triboelectric Nanogenerator**  
Yeongcheol Yun (Kyung Hee University, Korea), Sumin Cho, Sunmin Jang, Jun Hyuk Choi, Yoonsang Ra, and \*Dongwhi Choi (Kyung Hee University, Korea)
- ThPS-81 P00255 **A Self-Powered Liquid Sensor Based on Triboelectric Generator and Microfluidic System**  
Daehwan Choi (Yonsei University, Korea), Wook Kim and Dukhyun Choi (Kyung Hee University, Korea), \*Jang-Yeon Kwon (Yonsei University, Korea)
- ThPS-82 P00299 **Triboelectric Nanogenerator based on Flow-induced Vibration**  
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- ThPS-83 P00318 **Eco-friendly Fluid Triboelectric Nanogenerator (FluTENG) with the Evaluation of Contact and Sliding Mode**  
Ravi Kumar Cheedarala and \*Song IL Jung (Changwon National University, Korea)

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ThPS-84 P00113 **A Study on Several Effects about HELMHOLTZ Resonator based Piezoelectric Sound Energy Harvester**

Jaehoon Choi, Inki Jung, and \*Chong-Yun Kang (Korea Institute of Science and Technology, Korea)

ThPS-85 P00125 **Magnetically Coupled Energy Harvester Array for Wide-band Frequency Operation**

Yeon-Jeong Yee ( KU-KIST Graduate School of Converging Science and Technology, Korea University, Korea), Dong-Gyu Lee (Korea University, Korea), Chong-Yun Kang (Korea Institute of Science and Technology, Korea), Sahn Nahm (KU-KIST Graduate School of Converging Science and Technology, Korea University, Korea), \*Hyun-Cheol Song (Korea Institute of Science and Technology, Korea)

ThPS-86 P00297 **Robust Nanogenerators Based on Graft Copolymers via Control of Dielectrics**

\*Jeong Min Baik, Jae Won Lee, Jin Pyo Lee, and Gi Hyeon Han (Ulsan National Institute of Science and Technology, Korea)

ThPS-87 P00298 **Highly-correlative Flexible Motion Sensors based on Asymmetric Piezotronic Effect**

\*Jeong Min Baik, Jae Won Lee, and Gi Hyeon Han (Ulsan National Institute of Science and Technology, Korea)

ThPS-88 P00322 **Super-flexible Piezoelectric Nanogenerator based on ZnO Nanowire Arrays**

Hyungseok Yong and Banseok Kim (Chung-Ang University, Korea), Dongseob Kim (Korea Institute of Industrial Technology, Korea), \*Sangmin Lee (Chung-Ang University, Korea)

ThPS-89 P00323 **Ultrathin Piezoelectric Nanogenerators as Self-powered Eyeball Motion Sensors**

Hyungseok Yong and Banseok Kim (Chung-Ang University, Korea), Dongseob Kim (Korea Institute of Industrial Technology, Korea), \*Sangmin Lee (Chung-Ang University, Korea)

ThPS-90 P00338 **Study for Temperature Dependent Piezotronic Effect of MoS<sub>2</sub> Monolayer**

Jaehwan Jung and \*Sang-Woo Kim (Sungkyunkwan University, Korea)

ThPS-91 P00339 **Point-Defect-Passivated MoS<sub>2</sub> Nanosheet-Based High Output Piezoelectric Nanogenerator**

Tae Hyeong Kim, Sang A Han, Tae-Ho Kim, and \*Sang-Woo Kim (Sungkyunkwan University, Korea)

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ThPS-93 P00257 **Large Thermoelectric Voltage Obtained by Electron and Ion Dual Contribution in Carbon Nanotube Incorporated Organic Nanocomposites**

Kyungwho Choi (Korea Railroad Research Institute, Korea), Yong Tae Park (Myongji University, Korea), \*Choongho Yu (Texas A&M University, United States)

ThPS-94 P00270 **Analyzing Thermoelectric Behavior by Altering Dispersant and Defoamer in Carbon Nanotubes Incorporated Cement Infra Composites**

\*Kyungwho Choi and Yunkyung Min (Korea Railroad Research Institute, Korea)

ThPS-95 P00306 **High Thermoelectric Performance of Layer-by-Layer Assembled Organic Thin Films**

Wonjun Jang (Myongji University, Korea), Dongseob Kim (Korea Institute of Industrial Technology (KITECH), Korea), Kyungwho Choi (Korea Railroad Research Institute, Korea), \*Yong Tae Park (Myongji University, Korea)

ThPS-96 P00174 **Visualizing the Enhanced Photoelectrochemical Hydrogen Evolution by An Atomically Thin Heterojunction catalyst**

Jae Yoon Lee (Korea University, Korea), Sungwoo Kang (Seoul National University, Korea), Donghun Lee (Korea University, Korea), Seokhoon Choi (Seoul National University, Korea), Seunghoon Yang (Korea University, Korea), Kangwon Kim (Sogang University, Korea), Yoon Seok Kim (Korea University, Korea), Ki Chang Kwon (Seoul National University, Korea), Sooho Choi (Dongguk University, Korea), Soo Min Kim (Institute of Advanced Composite Materials, Korea Institute of Science and Technology, Korea), Woong Huh and Hee Seong Kang (Korea University, Korea), Hyeonsik Cheng (Sogang University, Korea), Seungwu Han and Ho Won Jang (Seoul National University, Korea), \*Chul-Ho Lee (Korea University, Korea)

ThPS-97 P00181 **Electron Transport Layer Modified Highly Stable Inverted Planar p-i-n Structure Perovskite Solar Cells**

Pramila Patil and \*Seok-In Na (Chonbuk National University, Korea)

ThPS-98 P00204 **Highly Efficient and Stable Inverted Planar Perovskite Solar Cell with NiO as A Hole Transport Layer**

Dilpreet Singh Mann and \*Seok-In Na (Chonbuk National University, Korea)

ThPS-99 P00216 **High performance Planar Perovskite Solar Cell Using New Electronic-Transportation Layer**

Da Seul Choi and \*Seok-In Na (Chonbuk National University, Korea)



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ThPS-100 P00262 **Semi-Transparent Perovskite Solar Cells with 2-Step InZnSnO Top Cathode Deposited by Linear Facing Target Sputtering without Plasma Damage**

Sang-Hwi Lim, Hae-Jun Seok and Shuai Lan (Sungkyunkwan University, Korea), Dong-Hyuk Choi and Do-Hyeong Kim (Korea Electric Power Research Institute, Korea), \*Han-Ki Kim (Sungkyunkwan University, Korea)

ThPS-101 P00267 **Hybrid ITO Films Prepared by Ion Plating and DC Sputtering on CPI Substrates for Flexible Perovskite Solar Cells**

\*Hae-Jun Seok, Sang-Hwi Lim and Shuai Lan (Sungkyunkwan University, Korea), Seok-Soon Kim (Kusan National University, Korea), Han-Ki Kim (Sungkyunkwan University, Korea)

ThPS-102 P00269 **Ultrathin Transparent Conductive Titanium Nitride Thin Films Fabricated by Radio-frequency Magnetron Sputtering**

\*Shuai Lan, Hae-Jun Seok, and Sang-Hwi Lim (Sungkyunkwan University, Korea), Dong-Hyuk Choi and Do-Hyeong Kim (Korea Electric Power Research Institute, Korea), Han-Ki Kim (Sungkyunkwan University, Korea)

ThPS-103 P00313 **A Novel Engineering Approach in Sustainable Energy Harvesting; by Fabrication of Quasi Flexible and Bio-inspired DSSCs**

Dinesh Veeran Ponnuvelu and \*Dukhyun Choi (Kyung Hee University, Korea), Biji Pullithadhathil (PSG Institute of Advanced Studies, India)

ThPS-104 P00069 **Comb-structured Triboelectric Nanogenerators for Multi-directional Energy Harvesting**

Yeonseok Jung, Hee Jae Hwang, and \*Dukhyun Choi (Kyung Hee University, Korea)

ThPS-105 P00099 **Spiral Shape Energy Harvester with Silicone Finger Bending Model using PVDF**

Yunhee Kim (KIST, Korea), Nazanin Minaian and Kwang J. Kim (University of Nevada, Las Vegas, United States), \*Youngsu Cha (KIST, Korea)

ThPS-106 P00235 **Impedance Matching FOR Maximum Energy Harvesting Circuits Using Buoy and Cable in Ocean**

Yoon Sang Jeong, Hina Ashraf and \*Chong Hyun Lee (Jeju National University, Korea)

ThPS-107 P00268 **Sustainable Energy Harvesting Technology based on Triboelectric Nanogenerators and Loss-energy Harvesting System**

Hyungseok Yong and Sangmin Lee (Chung-Ang University, Korea), \*Dongseob Kim (Korea Institute of Industrial Technology, Korea)

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- ThPS-108 P00271 **Wireless-Powered VOC Sensor Based on Wi-Fi Energy-Harvesting Metamaterial with i-TPU**  
Wonwoo Lee, Heejoo Park, and Hyunseung Jung (Soongsil University, Korea), So Young Kim and Do Hwan Kim (Hanyang University, Korea), \*Hojin Lee (Soongsil University, Korea)
- ThPS-109 P00094 **Development of Functionalized Titanium Carbide and Vanadium Pentoxide Nanowires-CNT for Lithium-Ion-Batteries**  
Sanghee Nam, Saewoong Oh, and \*Il-Kwon Oh (Korea Advanced Institute of Science and Technology, Korea)
- ThPS-110 P00201 **Porous Materials of SnO<sub>2</sub>@Co<sub>3</sub>O<sub>4</sub>/Nitrogen Doped Graphene Oxide Electrodes for Symmetric and Asymmetric Supercapacitor Applications**  
\*Sivalingam Ramesh, H.M. Yadav, and Heung Soo Kim (Dongguk University, Korea), Joo-Hyung Kim (Inha University, Korea)
- ThPS-111 P00203 **Nanosheet Structured of Ni(OH)<sub>2</sub> Decorated on the Nitrogen doped MWCNT for High-performance Supercapacitor Material Applications**  
\*Sivalingam Ramesh, H.M. Yadav, and Heung Soo Kim (Dongguk University, Korea), Joo-Hyung Kim (Inha University, Korea)
- ThPS-112 P00210 **Understanding of Thermodynamic and Structural Behaviors of NaNi<sub>x</sub>Mn<sub>1-x</sub>O<sub>2</sub> (0≤x≤1) for Sodium-Ion Batteries.**  
Jangmin Lee and \*Duho Kim (Kyung-Hee University, Korea)
- ThPS-113 P00226 **Zn-Ni-S nanosheet arrays for ultrahigh-performance of asymmetric supercapacitor**  
Ghuzanfar Saeed, Young Sun Lee, Duy Thanh Tran, Nam Hoon Kim, and \*Joong Hee Lee (Chonbuk National University, Korea)
- ThPS-114 P00227 **NbCoMoS nanoparticles anchored N, S Graphene Aerogel as Highly Efficient Electrode Materials for Supercapacitors**  
Jiu Yi Dai, Jayaraman Balamurugan, Thanh Tuan Nguyen, Nam Hoon Kim, and \*Joong Hee Lee (Chonbuk National University, Korea)
- ThPS-115 P00265 **Hierarchical SiCN Nanowires for Efficient Photocatalytic-photoelectrocatalytic and Supercapacitor Applications**  
Junhan Park (Korea Institute of Industrial Technology, Korea), Jaesool Shim (Yeungnam University, Korea), \*Dongseob Kim (Korea Institute of Industrial Technology, Korea)

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- ThPS-116 P00266 **Highly Stretchable Zinc Silver Rechargeable Batteries**  
Woo-Jin Song (Pohang University of Science and Technology, Korea), Min Sik Kong (POSTECH, Korea), Unyong Jeong and \*Soojin Park (Pohang University of Science and Technology, Korea)
- ThPS-117 P00311 **Ameliorating the Electrode/Electrolyte Interfacial Contact in Garnet-type All Solid-state Li-ion Battery**  
Ramkumar Balasubramaniam, \*Yun-Sung Lee, Chan-Woo Nam, and Hyun-Jae Kim (Chonnam National University, Korea)
- ThPS-118 P00312 **Improved Stability of NCM811 by optimized  $Al_2O_3$  Nanocoatings via Atomic Layer Deposition**  
Hari Vignesh Ramasamy and \*Yun-Sung Lee (Chonnam National University, Korea)
- ThPS-119 P00120 **Micro Molding of Nanocellulose Multifunctional Material for Space Lens Application**  
Hyun Chan Kim, Jung Woong Kim, \*Jaehwan Kim, Lindong Zhai, and Ruth M. Muthoka (Inha University, Korea)
- ThPS-120 P00154 **Review on Technology of Deployable Boom in Solar Sail in Viewpoint of Material, Structure, and Manufacturing**  
WooHyuk Lee, Jae Yeon Cho, and \*Sang-Eui Lee (Inha University, Korea)
- ThPS-121 P00292 **Modeling and Validation of Solar Panels Deployment with Path-dependent Tape Spring Hinge by Multi Flexible Body Dynamics and Zero-G Device**  
Dong-Yeon Kim, \*Jae Hyuk Lim, Do-Won Kim, and Han-Sol Choi (Chonbuk National University, Korea), Hyeon Kim (CAMTIC, Korea)
- ThPS-122 P00109 **Development for Multi-purpose Space Exploration Cubesat**  
Gwang-Wook Hong, Woo-Jong Tak, Eunhyun Kim, Jinuk Kim, and \*Joo-Hyung Kim (Inha University, Korea)
- ThPS-123 P00263 **Investigation of Crater Meton as a Prospective Lunar Landing Candidate Site**  
Suyeon Kim (Chungnam National University, Korea), \*Kyeong Ja Kim (Korea Institute of Geoscience and Mineral Resources, Korea), Yu Yi (Chungnam National University, Korea)
- ThPS-124 P00123 **A Study on the Characteristics Dissimilar Polymer Flexible Sensor by using Dual Nozzle FDM 3D Printer**  
Sun Kon Lee, Young Chan Oh, Woo-Jong Tak, Su Hyun Kim, Gwang-Wook Hong, and \*Joo-Hyung Kim (Inha University, Korea)

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Minjeong Ji, Jeong Hee Hong (Gachon University, Korea) and \*Kuk Hui Son (Korea University, Korea)
- ThPS-126 P00247 **Computational Simulation of the Nickel Plated MWCNT via Molecular Dynamics**  
Hangil You and \*Gun Jin Yun (Seoul National University, Korea)
- ThPS-127 P00249 **Optimal Design of Scissor Structural Mechanism for Space Deployable Structures**  
Yeeryung Choi and \*Gun Jin Yun (Seoul National University, Korea)
- ThPS-128 P00246 **Experimental Development of Continuous Flow-Through Trace Gas Preconcentrator**  
\*Jihyun Kim (Inha University, Korea)