Program Book

The 8th ICMAP & The 9th ISFM

The 8th International Conference on Microelectronics and Plasma Technology

The 9th International Symposium on Functional Materials

January 17~20, 2021

Online Conference

Organized by

KVS The Korean Vacuum Society

첨단소재기술연구소 Research Center for Advanced Materials Technology

BK21 FOUR 성균관대학교 학생성공형 인테크소재 글로벌 인재양성 교육연구단

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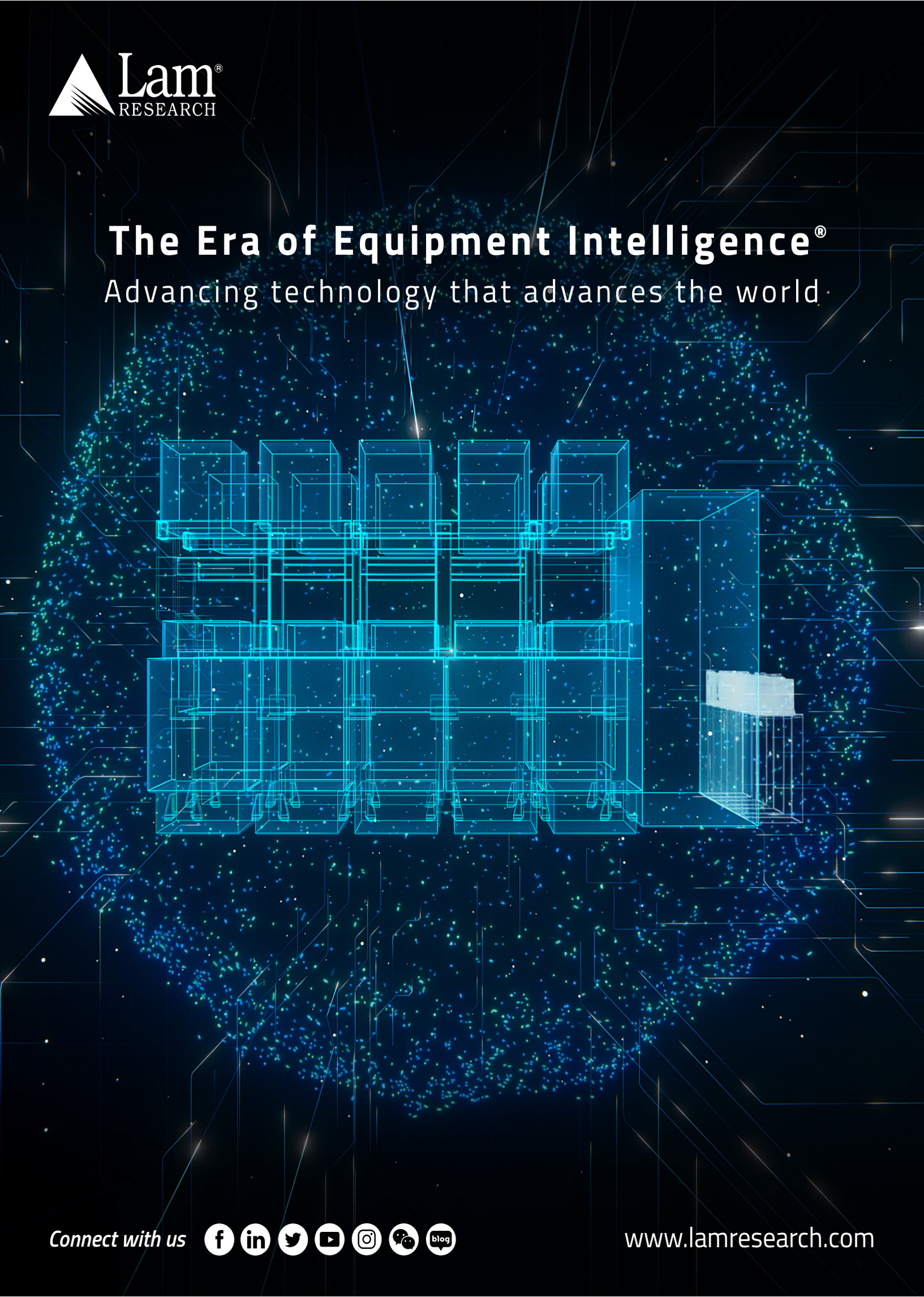

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Ⅰ. Welcome Message

The 8th ICMAP

The 8th International Conference on Microelectronics and Plasma Technology (ICMAP) will provide an open forum for the discussion of the current status of scientific and technological achievements in the field of plasma technology and applications including the microelectronics. The microelectronics has been the most important main area that the ICMAP should generally cover but there are also many other interesting research areas that could be discussed in the ICMAP since they have been getting more innovated by adopting the plasma technology. So, the main scope of this conference will cover more extended areas: Plasma bioscience & medicine, plasma processing for semiconductor and display devices, plasma processes for nanomaterial development, plasma diagnostics and process monitoring technology, plasma sources and technology, plasma modelling and simulation techniques.

The 8th ICMAP was supposed to be held last year as usual but had to been postponed to this year because of the pandemic situation and finally is held in an on-line conference on January 17 ~ 20, 2021. In spite of the very strange experience with the on-line conference, some interesting programs will additively be prepared: Special session to exchange ideas of current issues, technical trends, R&D needs, connectivity for the future, and also tutorial sessions.

On behalf of the organizing committee, we would like to express our warmest welcome to all of you who are participating in The 8th ICMAP. We sincerely hope that all the participants enjoy one of the most valuable experiences to share the latest knowledge and make new friendships in this advanced on-line world, The 8th ICMAP.

Suk Jae Yoo
KFE, Korea
Conference Chairs of The 8th ICMAP

The 9th ISFM

It is my honor and privilege to greet each and every one of you from different parts of the world to participate in **the 8th International Conference on Microelectronics and Plasma Technology (The 8th ICMAP) & the 9th International Symposium on Functional Materials (The 9th ISFM).**

As I know, The 8th ICMAP is initiated to provide an open forum for the discussion of the current status of scientific and technological achievements in the various fields of plasma applied research and developments including microelectronic devices. The 9th ISFM is a biennial multidisciplinary meeting bring together scientists, researchers, and engineering applications of functional materials, and will cover a broad spectrum of key topics related to energy, environmental, biomedical, electronic and nanostructure materials.

On behalf of the organizing committee, I firstly would like to express our warmest welcome to all of you who are participating in The 8th ICMAP & The 9th ISFM. Due to the global pandemic of COVID-19, we are very sorry that The 8th ICMAP & The 9th ISFM Conference will only be held On-line for 4 days from January 17 to January 20, 2021.

Despite this situation, I would like to deeply thank the plenary speakers, keynote speakers, invited speakers, general oral and poster speakers who are willing to present valuable research results for this conference. For this meeting, our technical program comprised more than 330 presentations on various topics from the 16 countries.

Next, I sincerely hope that all the participants have valuable time to have profound and useful discussions and also make long-lasting friendships with other participants and renowned researchers. Also, I wish that this conference will help foster collaborations among scientists and experts in the subject areas by exchanging information and new findings with each other.

Finally, I am very grateful for the financial support from various Korean industries and universities. And a special thank goes to General Secretary, all Secretaries and Staffs for the preparation of this meeting successfully.

Thank you very much.

Jin-Hyo Boo
Sungkyunkwan Univ., Korea
Conference Chairs of The 9th ISFM

II. Program

January 17 (Sun.)					
Time/Place		**Channel A**	**Channel B**	**Channel C**	**-**
11:00-11:10	10'	**Opening Ceremony**			
11:10-12:00	50'	**[PL1] Prof. Shu-Hong Yu (Univ. of Sci. and Tech. of China, China)** **"Emerging Nanoassemblies and Their Functions"** Session Chair: Prof. Jin-Hyo Boo (Sungkyunkwan Univ., Korea)			
12:00-13:10	70'	Lunch			
13:10-14:00	50'	**[PL2] Prof. Peter Bruggeman (Univ. of Minnesota, USA)** **"Plasma Biology and Chemistry for Innovations in Agriculture and the Food Cycle"** Session Chair: Eun-Ha Choi (Kwangwoon Univ., Korea)			
14:00-14:20	20'	Break			
14:20-16:00	100'	**SA1** Flexible and Stretchable Substrate and Display (14:20-16:00)	**SB1** 2D Materials and Their Application to Nano/Micro Devices I (14:20-15:50)		**[튜토리얼]** 시뮬레이션 14:00-17:00
16:00-16:20	20'	Break			
16:20-18:00	100'	**SA2** Flexible and Stretchable Physcial Sensors (16:20-18:40)	**SB2** 2D Materials and Their Application to Nano/Micro Devices II (16:20-18:10)		

January 18 (Mon.)					
Time/Place		**Channel A**	**Channel B**	**Channel C**	**-**
09:00-10:40	100'	**MA1** Flexible and Stretchable Biochemical Sensors (09-00-10:50)	**MB1** 2D Materials and Their Application to Nano/Micro Devices III (09-00-10:50)	**MC1** Plasma Modeling and Simulation Techniques I (09:00-10:40)	**[튜토리얼]** 진단 09:00-11:00
10:40-11:00	20'	Break			
11:00-11:50	50'	**[PL3] Eric Robert (Univ. Orleans, France)** **"Plasma Jets above or inside Liquids: Basic but Tricky and Promising Setups"** Session Chair: Eun-Ha Choi (Kwangwoon Univ., Korea)			
11:50-13:00	70'	Lunch			
13:00-13:50	50'	**[PL4] Dr. Hyeon Gon Lee (KFE, Korea)** **"Status of Research and Development for Demonstration of Fusion Energy"** Session Chair: Jung-Sik Yoon (Korea Inst. of Fusion Energy, Korea)			
13:50-14:10	20'	Break			
14:10-15:50	100'	**MA2** Vaccum Depoosition Technology for Inorganic Materials and Devices (14:10-15:50)	**MB2** 2D Materials and Their Application to Nano/Micro Devices IV (14:10-15:40)	**MC2** Plasma Modeling and 7Simulation Techniques II (14:10-16:00)	**[튜토리얼]** 분석기술 14:00-17:00
15:50-16:10	20'	Break			
16:10-17:50	100'	**MA3** Perovskite Opto-Electronics (16:10-18:10)	**MB3** 2D Materials and Their Application to Nano/Micro Devices V (16:10-17:30)	**MC3** Plasma Modeling and Simulation Techniques III (16:10-18:00)	

January 19 (Tue.)

Time/Place		Channel A	Channel B	Channel C	-
09:00-10:40	100'	**TA1** 2D Materials and Nanoparticle Applications (09:00-10:40)	**TB1** Plasma Sources and Technology I (09:00-10:40)	**TC1** Plasma Modeling and Simulation Techniques IV (09:00-10:40)	
10:40-11:00	20'	Break			
11:00-11:50	50'	**[PL5] CEO. Changjin Kang (SEMES, Korea)** **"Plasma Technology Trends in Semiconductor Equipment Industry"** Session Chair: Heeyeop Chae (Sungkyunkwan Univ., Korea)			
11:50-13:00	70'	Lunch			
13:00-14:10	70'	**TA2** Nanoparticle Applications (12:50-14:20)	**TB2** Plasma Sources and Technology II (13:00-14:00)	**TC2** Plasma Modeling and Simulation Techniques V (13:00-14:20)	**[스페셜세션]** 13:00-18:00
14:10-14:30	20'	Break			
14:30-16:10	100'	**TA3** Plasma Bioscience (14:30-16:10)	**TB3** Plasma Sources and Technology III (14:30-16:10)	**TC3** Plasma Deposition and Etching - I (PECVD, Beam, Tilting, Pulsing) (14:30-16:00)	
16:10-16:30	20'	Break			
16:30-18:10	100'	**TA4** Plasma Agriculture (16:30-18:10)	**TB4** Plasma Diagnostics and Process Monitoring Technology I (16:30-18:10)	**TC4** Plasma Deposition and Etching - II (GWP, Thermal, ALE, MTJ, DFT) (16:30-18:50)	

January 20 (Wed.)

Time/Place		Channel A	Channel B	Channel C	-
09:00-10:40	100'	**WA1** Photovoltaics Related Materials and Devices (09:00-10:50)	**WB1** Plasma Diagnostics and Process Monitoring Technology II (09:00-10:10)	**WC1** Plasma Deposition and Etching - III (ALE, PI-VM and MD Simulation) (09:00-10:40)	**[튜토리얼]** ALD 09:00-12:00
10:40-11:00	20'	Break			
11:00-12:10	70'	**WA2** Battery Related Materials and Devices (11:00-12:10)	**WB2** Plasma Diagnostics and Process Monitoring Technology III (11:00-12:20)	**WC2** Plasmas Characterization and Application (11:00-11:50)	
12:10-13:20	70'	Lunch			
13:20-15:00	100'	**WA3** Energy Harvesting, Storage and Conversion I (13:20-15:00)	**WB3** Plasma Diagnostics and Process Monitoring Technology IV (13:20-14:40)	**WC3** Plasmas for Nanomaterial Synthesis (13:20-15:00)	**[튜토리얼]** ALE 14:00-17:00
15:00-15:20	20'	Break			
15:20-17:00	100'	**WA4** Energy Harvesting, Storage and Conversion II (15:20-17:00)		**WC4** Plasma Process for Environmental Issues (15:20-17:00)	
17:00-17:20	20'	Break			
17:20-18:30	70'	**WA5** Plasma Medicine (17:20-18:30)		**WC5** Plasmas for Energy Related Issues (17:20-18:00)	
18:30-18:40	10'	Break			
18:40-18:50	10'	**Closing Ceremony**			

Topics

01 : Plasma Bioscience & Medicine

02 : Plasma Processing for Semiconductor and Display Devices

03 : Plasma Processes for Nanomaterial Development

04 : Plasma Diagnostics and Process Monitoring Technology

05 : Plasma Sources and Technology

06 : Plasma Modeling and Simulation Techniques

07 : 2D Materials and Their Application to Nano/Micro Devices

08 : Flexible and Stretchable Displays & Sensors

09 : Energy Related Devices

10 : Functional Materials - Synthesis, Characterizations, and Application

How to See the Session Codes

Day of Week		Channel	Session No.	Presentation No.
Sunday	S	A	1	1
Monday	M	B	2	2
Tuesday	T	C	3	3
Wednesday	W	-	4	4
			5	5
				-

※ Off-line Conference Venue: Rolling Hills, Hwaseong, Korea

III. Sponsorship and Support

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IV. Organization

Organizing Committees

Honorary Chair	Chi Kyu Choi (Jeju Nat'l Univ., Korea) Geun Young Yeom (Sungkyunkwan Univ., Korea)
Conference Chair	**The 8th ICMAP :** Suk Jae Yoo (Korea Inst. of Fusion Energy, Korea) **The 9th ISFM :** Jin-Hyo Boo (Sungkyunkwan Univ., Korea)
Committee Members	Hee Hwan Choe (Korea Aerospace Univ., Korea) Bert Ellingboe (Dublin City Univ., Ireland) David B. Graves (Univ. of California Berkley, USA) Satoshi Hamaguchi (Osaka Univ., Japan) Junghoon Joo (Kunsan Nat'l Univ., Korea) Deuk-Chul Kwon (Korea Inst. of Fusion Energy, Korea) Hyo-Chang Lee (KRISS, Korea) Se Youn Moon (Chonbuk Nat'l Univ., Korea) Masaharu Shiratani (Kyushu Univ., Japan) Yuan-Hong Song (Dalian Univ. of Tech., China) Jung-Sik Yoon (Korea Inst. of Fusion Energy, Korea) Shin Jae You (Chungnam Nat'l Univ., Korea) [ISFM] Chang Lyoul Lee (GIST, Korea) [ISFM] Jeahyeong Lee (Sungkyunkwan Univ., Korea) [ISFM] Changsik Song (Sungkyunkwan Univ., Korea)

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Prof. Yinong Liu (Western Australia Univ., Australia)
Prof. Ruediger A. Eichel (Forschungszentrum Juelich, Germany)
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Prof. Jaebum Choo (Chung-Ang Univ., Korea)
Prof. Hongjie Zhang (CAS, China)
Prof. Van Humbeeck Jan (Kathelieke Univ. Leuven, Belgium)
Prof. Eunha Choi (Kwangwoon Univ., Korea)
Prof. Jiman Kim (Sungkyunkwan Univ., Korea)
Prof. Taekdong Chung (Seoul Nat'l Univ., Korea)
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Prof. Joshua Edel (Imperial College London, UK)
Prof. Kyoung Nam Kim (Yonsei Univ., Korea)
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Won Jong Yoo (Sungkyunkwan Univ., Korea)
Shin Jae You (Chungnam Nat'l Univ., Korea)
Wansoo Yun (Sungkyunkwan Univ., Korea)

Ⅴ. Conference Topics

1. Plasma Bioscience & Medicine

Session Chairs: Eun-Ha Choi (Kwangwoon Univ., Korea), Sungmo Moon (KIMS, Korea)

- Fundamentals of Atmospheric Plasmas
- Plasma Sources for Biomedical Applications
- Plasma-cell and Plasma-tissue Interactions – Biological and Biochemical Reactions
- Plasma-surface Interactions/Modifications for Biomedical Applications
- Plasma-based Decontamination and Sterilization
- Plasma for Pharmaceutical Applications, Biochemical and Biomolecular Engineering
- Plasma Modeling and Numerical Simulation

2. Plasma Processing for Semiconductor and Display Devices

Session Chairs: Heeyeop Chae (Sungkyunkwan Univ., Korea), Hyeongtag Jeon (Hanyang Univ., Korea), Junghoon Joo (Kunsan Nat'l Univ., Korea), Se Hun Kwon (Pusan Nat'l Univ., Korea)

- Plasma-Enhanced Chemical Vapor Deposition (PECVD)
- Plasma-Enhanced Atomic Layer Deposition (PEALD)
- Plasma Sputtering for TSV Applications
- Plasma Etching
- Atomic Layer Etching (ALE)/Plasma Atomic Layer Etching
- Atomic Layer Cleaning
- Plasma Ashing
- Environment-friendly Plasma Processing

3. Plasma Processes for Nanomaterial Development

Session Chairs: Goo-Hwan Jeong (Kangwon Nat'l Univ., Korea), Li Oi Lun (Pusan Nat'l Univ., Korea)

- Plasma-Assisted Nanomaterial Synthesis and Functionalization
- Atmospheric Plasma Processes for Nanomaterial Development
- Solution Plasma Processes for Nanomaterial Development

4. Plasma Diagnostics and Process Monitoring Technology

Session Chair: Shin Jae You (Chungnam Nat'l Univ., Korea)

- Plasma Parameter Diagnostics
- Processing Monitoring (Film Thickness, Collision Frequency, Wafer Temperature, etc.)
- AI Based Plasma Diagnostics/Monitoring

5. Plasma Sources and Technology

Session Chair: Julian Schulze (Ruhr Univ. Bochum, Germany)

- Plasma Sources (RF Plasma, DC Plasma, Plasma Propulsion, Thermal Plasma, Laser Plasma, Magnetized Plasma, etc.)

6. Plasma Modeling and Simulation Techniques

Session Chair: Yuan-Hong Song (Dalian Univ. of Tech., China)

- Sheaths / Plasma Physics / Plasma Kinetics / Fundamental Plasma Physics
- Modeling / Numerical Analysis / Plasma Simulations
- Dusty Plasmas / Strongly Coupled Plasmas
- Fundamental Processes in Plasma

7. 2D Materials and Their Application to Nano/Micro Devices

Session Chairs: Taesung Kim (Sungkyunkwan Univ., Korea), Won Jong Yoo (Sungkyunkwan Univ., Korea)

- Issues on Plasma Processing of 2D Materials
- Characterization of 2D Materials and Devices
- Application to Flexible Devices
- Application to Energy Devices

8. Flexible and Stretchable Displays & Sensors

Session Chair: Nae-Eung Lee (Sungkyunkwan Univ., Korea)

Sub Session Chairs: Munpyo Hong (Korea Univ., Korea), Sungsoo Kim (Paichai Univ., Korea), Wansoo Yun (Sungkyunkwan Univ., Korea)

- Flexible and Stretchable Display Devices
- Flexible and Stretchable Physical, Chemical and Biological Sensors
- Flexible and Stretchable Thin-film Transistors
- Flexible and Stretchable Materials for Soft Electronics

9. Energy Related Devices

Session Chairs: Dong Chan Lim (KIMS, Korea), Donggun Lim (Korea Nat'l Univ. of Transportation, Korea)

- Energy Harvesting Materials and Devices
- Power to Gas (Fuel cell, Hydrogen, CO_2 Conversion)
- Energy Storage and Conversion Materials and Devices

10. Functional Materials - Synthesis, Characterizations, and Application

Session Chair: Chang Lyoul Lee (GIST, Korea)

Sub Session Chairs: Eun-Ha Choi (Kwangwoon Univ., Korea), Mun Seok Jeong (Sungkyunkwan Univ., Korea), Yong-Cheol Kang (Pukyong Nat'l Univ., Korea), Joo-Hyung Kim (Inha Univ., Korea), Young Dok Kim (Sungkyunkwan Univ., Korea), Jaehyeong Lee (Sungkyunkwan Univ., Korea)

- Perovskite Materials and Devices
- Organic and Inorganic Transistor
- Display (OLED, Phosphorescent LEDs, II-VI, III-V Devices)
- Organic and Inorganic Memories
- Epitaxial & Chemically Synthesized Dots
- Hybrid Organic/Inorganic QDs and Devices
- Emerging Organic and Inorganic Electronics

VI. Tutorial Sessions (On-demand)

Tutorial Session 1 : Bio Science Medicine

Plasma Biology	Prof. David Graves (Princeton Plasma Physics Lab., USA)
Influence of Cold Atmospheric Pressure Plasma on Wound Healing	Dr. Kai Masur (INP, Germany)
Nonthermal Biocompatible Plasma (NBP) Sources and Their RONS Characteristics for Plasma Biosciences	Prof. Eun Ha Choi (Kwangwoon Univ., Korea)

Tutorial Session 2 : Plasma Simulation

Numerical Modeling and Simulation of 3D ICP Reactor	Ananth Bhoj (ESI Group (ESI North America RnD), USA)

VII. Submission of Manuscript

The submitted regular manuscripts will be published in **Journal of Nanoscience and Nanotechnology (JNN), Thin Solid Films, and Functional Materials Letters, Materials Express, Applied Science and Convergence Technology (ASCT), Physics of Plasmas, Plasma Research Express, Micromachines, Catalysts** after peer reviews.
In order to be included in the journals, at least one of the authors should attend the conference and make a presentation in the assigned session.
The manuscripts should be prepared in MS-Word format. The registration fee does not include the publication charge. The accepted manuscript will be published in the journals with a fee.
(The exact fee will be notified later.)

1. Journal of Nanoscience and Nanotechnology (JNN)

Journal of Nanoscience and Nanotechnology (JNN) is a multidisciplinary peer-reviewed journal with a wide-ranging coverage, consolidating research activities in all areas of nanoscience and nanotechnology into a single and unique reference source. JNN is the first cross-disciplinary journal to publish original full research articles, rapid communications of important new scientific and technological findings, timely state-of-the-art reviews with author's photo and short biography, and current research news encompassing the fundamental and applied research in all disciplines of science, engineering and medicine.

- Publication Fee: USD 550 per paper

2. Materials Express

Materials Express (MEX) is an international multidisciplinary peer-reviewed journal reporting research on the synthesis, characterization, properties, and applications of a very wide range of materials from physical sciences to engineering to life sciences. In particular, the journal aims to report advanced materials with interesting electronic, magnetic, optical, mechanical and catalytic properties. A broad spectrum of the research topics on materials are covered.

- Materials Express is an open access journal, which provides free access to all its articles to anyone.
- Publication Fee: USD 650 per paper

3. Thin Solid Films

Thin Solid Films is an international journal which serves scientists and engineers working in the fields of thin-film synthesis, characterization, and applications. The field of thin films, which can be defined as the confluence of materials science, surface science, and applied physics, has become an identifiable unified discipline of scientific endeavor.

- It will be published in the online form of Virtual Special Issue(VSI) with no hard copy version for faster processing.
- The first submission date: 17 Jan 2021 (Elsevier System open for submissions)
- The final submission deadline: 31 Jan 2021 (The last date until which Elsevier System will be open for new submissions)
- The final acceptance deadline (for guest editors): 31 Apr 2021 (Final decision on each of the manuscript must have been made by this date)
- Publication Fee: Free

4. Functional Materials Letter

Functional Materials Letters is an international peer-reviewed scientific journal for original contributions to research on the synthesis, behavior and characterization of functional materials. The journal seeks to provide a rapid forum for the communication of novel research of high quality and with an interdisciplinary flavor. The journal is an ideal forum for communication amongst materials scientists and engineers, chemists and chemical engineers, and physicists in the dynamic fields associated with functional materials.

Functional materials are designed to make use of their natural or engineered functionalities to respond to changes in electrical and magnetic fields, physical and chemical environment, etc. These design considerations are fundamentally different to those relevant for structural materials and are the focus of this journal. Functional materials play an increasingly important role in the development of the field of materials science and engineering.

- The First Submission Date: Jan. 17, 2021 (Submit manuscript using the journal submission system with banner of ISFM2021.)
- The Deadlines of Submission will be Feb. 28, 2021.
- The Number of Publication: 20 papers
- Publication Fee: Free

5. Applied Science and Convergence Technology (ASCT)

The Korean Vacuum Society launched its official journal in 1992 under the name of Journal of the Korean Vacuum Society (JKVS; p-ISSN 1225-8822) as a quarterly journal, and it has been published in bimonthly since 2006. ASCT has succeeded JKVS as an online journal since 2014.

Applied Science and Convergence Technology (Appl. Sci. Converg. Technol., ASCT; e-ISSN 2288-6559) is currently abstracted and indexed in SCOPUS and KCI (Korea Journal Citation Index) ESCI (Emerging Sources Citation Index).

ASCT is indexed in DOI/Crossref, Google Scholar; Science Central, an archive of scientific society journal literatures at the Korean Federation of Science and Technology Societies (KOFST); Korea Science, the open platform for Korean scholarly publications of the Korea Institute of Science and Technology Information (KISTI); and the Korea Citation Index (KCI), an academic database of National Research Foundation of Korea. It also has been listed in the "Excellent Accredited Journal" since 2017, where only a few of the best journals in KCI are selected.

- Publication Fee: $300 per paper

6. Physics of Plasmas

The invited speakers to be presented in session 2, 4, 5, and 6 of the ICMAP are invited to submit their original papers in a Special Topic on "Plasma Physics and Science in Current and Next Generation Semiconductor Process" to appear in Physics of Plasmas (Guest Editor: Hyo-Chang Lee, email: LHC@kriss.re.kr), a journal published by the American Institute of Physics (AIP).

The papers will undergo regular anonymous peer-review and should be submitted by invitation only.

7. Plasma Research Express

Plasma Research Express is a broad, multidisciplinary journal devoted to publishing new experimental and theoretical research covering all areas of fundamental, engineering, and applied plasma science at low and high temperatures. Plasma Research Express welcomes contributions reporting the underlying physics mechanisms

and their wide implications through the viewpoint of plasma science, to connect the interdisciplinary applications of a wide range of temperature and density of plasmas.

• Special Topic: 'Plasma Process Technology - Sources, Diagnostics, Monitoring, Modeling, and Simulation'

Once articles are submitted (via the journal's ScholarOne system), our in-house peer review team will handle all items relating to peer review: initial selection of reviewers, invitations to review, and then follow-up with reviewers to ensure we receive the requisite 2 complete reviewer reports for each paper. For clarity, Guest Editors will not need to be involved directly in reviewing all articles. We will only need to approach the Guest Editors in specific cases, such as: to check to see that a reviewer is suitable to invite; to offer an adjudication (where reviewer reports offer a contrasting views on a paper e.g. one accept, one reject), and so forth. We can, of course, keep the Guest Editor(s) updated on the status of papers submitted to the Special Issue, as necessary.

8. Micromachines

Micromachines (ISSN 2072-666X) is an international, peer-reviewed, open access journal, which provides an advanced forum for studies on micro/nano-scaled structures, materials, devices and systems. The journal publishes reviews, original research articles, and communications in this field. Our aim is to encourage scientists to publish their theoretical and experimental results in as much detail as possible. Therefore, there is no restriction on the length of the papers or the number of electronic supplementary files. Full details on experiments, materials and methods must be provided for a research article so that the results can be reproduced.

• Publication Fee: 1600 CHF (Swiss Francs)

9. Catalysts

Catalysts (ISSN 2073-4344) is an international open access journal of catalysts and catalyzed reactions. Catalysts publishes reviews, regular research papers (articles) and short communications. Our aim is to encourage scientists to publish their experimental and theoretical results in as much detail as possible. Therefore, there is no restriction on the length of the papers. The full experimental details must be provided so that the results can be reproduced.

• If you would like to submit the paper to a special Issue named 'State-of-the-Art Nanostructured Catalysts in Asia', please submit the paper by the end of the February, 2021.
• The Number of Publication: Max. 15 papers
• Publication Fee: 2000 CHF (Swiss Francs)

Ⅷ. Program Schedule

Plenary Speakers

Plenary 1

- Date / Time: January 17 (Sun.), 2021 / 11:10-12:00
- Session Chair: Prof. Jin-Hyo Boo (Sungkyunkwan Univ., Korea)

Emerging Nanoassemblies and Their Functions

Prof. Shu-Hong Yu
(Univ. of Sci. and Tech. of China, China)

Abstract

There is a rich and long history of gaining inspiration from nature for the design of practical materials and systems. Biominerals are well-known composites of inorganic and organic materials in the form of fascinating shapes and high ordered structures, which exist in Nature, for example, pearl, oyster shells, corals, ivory, sea urchin spines, cuttlefish bone, limpet teeth, magnetic crystals in bacteria, and human bones, created by living organisms. During the past few decades, it has been one of the hottest research subjects in materials chemistry and its cutting-edge fields to explore new bio-inspired strategies for generation of materials with controlled morphologies, unique structural specialty, and complexity. This lecture will present our recent advances on bio-inspired synthesis of a family of inorganic or inorganic-organic micro-/nano- structural materials and their macroscopic scale assemblies, including bio-inspired molecule induced synthesis of micro-/nano-inorganic materials, bio-inspired interfacial assembly of macroscopic assemblies and functionalization. Especially, we will report our recent effort on how to realize the production of bulk materials, such as synthetic nacre and artificial woods, spanning all the length scales, either by predesigned matrix-directed mineralization process or a bottom-up self-assembly process. These bio-inspired materials are emerging as a new material system, showing enormous application potentials in diverse fields.

Biography

Shu-Hong Yu completed PhD in inorganic chemistry in 1998 from University of Science and Technology of China. From 1999 to 2001, he worked in Tokyo Institute of Technology as a Postdoctoral Fellow, and was awarded the AvH Fellowship (2001-2002) in the Max Planck Institute of Colloids and Interfaces, Germany. He was appointed as a full professor in 2002 and the Cheung Kong Professorship in 2006. He was elected as Academician of Chinese Academy of Sciences in 2019. He serves as the Director of the Division of Nanomaterials and Chemistry, Hefei National Laboratory for Physical Sciences at Microscale. He is the Editor-in-Chief of Materials Chemistry Frontiers, and was a senior editor for Langmuir from 2017 to 2020, and an associate editor for Sci. China Mater. and EnergyChem, and on the editorial board or advisory board of journals Accounts of Chemical Research, Advanced Materials, Nano Letters, Chemistry of Materials, Materials Horizons, Matter, Trends in Chemistry, Research, Nano Research, and ChemNanoMat. His research interests include bio-inspired synthesis of inorganic nanostructures, self-assembly of nanoscale building blocks, nanocomposites, their related properties and applications. His research work has been cited more than 57,600 citations (H index 133), named as a Highly Cited Researcher from 2014 to 2020.

Plenary 2

- Date / Time: January 17 (Sun.), 2021 / 13:10-14:00
- Session Chair: Eun-Ha Choi (Kwangwoon Univ., Korea)

Plasma Biology and Chemistry for Innovations in Agriculture and the Food Cycle

Prof. Peter Bruggeman
(Univ. of Minnesota, USA)

Abstract

The unique non-equilibrium conditions of low temperature plasmas enable the delivery of highly reactive plasma species to surfaces. This distinctive ability of low temperature plasmas led to major advances in the microelectronics industry. More recently, advances in the generation and control of atmospheric pressure plasmas enabled the extension of the use of atmospheric pressure plasmas to the treatment of heat sensitive substrates including polymers, tissue, plants and wounds leading to the emergence of many new applications in biology, medicine and agriculture.

This presentation will provide an overview of the-state-of-the-art of the field of atmospheric pressure low temperature plasmas with a focus on its use for innovations in agriculture and the food cycle. We will review plasma-based food decontamination, nitrogen fixation and the potential beneficial impact of plasma on plants and foods in general while focusing on the fundamental plasma physics, chemistry and biology that underpin these emerging applications. We will further motivate the advantages of plasma compared to conventional technologies and highlight the remaining challenges that are being addressed to enable the implementation of plasma technology in agriculture and the food industry.

Acknowledgement:

This work was partially supported by U.S. Department of Energy, Office of Science, Office of Fusion Energy Sciences, General Plasma Science program, under Award Number DE-SC-0016053 and DE-SC-0020232, the National Science Foundation under NSF OIA 2020695 and the U.S. Department of Agriculture, National Institute of Food and Agriculture under Award number 2017-67017-26172.

Biography

Dr. Peter J. Bruggeman is currently Professor and Associate Head of Mechanical Engineering at the University of Minnesota. He serves as the Director of the High Temperature and Plasma Laboratory and Associate Director of the Department of Energy Center on Plasma Interactions with Complex Interfaces consisting of 8 institutions. He also leads a Multi-University Research Initiative on “Plasma-driven solution electrochemistry”. Prof. Bruggeman obtained his PhD from Ghent University, Belgium, in 2008 and was an Assistant Professor of Applied Physics at the Eindhoven University of Technology, the Netherlands, from 2009 until he joined the University of Minnesota in 2013. A significant part of his research is focused on the fundamental physical and chemical processes of low temperature non-equilibrium plasmas enabling many environmental, biomedical and renewable energy applications and technologies. He has published over 110 papers in peer-reviewed journals and delivered invited and keynote lectures at over 80 international meetings. His research has been recognized by several awards including the 2012 Hershkowitz Early Career Award, the 2013 Institute of Pure and Applied Physics Young Scientist Medal and Prize in

Plasma Physics, the 2016 US Department of Energy Early Career Award, the 2018 Peter Mark Memorial Award of the American Vacuum Society and the 2020 George W. Taylor Award for Distinguished Research of the College of Science and Engineering of the University of Minnesota. Prof. Bruggeman is an active member of his research community. He is currently the section editor for Low Temperature Plasmas of the Journal of Physics D: Applied Physics (Institute of Physics Publishing, UK) and serves as an editorial board member of several other journals. He also served on the committee charged by the National Academies with the Decadal Study of Plasma Science (Plasma 2020) and co-edited the "2017 Plasma Roadmap" giving directions for the future development of the field of low temperature plasma. Prof. Bruggeman is also an elected member of the board of directors of the International Society of Plasma Chemistry. He has been a member of more than a dozen international scientific and organizing committees of meetings in his research field. Prof. Bruggeman was the elected chair of the 2018 Gordon Research Conference on Plasma Processing Science and organized the conference "Frontiers in Low Temperature Plasma Diagnostics X" in 2013 in the Netherlands.

Plenary 3

- Date / Time: January 18 (Mon.), 2021 / 11:00-11:50
- Session Chair: Eun-Ha Choi (Kwangwoon Univ., Korea)

Plasma Jets above or inside Liquids: Basic but Tricky and Promising Setups

Prof. Eric Robert
(Univ. Orleans, France)

Abstract

This work reports on the interaction of so-called plasma jet with or within liquid solutions. The use of the Plasma Gun as an archetypical setup for processing liquid samples or humid tissues in the context on plasma biomedical applications but also in a more innovative configuration where plasma jet is immersed in solution to generate plasma in gas bubbles will be discussed. In the "above solution" setup, recent experiments have shown that reactive species generation and delivery in the liquid could be very non intuitive, revealing the existence of steady state vortexes, surface accumulation zones, needle-like transient patterns, ... depending on various operating conditions such as gas flow, pulse repetition rate, distance to the sample, while being quite universal for various liquid containers typically used for biomedical applications. Conversely, the in-bubble plasma generation while being very dependent on the operating conditions as well and on the liquid electrical conductivity, is shown to allow for a, at a first glance surprising, very fast and very homogenous delivery of reactive species in liquid samples. Plasma generation is gas bubbles will be documented, together with the reactive species generation efficiency versus gas flow rate, number of plasma pulse delivery in a single bubble. It is shown that plasma generation in gas bubble has drastic impact on the bubble expansion dynamics and that synchronization of plasma pulse generation during the bubble lifetime could be a key parameter to optimize the reactive species generation and balance.
Perspectives for multi bubble plasma reactors delivered in large liquid volume processing will be discussed.

Biography

Eric ROBERT is CNRS senior Scientist at GREMI laboratory, Orléans, France. He has been involved in the development, diagnostics and applications of gas discharge plasmas for light source, microelectronics, Xrays diagnostics, and from ten years in the biomedical technologies.
His recent publications concern the physics of plasma jets, the antitumor action of atmospheric pressure cold plasma jets, the combination of plasma treatment with electrochimiotherapy, the use of plasmas for skin treatment in anti-aging strategies.
He is deputy director of GREMI laboratory, in charge of the "plasma for biomedical applications" team, and director of the French network "HAPPYBIO" merging forty teams connected with the researches on the use of plasmas, pulsed electric field and dynamic phototherapy for biology. He is board member of the International Society for Plasma Medicine and of the International Plasma Chemistry Society.

Plenary 4

- Date / Time: January 18 (Mon.), 2021 / 13:00-13:50
- Session Chair: Jung-Sik Yoon (Korea Inst. of Fusion Energy, Korea)

Status of Research and Development for Demonstration of Fusion Energy

Dr. Hyeon Gon Lee
(Korea Inst. of Fusion Energy, Korea)

Abstract

Fusion is the process that powers the sun and the stars. It takes place when light atomic nuclei fuse together to form a heavier one. When the lightest atom, hydrogen isotope, is heated to high temperatures, it becomes a plasma of ionized gas. In this plasma, a deuterium ion and a tritium ion could fuse to form a heavier ion of helium with emitting a neutron. In the process of fusing, some mass is converted into large amounts of kinetic energy of the neutron. The capability to contain this fusion reaction and harness the energy from it, are among the main goals of fusion research and development, which eventually leads to a new, sustainable and almost unlimited energy source on earth.

After understanding the fundamental physics of the sun energy source, physicists started research to realize the fusion energy on earth during last 60 years. As a result, significant technological and scientific achievements are induced from plasma science and fusion research. A plausible way suggested is the magnetic-confinement fusion in a device such as tokamak, stellarator, etc. Based on these basic studies by researchers, the ITER project is launched in 1988 as an international collaboration. The main purpose of the ITER is to demonstrate the scientific and technological feasibility of fusion power, by producing 500 MW of fusion power from a thermal input of 50 MW with a gain of 10. Seven Members (China, Europe, India, Japan, Korea, Russian Federation, and USA) contribute to building the ITER machine in Saint-Paul-lez-Durance of France. The ITER is the world's largest experimental facility with a first-of-a-kind fusion reactor that is inherently faced with technical challenges. Therefore, it is important for world-wide fusion communities to make their common effort towards the success of ITER (now 71% progress to the First Plasma). After construction and burning plasma operation of the ITER, all Members would set up to develop the commercial fusion plant of DEMO around the 2050s. It is noted that a number of efforts to accelerate the construction of the DEMO from each country are presented through long-term plans and roadmaps to fusion commercialization. Korea is also keen to achieve the fusion energy as a new or renewable energy source. Hence, the KO fusion community try to make every effort in preparing a technical ability and comprehensive strategy on the way towards DEMO in the areas of human resources and infra-structures for fusion R&D. In this presentation, the world-wide fusion R&D activities and roadmaps will be introduced and reviewed. In addition, perspective views on the demonstration of fusion energy on earth will be addressed.

Biography

Dr. Hyeon Gon LEE is the Vice President of Korea Institute of Fusion Energy (KFE) since 2019, who takes charge of management of R&D on the KSTAR operation, the K-DEMO design, and the plasma technology application. He is also serving as the Deputy Director General of ITER Korea, KFE since 2012. His research interests are the fusion science and engineering and plasma diagnostics, etc. He has published about 70 articles in physics and fusion science as author or co-author. He received his Ph.D. in Physics from the Graduate School of Ajou University, Korea in August 1996, following a Master Degree in 1985 and a Bachelor Degree in 1983 from the Seoul National University, Korea. He has

worked for 30 years at the KFE for R&D on the optical physics and the fusion science and engineering, including R&D as a staff member of the Korean Domestic Agency (KO-DA) for 15 years since 2004 after the accession of the Republic of Korea to a member state of the ITER Agreement. His research career was started from a study on the magneto-optical physics at the KBSI in 1990, and the research subject was moved to the optical Thomson scattering diagnostics of the plasma at the Hanbit mirror machine during 1996 - 2000. Based on this experience, he contributed to design of the Thomson scattering diagnostic system for the KSTAR during 2000 - 2005. Since 2005, he joined the Korean ITER Project as staff of the KO-DA for development of the Korean ITER diagnostics, which are the VUV Spectrometer, the Neutron Activation System, and an Upper Port Plug Engineering. In 2012, he promoted the Deputy Director General of the KO-DA to take full charges of managing all the technical areas for ontime and on-quality procurement of the KO packages, following the Head of System Engineering Division of the KO-DA in 2006.

Plenary 5

- Date / Time: January 19 (Tue.), 2021 / 11:00-11:50
- Session Chair: Heeyeop Chae (Sungkyunkwan Univ., Korea)

Plasma Technology Trends in Semiconductor Equipment Industry

CEO. Changjin Kang
(SEMES, Korea)

Abstract

The COVID-19 pandemic, in addition to the growth of data storage and AI, has ultimately reshaped our daily lives – now many things are done contactless and virtual. With the increasing use of cloud, server, networks, and computing, semiconductor bit growth need is increasing rapidly, whereas as the speed of shrinking chip size is decreasing due to technological difficulties. Therefore, now is the time for leading chipmakers to increase fab investment to meet the bit growth demand, and for equipment makers to develop high-performing and cost-effective equipment to reduce the investment cost.

Plasma plays a vital role in fab processes and equipment: a core technology in dry etch, chemical vapor deposition (CVD) and sputter deposition, and even in EUV light source for the next-gen lithography. In this talk, the application and forecast of plasma technology in the semiconductor equipment industry will be discussed.

Biography

Changjin Kang joined SEMES as Chief Executive Officer in January 2019. He has more than 30 years of experience in the semiconductor industry. Prior to this role, he had worked at Samsung Electronics in various R&D and business executive roles, including most recently as Executive Vice President of the Strategic Planning Team until 2018; Senior Vice President of the Corporate Consulting Team and the Auditing Team from 2014 to 2017; and Vice President of the Process Development Team at Semiconductor R&D Center where he started his career as a process engineer. He holds a Ph.D. and an M.S. in Material Science Engineering from Korea Advanced Institute of Science, and a B.S. in Metallurgical Engineering from Seoul National University.

Keynote Speakers

Keynote 1
[MC3-1]

- Session: [MC3] Plasma Modeling and Simulation Techniques III
- Date / Time: January 18 (Mon.), 2021 / 16:10-18:00
- Place: Channel C

Realistic Simulations of Low Pressure Capacitive Radio Frequency Plasmas Operated at Low Frequencies and High Voltage

Prof. Julian Schulze
(Ruhr-Univ. Bochum, Germany)

Abstract

For High Aspect Ratio (HAR) plasma etching capacitively coupled plasmas are operated at pressures below 1 Pa, at low driving frequencies of a few 100 kHz, and at very high voltage of about 10 kV to realize high energy and vertical ion bombardment at the wafer. To enhance the ion flux a second higher frequency in the range of several 10 MHz is often added. Due to the high driving voltage and the low pressure, charged particles, i.e. ions and secondary electrons, can gain extremely high energies of up to 10 keV inside the sheaths. Non-local kinetic effects are important and, thus, computational investigations require the use of PIC/MCC simulations. However, the long RF period and the presence of extremely energetic electrons, which must be traced correctly, leads to a very high number of time steps per RF period and, thus, to computational challenges. Here, we use GPU based 1d3v PIC/MCC simulations including a realistic plasma-surface interaction model to study such plasmas. We include energy dependent and material specific heavy particle and electron induced secondary electron emission coefficients for SiO2 and Si. The spatio-temporal electron dynamics is analyzed and a strong influence of the secondary electron emission properties of the electrode surfaces on the charged particle dynamics is found, especially in the case of unequal electrode materials. Based on this fundamental understanding, we use different tailored driving voltage waveforms (peaks- and square-waveforms) to customize the electron dynamics in the vicinity of the wafer. By minimizing the duration of the local sheath collapse, we generate and control electric field reversals that accelerate electrons towards the wafer to very high energies. In this way we realize vertical high energy bombardment of the wafer both by ions and electrons. Such electrons can penetrate deeply into dielectric HAR etch features to neutralize wall charges. In this way parasitic effects such as twisting, notching, and mask charging can be avoided. This work was funded by the Samsung Electronics University R&D program.

Biography

University Education

- Ruhr- University Bochum, Germany
  Habilitation, Plasma Technology, 2019
  Ph.D., Physics, 2009
  Diploma, Physics, 2006

Academic and Research Positions

- Ruhr University Bochum, Germany
  Akademischer Rat, Department of Electrical Engineering

- West Virginia University, USA
  Adjunct Associate Professor, Department of Physics
- Dalian University of Technology, China
  Visiting Research Professor, School of Physics

Research Interests

- Low Temperature Plasma Technology
- Radio Frequency Plasmas
- Control of Particle Dynamics and Distribution functions

Selected Academic Honors and Awards

- Hershkowitz award (2015, Plasma Sources Science and Technology)
- Award for Outstanding Quality of Teaching, Ruhr-University Bochum (5x5000 award, 2012)
- Hans Werner Osthoff award for Plasma Physics (Max-Planck society, 2012)
- Ph.D. award of the European Physical Society Plasma Physics Division (2011)

Publications

- 110 publications in low temperature plasma science in peer reviewed international journals (2796 citations, H-index: 31, Google Scholar: https://scholar.google.de/citations?user=7CYrMRAAAAAJ&hl=de)
  250 contributions to national and international conferences on low temperature plasma science.

Other activities

- Editorial Board Member: Plasma Sources Science and Technology
- Guest-Editor Plasma Sources Science and Technology (special issues on electron heating in technological plasmas, plasma-surface interactions, and Voltage Waveform Tailoring)
- GEC Executive Committee Chair Elect

Keynote 2
[TB1-1]

- Session: [TB1] Plasma Sources and Technology I
- Date / Time: January 19 (Tue.), 2021 / 09:00-10:40
- Place: Channel B

Non-Equilibrium in Plasma-Surface Interactions – Does this Occur at Atmospheric Pressure?

Prof. Mark J. Kushner
(Univ. of Michigan, USA)

Abstract

Non-equilibrium in low temperature plasmas (LTPs) may need some clarification. The concept of temperature non-equilibrium (NE) is the basis of the LTP field – electrons (typically) have higher temperatures than ions and neutrals. Non-Maxwellian velocity distributions are often described as being NE which, by the strict definition of local-thermodynamic equilibrium (LTE), is true. Another form of NE is a direct outcome of temperature non-equilibrium – chemical non-equilibrium. By virtue of electron (and energetic ion) impact producing dissociation, distributions of chemically active species can be generated that would not otherwise exist based on LTE. Other forms of LTP behavior are often called non-equilibrium but perhaps are better described as non-steady or transient behavior. Non-equilibrium exists by virtue of gradients in driving forces being larger than mean-freepaths L or collision frequencies – for example, (dE/dx) > E/L. These trends then raise the question of whether LTP processes, and plasma surface interactions in particular, can be non-equilibrium at atmospheric pressure? With interest in plasma-liquid interactions on the rise, is it possible for a NE gas phase plasma to produce non-equilibrium in a bounding fluid? Or are these just transients? In this talk results from computational investigations will be used to discuss this question – do (or can) non-equilibrium processes dominate in atmospheric pressure plasma-surface interactions? Examples will be taken from plasma jets and DBDs interacting with complex surfaces at atmospheric pressure, with comparison to their low pressure counterparts. Work was supported by the US National Science Foundation, US Department of Energy and US Army Research Office Multidisciplinary University Research Initiative program.

Biography

Mark J. Kushner received the BS in Nuclear Engineering and the BA in Astronomy from the University of California at Los Angeles; and the MS and Ph.D. in Applied Physics from the California Institute of Technology. After a post-doctoral appointment, Mark served on the technical staffs of Sandia National Laboratory, Lawrence Livermore National Laboratory and Spectra Technology before joining the University of Illinois at Urbana Champaign where he was the Founder Professor of Engineering and held several administrative positions. Mark served as Dean of Engineering at Iowa State University before joining the University of Michigan in 2008. His research addresses the fundamentals of low temperature plasmas and their applications. Mark has held several leadership positions in professional societies, conferences and in scientific publishing, as well as participating in national assessments of plasma physics.

Keynote 3
[TC4-6]

- Session: [TC4] Plasma Deposition and Etching - II (GWP, Thermal, ALE, MTJ, DFT)
- Date / Time: January 19 (Tue.), 2021 / 16:30-18:50
- Place: Channel C

Needs of New Plasma Etching Technologies for the Next 10 Years' Chip Fabrication

Dr. Jong Chul Park
(Samsung Electronics Co., Ltd., Korea)

Abstract

EUV lithography technology will push the limitation of the device patterning pitch to under-20nm in the near future. The narrow pitch patterning requires new plasma etching technologies different from the previous ones which are based on RF plasma, pulsed RF Power, depo/etch cyclic and so one. The major limits for the next generation device fabrication are depth loading and etch selectivity, which need ultra low temperature (<-150C), ultra low pressure (< 1mTorr) and space separation of radical and ions. Already such many technologies have been researched for the mass production, and actually some data from them show goog result which was initially expected on the base of theory and concept.

Biography

- Electrical Electronic Engineering, Kyungpuk National University
- Electrical Electronic Engineering, POSTECH
- Dry etching at process development team. Semiconductor R&D center, Samsung Electronics Co., Ltd.

Keynote 4
[WA2-1]

- Session: [WA2] Battery Related Materials and Devices
- Date / Time: January 20 (Wed.), 2021 / 11:00-12:10
- Place: Channel A

Na-Ion and All-Solid-State Na Batteries

Prof. Li Lu
(Nat'l Univ. of Singapore, Singapore)

Abstract

Since discovery by Sony in 1991, Li-ion batteries have been playing extraordinary roles in all types of portable devises, electrical vehicles and even in self-powered air-flights. Heavy use of Li resources has caused large increase in its price. As such Na ions as an alternative choice of the charge carrier has been considered and quickly developed. This presentation will report current advances in the research of the Ni-ion batteries, including all-solid-state Na batteries using oxide electrolyte in order to increase safety of the batteries.

Biography

Li Lu received his B.Eng and M. Eng from Tsinghua University, China, and his Ph.D from the Katholiek Universiteit Leuven, Belgium. After four years of doctoral study and two years of post-doctoral work at the Departement Metaalkunde en Toegepaste (Department of Metallurgy and Materials Engineering), Katholieke Universiteit Leuven (Catholic University of Leuven), Belgium, he joined the Department of Mechanical Engineering, National University of Singapore in 1991 and is a Full Professor is involved in the research of functional materials, mainly in two directions: i) materials for Li-ion rechargeable batteries which include traditional bulk batteries and all-solid-state batteries, and for supercapacitors, and ii) piezoelectric and ferroelectric materials. Dr. Lu is also interested in technology transfer from his research laboratory to industries.

Dr. Lu is the Editor-in-Chief of Functional Materials Letters (World Scientific Publisher), Associate Editor of Materials Technology (Taylor & Francis) particularly in charge of functional materials.

Oral Sessions

▶January 17 (Sun.)

[SA1] Flexible and Stretchable Substrate and Display	
Date / Time	January 17 (Sun.), 2021 / 14:20-16:00
Place	Channel A
Session Chair(s)	Mun Pyo Hong (Korea Univ., Korea)

[SA1-1] **14:20-14:40**

The Double Lamination of a Polyimide Film with Elastomeric Substrates for Stretchable Display

Ho Won Yoon, Seung Min Shin, Jiho Kim, Tae Sang Park, Falguni Ahmed, Min Jae Choi, Junho Song, Byoungho Cheong, Kungwon Rhie, and Mun Pyo Hong

Korea Univ., Korea

[SA1-2] **14:40-15:00**

Investigations of Hybrid Elastomer Substrates for Stretchable Devices

Gerhard Domann, Sabrina Beranek, Sigrid Arzuman, Sönke Steenhusen, Andreas Raeder, Johannes Ziegler, and Juergen Clade

Fraunhofer Inst. für Silicatforschung, Germany

[SA1-3] **15:00-15:20**

Pixelized Encapsulation for Stretchable OLED via Neutral Beam Assisted Sputtering and Advanced Top Coating Material

Seungmin Shin, Ho Won Yoon, Seong Yong Kwon, and Mun Pyo Hong

Korea Univ., Korea

[SA1-4] **15:20-15:40**

Thermoregulating Hairy Skin based on Micro/Nanoporous Shape Memory Polymer

Ayoung Choe, Jeonghee Yeom, Yeju Kwon, Youngoh Lee, Young-Eun Shin, Jinyoung Kim, and Hyunhyub Ko

UNIST, Korea

[SA1-5] **15:40-16:00**

Flexible Image Sensor Array with Active Matrix Circuitry

Yan Xuan, Yuyao Lu, Takayuki Arie, Seiji Akita, and Kuniharu Takei

Osaka Prefecture Univ., Japan

[SB1] 2D Materials and Their Application to Nano/Micro Devices I	
Date / Time	January 17 (Sun.), 2021 / 14:20-15:50
Place	Channel B
Session Chair(s)	Sun Kook Kim (Sungkyunkwan Univ., Korea)

[SB1-1] Invited **14:20-14:50**

Flexible Electrode Coated with MoS_2 for the Highly Sensitive Detection of Endocrine Hormones

Minho Lee[1], Taesung Kim[2], Hyeong-U Kim[2], and Hyeyoun Kim[1]

[1]Chung-Ang Univ., Korea, [2]Sungkyunkwan Univ., Korea

[SB1-2] **14:50-15:10**

Identification of Chemical Warfare Agents with an Optimized Multi-Array SAW Detector

Hyewon Park, Jinuk Kim, Jihyun Kim, Byung Il Seo, and Joo-Hyung Kim

Inha Univ., Korea

[SB1-3] **15:10-15:30**

Biogenic Chitosan Nanoparticles-Functionalized MoS_2 Nanocomposite Based Resistive Device for Pollutant Monitoring

Mandar Shirolkar, Pooja Deshpande, Rujuta Athavale, Nidhi Sapre, and Atul Kulkarni

Symbiosis Internat'l (Deemed Univ.), India

[SB1-4] **15:30-15:50**

Multilayer MoS_2 Biosensor for Ultrasensitive Detection of Cortisol

Seung Ho Baek, Heekyung Park, Anamika Sen, and Sunkook Kim

Sungkyunkwan Univ., Korea

[SA2] Flexible and Stretchable Physical Sensors	
Date / Time	January 17 (Sun.), 2021 / 16:20-18:40
Place	Channel A
Session Chair(s)	Nae Eung Lee (Sungkyunkwan Univ., Korea) Tae Yoon Lee (Yonsei Univ., Korea)

[SA2-1] Invited **16:20-16:50**

Textile Electronics for New Platform of Wearable Electronics

Taeyoon Lee

Yonsei Univ., Korea

[SA2-2] **16:50-17:10**

Standing Gold Nanowires E-Skin: from Highly Stretchable Electronics to Ultrasensitive Tattoo-Like Sensors

Shu Gong and Wenlong Cheng

Monash Univ., Australia

[SA2-3] **17:10-17:30**

Soft and Stretchable Gold Nanowires-Based Tattoo-Like Triboelectric Sensors for Human-Machine Interface

Tiance An and Wenlong Cheng

Monash Univ., Australia

[SA2-4] **17:30-17:50**

Self-Signal Processing Pressure Sensor by Controlled Response Curve

Chanho Jeong and Tae-Il Kim

Sungkyunkwan Univ., Korea

[SA2-5] Invited **17:50-18:20**

Printable, Flexible and Transparent Electronic Memories and Sensors

Andreas Ruediger[1], Christina Schindler[2], Bernhard Mittermeier[2], Johannes Jehn[2], and Mohamed Delfag[1]

[1]Inst. Nat'l De La Recherche Scientifique, Canada, [2]Munich Univ. of Applied Sciences, Germany

[SA2-6] **18:20-18:40**

Scalable 4-Terminal Array for Horizontally Aligning Nanorods for MicroLED Display Assembly

Ho Won Yoon, Jungmin An, Lia Hong, Jae Byung Park, and Mun Pyo Hong

Korea Univ., Korea

[SB2] 2D Materials and Their Application to Nano/Micro Devices II	
Date / Time	January 17 (Sun.), 2021 / 16:20-18:10
Place	Channel B
Session Chair(s)	Taesung Kim (Sungkyunkwan Univ., Korea)

[SB2-1] Invited 16:20-16:50

Plasma Etching: an Enabler to Better Concentrated Photovoltaics Systems

Maxime Darnon[1,2], Mathieu de Lafontaine[1,2], Pierre Albert[1,2], Gwenaelle Hamon[1,2], Maïté Volatier[1], Vincent Aimez[1], Erwine Pargon[2], and Abdelatif Jaouad[1]

[1]Univ. De Sherbrooke, Canada, [2]CNRS, France

[SB2-2] 16:50-17:10

Battery-Free Tribotronic MoS_2 Touch Memory for Post-Impact Detection

Jae-Hwan Jung and Sang-Woo Kim

Sungkyunkwan Univ., Korea

[SB2-3] 17:10-17:30

Roughness Engineering of 2D-Material-Based Electrical Contacts

Sneha Banerjee[1], Liemao Cao[2], Yee Sin Ang[2], L. K. Ang[2], and Peng Zhang[1]

[1]Michigan State Univ., USA, [2]Singapore Univ. of Tech. and Design, Singapore

[SB2-4] 17:30-17:50

Contact Resistance Measurements of 2D Materials by Using TLM

Zheng Yang, Tien Dat Ngo, Myeongjin Lee, and Won Jong Yoo

Sungkyunkwan Univ., Korea

[SB2-5] 17:50-18:10

Interfacial Adhesion between Large-Area Monolayer Graphene and SiO_2/Si

Yonas Tsegaye Megra and Ji Won Suk

Sungkyunkwan Univ., Korea

▶January 18 (Mon.)

[MA1] Flexible and Stretchable Biochemical Sensors	
Date / Time	January 18 (Mon.), 2021 / 09-00-10:50
Place	Channel A
Session Chair(s)	Atanu Bag (Sungkyunkwan Univ., Korea) Wan Soo Yun (Sungkyunkwan Univ., Korea)

[MA1-1] **09:00-09:20**

Graphene Oxide/Chitosan Composite Based Flexible Electrochemical Sensors for Heavy Metal Ion Detection

Pawan Pathak and Hyoung Cho

Univ. of Central Florida, USA

[MA1-2] **09:20-09:40**

Ionotronic Artificial Tongue for Astringency Perception

Jeonghee Yeom, Ayoung Choe, Seongdong Lim, Youngsu Lee, Sangyun Na, and Hyunhyub Ko

UNIST, Korea

[MA1-3] Invited **09:40-10:10**

MEMS-Type Gas Sensor toward Ultra-High-Detection in Ppt Level

Kengo Shimanoe, Koichi Suematsu, and Ken Watanabe

Kyushu Univ., Japan

[MA1-4] **10:10-10:30**

Development of Bio-Socket Systems Embedded with 3D-Printed Sensors

Hyeon Jung Kwon, Kyeong Ho Shin, Jihyun Kim, Sun Kon Lee, and Joo Hyung Kim

Inha Univ., Korea

[MA1-5] **10:30-10:50**

Lotus Leaf Inspired Low Surface Energy for Humidity Interference Suppression in Gas Sensors Application

Weiwei Wu

Xidian Univ., China

[MB1] 2D Materials and Their Application to Nano/Micro Devices III	
Date / Time	January 18 (Mon.), 2021 / 09:00-10:50
Place	Channel B
Session Chair(s)	Ho Cheon Yoo (Gachon Univ., Korea) Won Jong Yoo (Sungkyunkwan Univ., Korea)

[MB1-1] Invited **09:00-09:30**

Recent Progress in Device Processes Using 2D Materials

Won Jong Yoo

Sungkyunkwan Univ., Korea

[MB1-2] **09:30-09:50**

High-Throughput Virtual Screening of Two-Dimensional Magnessium Hydride for Hydrogen Storage Material via Generative Adversarial Network

Junho Lee, Seon Bin Song, and Joonsuk Huh

Sungkyunkwan Univ., Korea

[MB1-3] **09:50-10:10**

Efficient Ammonia Sensing at Room Temperature by Ru Decorated Layered V_2O_5 Quasi-2D Nanostructures

Shobha Birajdar[1], Parag Adhyapak[1], Bharat Kale[1], and Dinesh Amalnerkar[2]

[1]Centre for Materials for Electronics Tech., India, [2]Savitribai Phule Pune Univ., India

[MB1-4] **10:10-10:30**

New Concept 2D Materials-Based Devices and their Applications to Functional Sensors, Memories, and Integrated Circuits

Hocheon Yoo

Gachon Univ., Korea

[MB1-5] **10:30-10:50**

High Performance Contact-Doped WSe_2 Field Effect Transistors Fabricated by Selective Oxidation

Inyong Moon, Sungwon Lee, and Won Jong Yoo

Sungkyunkwan Univ., Korea

[MC1] Plasma Modeling and Simulation Techniques I	
Date / Time	January 18 (Mon.), 2021 / 09:00-10:40
Place	Channel C
Session Chair(s)	He-Ping Li (Tsinghua Univ., China)

[MC1-1] Invited **09:00-09:30**

Numerical Modeling of Molecular Interactions between Plasma Species and Biological Membrane

Satoshi Uchida

Tokyo Metropolitan Univ., Japan

[MC1-2] Invited **09:30-10:00**

Modeling Study on Interactions of Reactive Species in Atmospheric Plasmas and Oliver Oil

Yuan-Tao Zhang

Shandong Univ., China

[MC1-3] **10:00-10:20**

Similarity Laws for Low-Temperature Plasmas from Continuum to Kinetic Regimes

Yangyang Fu, Bocong Zheng, Peng Zhang, Qi Hua Fan, and John P. Verboncoeur

Michigan State Univ., USA

[MC1-4] **10:20-10:40**

The Ion Kinetics at the Wafer Edge for Plasma Processes in Capacitively Coupled Discharges

Jin Seok Kim[1], Min Young Hur[1], Kim Ho Jun[2], and Hae June Lee[1]

[1]Pusan Nat'l Univ., Korea, [2]Gachon Univ., Korea

[MA2] Vaccum Deposition Technology for Inorganic Materials and Devices	
Date / Time	January 18 (Mon.), 2021 / 14:10-15:50
Place	Channel A
Session Chair(s)	Young-Jun Lee (Inha Univ., Korea) Kyung Geun Lim (KRISS, Korea)

[MA2-1] Invited **14:10-14:40**

High Temperature Hydrogen Gas Sensing Property of Morphology Controllable Nitrides

Shu Yin, Angga Hermawan, Takuya Hasegawa, and Yusuke Asakura

Tohoku Univ., Japan

[MA2-2] Invited **14:40-15:10**

Multiscale Crystallization of Functional Materials

Dongfeng Xue

Multiscale Crystallization of Functional Materials

[MA2-3] **15:10-15:30**

Sputter Deposition of Low Resistive Amorphous In_2O_3:Sn Films Using Nitrogen Mediate Amorphization Method: Effects of Nitrogen Flow Rate

Yuta Mido, Seiichi Urakawa, Daisuke Yamashita, Takamasa Okumura, Kunihiro Kamataki, Kazunori Koga, Masaharu Shiratani, and Naho Itagaki

Kyushu Univ., Japan

[MA2-4] **15:30-15:50**

Structural and Optical Properties of ZnMgO Films on Sapphire Substrates Fabricated by Sputter Epitaxy

Daichi Takahashi, Yuta Nakamura, Seiichi Urakawa, Daisuke Yamashita, Takamasa Okumura, Kunihiro Kamataki, Kazunori Koga, Masaharu Shiratani, and Naho Itagaki

Kyushu Univ., Japan

[MB2] 2D Materials and Their Application to Nano/Micro Devices IV	
Date / Time	January 18 (Mon.), 2021 / 14:10-15:40
Place	Channel B
Session Chair(s)	Tae Sung Kim (Sungkyunkwan Univ., Korea) Joo Hoon Kang (Sungkyunkwan Univ., Korea)

[MB2-1] Invited **14:10-14:40**

Energy Applications of 2D TMD FETs and Diodes Fabricated Using Plasma Processes

Seongil Im

Yonsei Univ., Korea

[MB2-2] **14:40-15:00**

Precursor-Assisted Chemical Welding for High-Performance Broadband Photodetectors

Jihyun Kim[1], Seongchan Kim[1], Yunseong Cho[1], Minseok Choi[1], Suho Jung[1], Jeongho Cho[2], Dongmok Whang[1], and Joohoon Kang[1]

[1]Sungkyunkwan Univ., Korea, [2]Yonsei Univ., Korea

[MB2-3] **15:00-15:20**

Graphene Edge Contact Devices Fabricated via Plasma Etching

Sungwon Lee, Inyong Moon, Tien Dat Ngo, Myeongjin Lee, Kwangro Lee, Hoseong Shin, and Won Jong Yoo

Sungkyunkwan Univ., Korea

[MB2-4] **15:20-15:40**

Modification of MoS_2 Surface by Inductively Coupled Remote Plasma

Ji Eun Kang, Ki Hyun Kim, You Jin Ji, and Geun Young Yeom

Sungkyunkwan Univ., Korea

[MC2] Plasma Modeling and Simulation Techniques II	
Date / Time	January 18 (Mon.), 2021 / 14:10-16:00
Place	Channel C
Session Chair(s)	De-Qi Wen (Michigan State Univ., USA)

[MC2-1] Invited **14:10-14:40**

Dynamics of Two-Dimensional Dusty Plasmas Modified by One-Dimensional Periodic Substrate

Yan Feng

Soochow Univ., China

[MC2-2] **14:40-15:00**

Hybrid Simulation on the Instability in Capacitively Coupled CF_4/Ar Plasmas Driven by an Asymmetric Dual Frequency Waveform

Wan Dong, Yi-Fan Zhang, Yuan-Hong Song, Zhong-Ling Dai, and You-Nian Wang

Dalian Univ. of Tech., China

[MC2-3] **15:00-15:20**

Effect of Driving Frequency on the Plasma Parameters and Electron Heating Mechanism in Very High Frequency Capacitive Discharges

Nishant Sirse[1], Sarveshwar Sharma[2], Miles M. Turner[3], and Albert R. Ellingboe[3]

[1]IPS Academy, Indore, India, [2]Inst. for Plasma Research, India, [3]Dublin City Univ., Ireland

[MC2-4] **15:20-15:40**

Investigation of Collision Effect on Ion Incident Angle at Biased Target in Magnetized Hydrogen Plasma

Myeong-Geon Lee[1], Nam-Kyun Kim[2], Jamin Song[1], Ki-Baek Roh[1], and Gon-Ho Kim[1]

[1]Seoul Nat'l Univ., Korea, [2]Samsung Electronics Co., Ltd., Korea

[MC2-5] **15:40-16:00**

Breakdown Process of Dual-Frequency Capacitively Coupled Plasma: A Collective Simulation

Hao Wu[1], Youyou Zhou[2], Jiamao Gao[1], Zhijiang Wang[1], Yanli Peng[3], and Wei Jiang[1]

[1]Huazhong Univ. of Sci. and Tech., China, [2]Wuhan Univ. of Tech., China, [3]East China Univ. of Tech., China

[MA3] Perovskite Opto-Electronics	
Date / Time	January 18 (Mon.), 2021 / 16:10-18:10
Place	Channel A
Session Chair(s)	Chang Lyoul Lee (GIST, Korea)

[MA3-1] Invited **16:10-16:40**

Additive Engineering for High-Performance Perovskite Solar Cells

Seokin Na

Jeonbuk Nat'l Univ., Korea

[MA3-2] Invited **16:40-17:10**

Anodization for the Highest Speed Swiching Vertical Organic Thin Film Transistor

Kyung Geun Lim[1], Axel Fischer[2], Hans Kleemann[2], and Karl Leo[2]

[1]KRISS, Korea, [2]Technische Univ. Dresden, Germany

[MA3-3] **17:10-17:30**

Realizing Inkjet-Printed Quantum Dot Light Emitting Diode

Hanleem Lee and Chang-Lyoul Lee

GIST, Korea

[MA3-4] **17:30-17:50**

Effects of Surface Polarity of ZnO Substrates on Epitaxial Growth of Magnetron Sputtered $(ZnO)_x(InN)_{1-x}$ Films

Ryota Narishige, Kentaro Kaneshima, Seiichi Urakawa, Daisuke Yamashita, Kunihiro Kamataki, Takamasa Okumura, Kazunori Koga, Masaharu Shiratani, and Naho Itagaki

Kyushu Univ., Japan

[MA3-5] **17:50-18:10**

Improvement of the Oxygen Storage/Release Rate of $YBaCo_4O_7$ Nanoparticles by the Polymerizable Complex Method

Tingru Chen[1], Yusuke Asakura[1], Takuya Hasegawa[1], Teruki Motohashi[2], and Shu Yin[1]

[1]Tohoku Univ., Japan, [2]Kanagawa Univ., Japan

[MB3] 2D Materials and Their Application to Nano/Micro Devices V	
Date / Time	January 18 (Mon.), 2021 / 16:10-17:30
Place	Channel B
Session Chair(s)	Jae Bum Choo (Chung-Ang Univ., Korea)

[MB3-1] Invited **16:10-16:40**

Valley Magnetic Domain: A New Pathway to Valleytronics

Jae Dong Lee

DGIST, Korea

[MB3-2] **16:40-17:00**

Hardware-Based Cryptographic Primitives Using MoS_2

Jaeseo Park[1], Jung Woo Leem[2], Zahyun Ku[3], Jun Oh Kim[1], Won Chegal[1], Sangwoo Kang[1], and Young L. Kim[2]

[1]KRISS, Korea, [2]Purdue Univ., USA, [3]AFRL, USA

[MB3-3] Invited **17:00-17:30**

Nanoplasmonic Microdevice Platforms for In Vitro Diagnostics

Jaebum Choo

Chung-Ang Univ., Korea

[MC3] Plasma Modeling and Simulation Techniques III	
Date / Time	January 18 (Mon.), 2021 / 16:10-18:00
Place	Channel C
Session Chair(s)	Yuan-Hong Song (Dalian Univ. of Tech., China) Hai-Xing Wang (Beihang Univ., China)

[MC3-1] Keynote **16:10-16:50**

Realistic Simulations of Low Pressure Capacitive Radio Frequency Plasmas Operated at Low Frequencies and High Voltage

Julian Schulze[1], Peter Hartmann[2], Li Wang[1], Birk Berger[1], Sebastian Wilczek[1], Katharina Noesges[1], Eunwoo Lee[3], Thomas Mussenbrock[1], Ralf Peter Brinkmann[1], and Zoltán Donkó[2]

[1]Ruhr-Univ. Bochum, Germany, [2]Wigner Research Center, Hungary, [3]Samsung Electronics Co. Ltd., Korea

[MC3-2] Invited **16:50-17:20**

2D Particle-in-Cell Simulations of Geometrically Asymmetric Capacitive RF Plasmas Driven by Tailored Voltage Waveforms including Realistic Plasma-Surface Interactions

Li Wang[1,2], Peter Hartmann[3], Zoltán Donkó[3], Yuan-Hong Song[1], and Julian Schulze[1,2]

[1]Dalian Univ. of Tech., China, [2]Ruhr-Univ. Bochum, Germany, [3]Wigner Research Centre for Physics, Hungary

[MC3-3] **17:20-17:40**

Investigation of Electrode Bias Effect on Plasma Series Resonance Formation of VHF Driven Asymmetric Electrode CCP Using Transmission Line Model

Ingyu Lee, Taejun Park, Sang-Won Ryu, and Gon-Ho Kim

Seoul Nat'l Univ., Korea

[MC3-4] **17:40-18:00**

Kinetic Simulation of Nanosecond Pulsed Discharges at Atmospheric Pressure

Shuhan Gao, Xucheng Wang, and Yuan-Tao Zhang

Shandong Univ., China

▶January 19 (Tue.)

[TA1] 2D Materials and Nanoparticle Applications	
Date / Time	January 19 (Tue.), 2021 / 09:00-10:40
Place	Channel A
Session Chair(s)	Jihyun Kim (Inha Univ., Korea)

[TA1-1] 09:00-09:20

Long-Term Deposition of Dried Nanoparticles on Substrates with Exceptional Redispersibility, Stability, and Functionality

Sunhwan Jeong, Hui Hun Cho, Su Ji Kim, Ali Turab Jafry, Jung Heon Lee, and Jin Kee Lee

Sungkyunkwan Univ., Korea

[TA1-2] 09:20-09:40

Bioinspired Assembly of Multifunctional Carbon Nanotube Nanocomposites

Junhyuck Chang, Kyung-Il Kim, and Jung Heon Lee

Sungkyunkwan Univ., Korea

[TA1-3] 09:40-10:00

Diagnostic Method of Abnormal Temperature in Rotating Equipment by Infrared Thermography

Jun-Su Lee[1], Seon-Woo Lee[1], Ju-Sik Kim[2], I-Seul Jeon[2], Gang-Min Lim[3], Jang-Woo Kwon[1], and Joo-Hyung Kim[1]

[1]Inha Univ., Korea, [2]Korea Hydro and Nuclear Power Co., Korea, [3]ATG Co., Korea

[TA1-4] 10:00-10:20

Reductant-Free Synthesis of Oxygen Vacancies-Mediated TiO_2 Nanocrystals with Enhanced Photocatalytic NO Removal Performance

Zhanyong Gu, Takuya Hasegawa, Yusuke Asakura, and Shu Yin

Tohoku Univ., Japan

[TA1-5] 10:20-10:40

Spectral Properties of Microplastics Floating on Water in Near-Infrared Spectra Range

Jihyun Kim, Seohyun Jang, and Joo-Hyung Kim

Inha Univ., Korea

[TB1] Plasma Sources and Technology I	
Date / Time	January 19 (Tue.), 2021 / 09:00-10:40
Place	Channel B
Session Chair(s)	Li Wang (Ruhr-Univ. Bochum, Germany)

[TB1-1] Keynote **09:00-09:40**

Non-Equilibrium in Plasma-Surface Interactions – Does this Occur at Atmospheric Pressure?

Juliusz Kruszelnicki, Kseniia Konina, Mackenzie Meyer, Jordyn Polito, Sanjana Kerketta, and Mark J. Kushner

Univ. of Michigan, USA

[TB1-2] Invited **09:40-10:10**

Hysteresis Physics in Inductively Coupled Plasmas

Hyo-Chang Lee

KRISS, Korea

[TB1-3] Invited **10:10-10:40**

Avalanche Induced Rapid Impedance Change and Electron Power Absorption During Gas Breakdown under Radio-Frequency Excitation

Yong Xin Liu, Xiang-Yu Wang, Quan-Zhi Zhang, and You-Nian Wang

Dalian Univ. of Tech., China

[TC1] Plasma Modeling and Simulation Techniques IV	
Date / Time	January 19 (Tue.), 2021 / 09:00-10:40
Place	Channel C
Session Chair(s)	Yan Feng (Soochow Univ., China) Satoshi Uchida (Tokyo Metropolitan Univ., Japan)

[TC1-1] **09:00-09:20**

Analytical Solution for Pulsed Laser Induced Photoemission from Biased Surfaces

Yi Luo and Peng Zhang

Michigan State Univ., USA

[TC1-2] **09:20-09:40**

Electron Dynamics in Magnetron Sputtering Discharges

Bocong Zheng[1], Yangyang Fu[2], Keliang Wang[1], Thomas Schuelke[1], and Qi Hua Fan[2]

[1]Fraunhofer Center for Coatings and Diamond Technologies, USA, [2]Michigan State Univ., USA

[TC1-3] **09:40-10:00**

Theoretical Study of Field Emission from Dielectric Coated Surfaces

Yang Zhou and Peng Zhang

Michigan State Univ., USA

[TC1-4] **10:00-10:20**

Non-Equilibrium Transport Processes in a Free-Burning Argon Arc Plasma under Different Operating Pressures

Chuan Fang, Jian Chen, Jing Li, and He-Ping Li

Tsinghua Univ., China

[TC1-5] **10:20-10:40**

Decisive Effects of Electron Temperature on the Transport of Charged Particles in a Confined Decaying Plasma

Jian Chen, Yao-Ting Wang, He-Ping Li, Dong-Jun Jiang, and Ming-Sheng Zhou

Tsinghua Univ., China

[TA2] Nanoparticle Applications	
Date / Time	January 19 (Tue.), 2021 / 12:50-14:20
Place	Channel A
Session Chair(s)	Young-Jun Lee (Inha Univ., Korea)

[TA2-1] Invited **12:50-13:20**

Fog Collection Using Secondary Electrohydrodynamic-Induced Hybrid Structures

Dae Joon Kang

Sungkyunkwan Univ., Korea

[TA2-2] **13:20-13:40**

Expeditious Crystallization of Room Temperature PLD Grown $Hf_{0.5}Zr_{0.5}O_2$ for Sub-60 mV/dec 2DNCFET

Hae Won Cho, Pujar Pavan, and Sun Kook Kim

Sungkyunkwan Univ., Korea

[TA2-3] **13:40-14:00**

Tuning Structure and Electronic Properties of $MoS_{2-x}Se_x$ Nanolayer for Improved NO Detection at Room Temperature

Ardiansyah Taufik, Takuya Hasegawa, Yusuke Asakura, and Shu Yin

Tohoku Univ., Japan

[TA2-4] **14:00-14:20**

Statistical Study on the Morphological Characteristics of Nanoparticles Using Machine Learning-Based Mass-Throughput Electron Microscopy Image Analysis

Yunchul Kim, Byoungsang Lee, Seokyoung Yoon, Jin Woong Lee, Junhyuck Chang, Jaesub Yun, Jong-Seok Lee, and Jung Heon Lee

Sungkyunkwan Univ., Korea

[TB2] Plasma Sources and Technology II	
Date / Time	January 19 (Tue.), 2021 / 13:00-14:00
Place	Channel B
Session Chair(s)	Julian Schulze (Ruhr-Univ. Bochum, Germany)

[TB2-1] **13:00-13:20**

Characteristics of Plasma Density Distribution in Focus Ring Region of VHF Narrow Gap CCP Etching Reactor

Sung Hyun Son[1], Jaemin Song[1], Haneul Lee[1], Gon-Ho Kim[1], Dae Chul Kim[2], and Jongsik Kim[2]

[1]Seoul Nat'l Univ., Korea, [2]KFE, Korea

[TB2-2] **13:20-13:40**

A Segmented Dielectric Window Inductively Coupled Plasma Source: Comparison with a Conventional Single Dielectric ICP Source

Ju-Hong Cha, Sang-Woo Kim, Min-Seok Jang, Jee-Hun Jeong, Koon Ho Kim, and Ho-Jun Lee

Pusan Nat'l Univ., Korea

[TB2-3] **13:40-14:00**

A Comprehensive Understanding of the Ignition Process of a Pulsed Capacitively Coupled Radio Frequency Discharge: the Effect of Power-off Duration

Xiang-Yu Wang, Yong Xin Liu, Jia Rui Liu, Quan-Zhi Zhang, and You-Nian Wang

Dalian Univ., of Tech., China

[TC2] Plasma Modeling and Simulation Techniques V	
Date / Time	January 19 (Tue.), 2021 / 13:00-14:20
Place	Channel C
Session Chair(s)	Hae June Lee (Pusan Nat'l Univ., Korea) Yuan-Tao Zhang (Shandong Univ., China)

[TC2-1] Invited **13:00-13:30**

Role of Chemical Nonequilibrium in Dynamic Anode Attachment of A Transffered Arc

Hai-Xing Wang, Su-Rong Sun, and Tao Zhu

Beihang Univ., China

[TC2-2] Invited **13:30-14:00**

Hybrid Simulation of Biased Inductively Coupled Plasma Discharges

Yuru Zhang, Lei Tong, Jia-Wei Huang, and You-Nian Wang

Dalian Univ. of Tech., China

[TC2-3] **14:00-14:20**

DC Atmospheric Pressure Plasma Modeling with COMSOL Multiphysics

Ade Pratama and Sagung Dewi Kencaca

Nat'l Taiwan Univ. of Sci. and Tech., Taiwan

[TA3] Plasma Bioscience	
Date / Time	January 19 (Tue.), 2021 / 14:30-16:10
Place	Channel A
Session Chair(s)	Eun Ha choi (Kwangwoon Univ., Korea) Dongping Liu (Dalian Univ. of Tech., China)

[TA3-1] Invited **14:30-15:00**

Influence of Plasma Treatment on Various Plant Structures

Mujahid Zaka Ul-Islam

Ruhr-Univ. Bochum, Germany

[TA3-2] **15:00-15:20**

Atmospheric Plasma Jet Device for Versatile Electron Microscope Grid Modification and Optimization

Eungjin Ahn

Univ. of Michigan, USA

[TA3-3] Invited **15:20-15:50**

Zinc Based Nanomaterials Preparation by Several Routes and Its Biomedical Applications

Antony Ananth[1], Ihn Han[2], Jin Hyo Boo[1], and Eun Ha Choi[2]

[1]Sungkyunkwan Univ., Korea, [2]Kwangwoon Univ., Korea

[TA3-4] **15:50-16:10**

Amine Formation in Carbon Polymers Deposited by Plasma Enhanced Chemical Vapour Deposition (PECVD)

Anjar Anggraini Harumningtyas[1], Tomoko Ito[1], Michiro Isobe[1], Satoshi Sugimoto[1], Miroslav Michlichek[2], David Necas[2], Lenka Zajickova[2], and Satoshi Hamaguchi[1]

[1]Osaka Univ., Japan, [2]Central European Inst. of Tech, Czech Republic

[TB3] Plasma Sources and Technology III	
Date / Time	January 19 (Tue.), 2021 / 14:30-16:10
Place	Channel B
Session Chair(s)	Li Wang (Ruhr-Univ. Bochum, Germany)

[TB3-1] **14:30-14:50**

The Influence of Electron Inertia in Low Pressure Capacitively Coupled Plasmas

Sebastian Wilczek[1], Máté Vass[2], Ralf Peter Brinkmann[1], Thomas Mussenbrock[1], Zoltán Donkó[2], Trevor Lafleur[3], and Julian Schulze[1]

[1]Ruhr Univ. Bochum, Germany, [2]Wigner Research Centre for Physics, Hungary, [3]Plasma Potential-Physics Consulting and Research, Australia

[TB3-2] **14:50-15:10**

Power-Coupling Mode-Change in a High-VHF (162MHz) Multi-Tile, Capacitively Coupled Plasma (CCP) Source

Cleo Harvey[1], Nishant Sirse[2], Cezar Gaman[1], and Bert Ellingboe[1]

[1]Dublin City Univ., Ireland, [2]Inst. of Engineering and Sci. IPS Academy, India

[TB3-3] Invited **15:10-15:40**

Electron Heating and the Magnetic Asymmetry Effect in Magnetized Capacitively Coupled Radio-Frequency Plasmas

Birk Berger, Moritz Oberberg, Li Wang, Dennis Engel, Christian Woelfel, Denis Eremin, Jan Lunze, Ralf Peter Brinkmann, Peter Awakowicz, and Julian Schulze

Ruhr-Univ. Bochum, Germany

[TB3-4] Invited **15:40-16:10**

Resonance Phenomena in Radio-Frequency Plasma Sources: From Basic Physics to Technological Significance

Thomas Mussenbrock

Ruhr Univ. Bochum, Germany

[TC3] Plasma Deposition and Etching - I (PECVD, Beam, Tilting, Pulsing)	
Date / Time	January 19 (Tue.), 2021 / 14:30-16:00
Place	Channel C
Session Chair(s)	Ho Jun Kim (Gachon Univ., Korea) Kazufumi Hata (Kanazawa Univ., Japan)

[TC3-1] Invited **14:30-15:00**

Open-Air Plasma-Enhanced Deposition of Titanium Oxide Thin Films

Rodolphe Mauchauffé, Jongwoon Kim, Dong-Hyun Kim, and Se Youn Moon
Jeonbuk Nat'l Univ., Korea

[TC3-2] **15:00-15:20**

Interactions of Si and SiO_2 Surfaces with Energetic $SiFx^+$ and $SiClx^+$ Ion Beams

Abdullah Jaber, Michiro Isobe, Tomoko Ito, Kazuhiro Karahashi, and Satoshi Hamaguchi
Osaka Univ., Japan

[TC3-3] **15:20-15:40**

Investigation of Plasma Distribution Dependency on Pattern Tilting in 300mm VHF-CCP Si Etch

Seongjae Lim, Jaemin Song, Taejun Park, Haneul Lee, Sung Hyun Son, and Gon-Ho Kim
Seoul Nat'l Univ., Korea

[TC3-4] **15:40-16:00**

Etch Characteristics of Nanoscale Poly-Si Fins by Using Pulsed Ar / Cl_2 Inductively Coupled Plasmas

Hee Ju Kim, Geun Young Yeom, Ji Soo Oh, Jong Woo Hong, Gyo Wun Kim, Won Jun Jang, Jeong Wan Kim, Chae Lin Lee, and Dong Woo Kim
Sungkyunkwan Univ., Korea

[TA4] Plasma Agriculture	
Date / Time	January 19 (Tue.), 2021 / 16:30-18:10
Place	Channel A
Session Chair(s)	Katsuyuki Takahashi (Iwate Univ., Japan)

[TA4-1] **16:30-16:50**

Elimination Effect of Airborne Fungi Using Dielectric Barrier Discharges Driven by a Pulsed Power Generator

Takuto Kikuchi[1], Alexis Guionet[1], Katsuyuki Takahashi[1], Koichi Takaki[1], Shinji Ishida[2], and Tatsuya Terazawa[2]

[1]Iwate Univ., Japan, [2]Energy Support Corp., Japan

[TA4-2] Invited **16:50-17:20**

Air Discharge Over Water: Generation, Process, and PAW Reactivity

Dongping Liu

Dalian Univ. of Tech., China

[TA4-3] **17:20-17:40**

Plasma Activated Water Increases Growth and Potential Yield in Micro-Tomato

Ryza Aditya Priatama, Donghyeun Ka, Seong Bong Kim, and Young Koung Lee

KFE, Korea

[TA4-4] Invited **17:40-18:10**

Applications of Low Temperature Plasma to Agriculture in Preharvest Stage

Masaharu Shiratani, Pankaj Attri, Takamasa Okumura, and Kazunori Koga

Kyushu Univ., Japan

[TB4] Plasma Diagnostics and Process Monitoring Technology I	
Date / Time	January 19 (Tue.), 2021 / 16:30-18:10
Place	Channel B
Session Chair(s)	Se Youn Moon (Jeonbuk Nat'l Univ., Korea)

[TB4-1] **16:30-16:50**

Understanding Electron Power Absorption in CCPs via a Boltzmann Term Analysis as a Basis for Knowledge-Based Process Development

Máté Vass[1], Sebastian Wilczek[1], Trevor Lafleur[2], Ralf Peter Brinkmann[1], Zoltán Donkó[3], and Julian Schulze[1]

[1]Ruhr Univ. Bochum, Germany, [2]Plasma Potential-Physics Consulting and Research, Australia, [3]Wigner Research Centre for Physics, Hungary

[TB4-2] **16:50-17:10**

Conversion of Volatile Organic Compounds in a Twin Surface Dielectric Barrier Discharge

Lars Schücke, Jan-Luca Gembus, Niklas Peters, Friederike Kogelheide, Ryan T. Nguyen-Smith, Andrew. R. Gibson, Julian Schulze, Peter Awakowicz, and Martin Muhler

Ruhr Univ. Bochum, Germany

[TB4-3] **17:10-17:30**

Application of PI-VM to Develop Automatic Process Controller (PI-APC) for Si Etching Processes

Sang-Won Ryu, Ji-Won Kwon, Jihoon Park, Ingyu Lee, and Gon-Ho Kim

Seoul Nat'l Univ., Korea

[TB4-4] **17:30-17:50**

Development of Si Etch Profile Virtual Metrology using Plasma Information(PI-VM) in SF_6/O_2/Ar Capacitively Coupled Plasma

Ji-Won Kwon[1], Sang-Won Ryu[1], Jihoon Park[1], Haneul Lee[1], Yunchang Jang[1], Seolhye Park[2], and Gon-Ho Kim[1]

[1]Seoul Nat'l Univ., Korea, [2]Samsung Display Co., Ltd., Korea

[TB4-5] **17:50-18:10**

Extracting Electron Neutral Collision Frequency from Impedance Characteristics of Magnetized Capacitive Coupled RF Discharge

Shikha Binwal[1], Jay K. Joshi[2], Shantanu Kumar Karkari[2], and Lekha Nair[1]

[1]Jamia Millia Islamia (A Central Univ.), India, [2]Inst. for Plasma Research, India

[TC4] Plasma Deposition and Etching - II (GWP, Thermal, ALE, MTJ, DFT)	
Date / Time	January 19 (Tue.), 2021 / 16:30-18:50
Place	Channel C
Session Chair(s)	Se Hun Kwon (Pusan Nat'l Univ., Korea)

[TC4-1] **16:30-16:50**

Etch Characteristics of SiO_2 Using Lower Global Warming CxF_8 (x=5,7) Inductively Coupled Plasmas

Da In Sung, Geun Young Yeom, Dong Woo Kim, and Hyun Woo Tak

Sungkyunkwan Univ., Korea

[TC4-2] **16:50-17:10**

Influence of Carbon Source Gas Flow Rate on High-Rate Deposition of Polycrystalline Diamond Film Using Time-Series Exposure of Modulated/Non-Modulated Induction Thermal Plasmas

Kazufumi Hata, Naoki Kano, Yusuke Nakano, Yasunori Tanaka, and Tatsuo Ishijima

Kanazawa Univ., Japan

[TC4-3] **17:10-17:30**

Atomic Layer Etching of SiO_2 and Si_3N_4 with Fluoroether and Fluoroalcohol Compounds

Yongjae Kim, Yebin Lee, Seonghyeon Lee, and Heeyeop Chae

Sungkyunkwan Univ., Korea

[TC4-4] **17:30-17:50**

Study on Etch Characteristics of Magnetic Tunnel Junction (MTJ) Materials Using Hydrogen Based Reactive Ion Beam

Yun Jong Jang, Doo San Kim, Ju Eun Kim, Ye Eun Kim, You Jung Gill, and Geun Young Yeom

Sungkyunkwan Univ., Korea

[TC4-5] **17:50-18:10**

Density Functional Theory Study on the Gas-Phase Cleaning of SiO_2 Using HF and NH4F

Romel Hidayat[1], Tanzia Chowdhury[1], Hye-Lee Kim[1], Tirta Rona Mayangsari[2], Seongjae Cho[3], Sangjoon Park[4], Jongwan Jung[1], and Won-Jun Lee[1]

[1]Sejong Univ., Korea, [2]Pertamina Univ., Indonesia, [3]Gachon Univ., Korea, [4]Wonik IPS, Korea

[TC4-6] Keynote **18:10-18:50**

Needs of New Plasma Etching Technologies for the Next 10 Years' Chip Fabrication

Jong Chul Park

Samsung Electronics Co., Ltd., Korea

▶January 20 (Wed.)

[WA1] Photovoltaics Related Materials and Devices	
Date / Time	January 20 (Wed.), 2021 / 09:00-10:50
Place	Channel A
Session Chair(s)	Muhammad Jahandar (KIMS, Korea) Dong Chan Lim (KIMS, Korea)

[WA1-1] Invited 09:00-09:30

Carrier Transport Mechanisms of Reactively Direct Current Magnetron Sputtered Tungsten Oxide/N-Type Crystalline Silicon Heterojunctions

Vinh-Ai Dao[1], Thanh Thuy Trinh[2], Van-Ngoc Le[2], Sang-Ho Kim[3], and Junsin Yi[3]
[1]Duy Tan Univ., Vietnam, [2]Viet Nam Nat'l Univ., Ho Chi Minh City, Vietnam, [3]Sungkyunkwan Univ., Korea

[WA1-2] 09:30-09:50

Enhance Output Power of Dye Sensitized Solar Cell (DSSC) with V-Shape System Concave-Mirror Concentrator

Tika Erna Putri
Kyushu Univ., Japan

[WA1-3] 09:50-10:10

Effects of Concentrated Light on the Performance and Stability of Quasi-Solid Electrolytes in Dye-Sensitized Solar Cells

Fadzai Lesley Chawarambwa, Attri Pankaj, Kazunori Koga, and Masaharu Shiratani
Kyushu Univ., Japan

[WA1-4] 10:10-10:30

Large-Area Organic Photovoltaics – Indoor Power Generators for Self-Sustainable IoT Devices

Muhammad Jahandar, Soyeon Kim, Prasetio Adi, Souk Yoon Kim, and Dong Chan Lim
KIMS, Korea

[WA1-5] 10:30-10:50

Co-Absorbing Polymer for High Performance Ternary Polymer Solar Cells via Effective Backbone Modulation

Insoo Shin, Danbi Kim, Hyun-Seock Yang, Pesi M. Hangoma, Bo Ram Lee, and Sung Heum Park
Pukyong Nat'l Univ., Korea

[WB1] Plasma Diagnostics and Process Monitoring Technology II	
Date / Time	January 20 (Wed.), 2021 / 09:00-10:10
Place	Channel B
Session Chair(s)	Se Youn Moon (Jeonbuk Nat'l Univ., Korea)

[WB1-1] Invited **09:00-09:30**

Solutions to the Challenges of Quantitative Neutral Species Measurements in Process Plasmas

Jianping Zhao[1], Peter Ventzek[1], Charles Schlechte[1], John Carroll[1], Michael Hummel[1], Toshihiko Iwao[2], and Kiyotaka Ishibashi[2]

[1]TEL, USA, [2]TEL, Japan

[WB1-2] **09:30-09:50**

Investigation of Power Coupling Property in E-H Mode Integrated Inductively Coupled Plasmas

Haneul Lee, Ingyu Lee, Sung Hyun Son, Jaemin Song, and Gon-Ho Kim

Seoul Nat'l Univ., Korea

[WB1-3] **09:50-10:10**

Computational Analyses of TEOS-Based Plasma Characteristics to Clarify SiO_2 Deposition Mechanisms in PECVD Processes

Hu Li and Kazuki Denpoh

Tokyo Electron Tech. Solutions, Japan

[WC1] Plasma Deposition and Etching - III (ALE, PI-VM and MD Simulation)	
Date / Time	January 20 (Wed.), 2021 / 09:00-10:40
Place	Channel C
Session Chair(s)	Yeon Ho Im (Jeonbuk Nat'l Univ., Korea)

[WC1-1] **09:00-09:20**

Characteristics of Silicon Nitride Deposited by Very High Frequency (162 MHz)-Plasma Enhanced Atomic Layer Deposition Using Bis(diethylamino)silane

You Jin Ji[1], Ki Hyun Kim[1], Ji Eun Kang[1], Youngsim Kim[1], Albert Rogers Ellingboe[2], and Geun Young Yeom[1]
[1]Sungkyunkwan Univ., Korea, [2]Dublin City Univ., Ireland

[WC1-2] **09:20-09:40**

Construction of Classical Interatomic Potential Functions for Molecular Dynamics Simulation of Si and SiO_2 Etching by I^+ Ions

Erin Joy Capdos Tinacba, Michiro Isobe, and Satoshi Hamaguchi
Osaka Univ., Japan

[WC1-3] **09:40-10:00**

Development of Virtual Metrology Using Plasma Information (PI-VM) on $Ge_xSb_yTe_z$ Pattern Etch for PRAM

Jaemin Song, Myeong-Geon Lee, Yunchang Jang, Chanyoung Yoo, Cheol Seong Hwang, and Gon-Ho Kim
Seoul Nat'l Univ., Korea

[WC1-4] **10:00-10:20**

Study of SiO_2 Etching Using $C_xH_2F_6$ (x=3,4) L-HFC Precursors

Hyun Woo Tak, Da In Sung, In Pyo Hong, Wen Long, Dong Woo Kim, and Geun Yong Yeom
Sungkyunkwan Univ., Korea

[WC1-5] **10:20-10:40**

A Study on the Atomic Layer Etching Using Radio-Frequency Biased Inductively Coupled Plasma in Ar/C_4F_6 Mixture

Min Young Yoon[1], Jung Hyung Kim[1], Jong-Ryul Jeong[2], and Hyo-Chang Lee[1]
[1]KRISS, Korea, [2]Chungnam Nat'l Univ., Korea

[WA2] Battery Related Materials and Devices	
Date / Time	January 20 (Wed.), 2021 / 11:00-12:10
Place	Channel A
Session Chair(s)	Joo Hyung Kim (Inha Univ., Korea)

[WA2-1] Keynote **11:00-11:40**

Na-Ion and All-Solid-State Na Batteries

Jin An, Sam Oh, Jianguo Sun, Yumei Wang, and Li Lu

Nat'l Univ. of Singapore, Singapore

[WA2-2] Invited **11:40-12:10**

All Solid-State Batteries – Enabling Lithium-Metal Anode Cells

Ruediger-A. Eichel[1,2]

[1]RWTH Aachen Univ., Germany, [2]Research Inst. Juelich, Germany

[WB2] Plasma Diagnostics and Process Monitoring Technology III	
Date / Time	January 20 (Wed.), 2021 / 11:00-12:20
Place	Channel B
Session Chair(s)	Duk Sun Han (KFE, Korea)

[WB2-1] Invited **11:00-11:30**

Tomography-Based Optical Diagnostics for Real-Time Monitoring of Spatial Uniformity in Microelectronics Processing Plasmas

Wonho Choe

KAIST, Korea

[WB2-2] **11:30-11:50**

Improvement of Triple Probe Measurement on Non-Maxwellian Plasmas

Namjae Bae, Jaemin Song, Jihoon Park, Haneul Lee, and Gon-Ho Kim

Seoul Nat'l Univ., Korea

[WB2-3] Invited **11:50-12:20**

Predictive Control of the Plasma Processes after Discontinuities in the OLED Display Mass Production Line Referring to the PI-VM Model

Seolhye Park[1], Jaegu Seong[1], Yeongil Noh[1], Yoona Park[1], Yongsuk Jang[1], Taeyoung Cho[1], Jae Ho Yang[1], and Gon-Ho Kim[2]

[1]Samsung Display Co., Ltd., Korea, [2]Seoul Nat'l Univ., Korea

[WC2] Plasmas Characterization and Application	
Date / Time	January 20 (Wed.), 2021 / 11:00-11:50
Place	Channel C
Session Chair(s)	Goo Hwan Jeong (Kangwon Nat'l Univ., Korea) Oi Lun Li (Pusan Nat'l Univ., Korea)

[WC2-1] Invited 11:00-11:30

Nanomaterials Synthesis Using Triple DC Thermal Plasma Jet System

Jeong-Hwan Oh[1], Seung-Hyun Hong[1], Yong Hee Lee[1], Minseok Kim[2], Tae-Hee Kim[3], and Sooseok Choi[1]

[1]Jeju Nat'l Univ., Korea, [2]Univ. of California, Riverside, USA, [3]Wonkwang Univ., Korea

[WC2-2] 11:30-11:50

Extremely Flexible and Rollable 2D-MoS_2/Si Heterojunction-Based Near Infrared (NIR) Photodetector via Atomic-Pressure (AP) PECVD

Yonghun Kim and Jung-Dae Kwon

KIMS, Korea

[WA3] Energy Harvesting, Storage and Conversion I	
Date / Time	January 20 (Wed.), 2021 / 13:20-15:00
Place	Channel A
Session Chair(s)	So Yeon Kim (KIMS, Korea) Young-Hun Kim (KIMS, Korea)

[WA3-1] **13:20-13:40**

Development of Halide Materials for Sodium-Ion Batteries towards Next Generation Energy Storage

Jianguo Sun and Li Lu

Nat'l Univ. of Singapore, Singapore

[WA3-2] **13:40-14:00**

Stable, High Output Triboelectric Nanogenerators Using Butylated Melamine Formaldehyde as a Durable and Highly Tribo-Positive Friction Layer

Sera Jeon, Sung Soo Kwak, and Sang-Woo Kim

Sungkyunkwan Univ., Korea

[WA3-3] **14:00-14:20**

Design and Application of PEDOT:PSS for Energy Harvesting

Soyeon Kim, Muhammad Jahandar, and Dong Chan Lim

Korea Inst. of Materials Sci., Korea

[WA3-4] **14:20-14:40**

High-Performance Triboelectric Nanogenerator based on Ferroelectric Polarization and Dielectric Properties

Donghyeon Kang, Wanchul Seung, Hong-Joon Yoon, and Sang-Woo Kim

Sungkyunkwan Univ., Korea

[WA3-5] **14:40-15:00**

Splitting of Carbon Dioxide Using an RF DBD Reactor with Segmented Electrode at Low Pressure

Kang-Ning Tian, Chao Wang, Su-Rong Sun, and Hai-Xing Wang

Beihang Univ., China

[WB3] Plasma Diagnostics and Process Monitoring Technology IV	
Date / Time	January 20 (Wed.), 2021 / 13:20-14:40
Place	Channel B
Session Chair(s)	Rodolphe Manchauffé (Jeonbuk Nat'l Univ., Korea)

[WB3-1] 13:20-13:40

Development and Demonstration of Planar Microwave Probes for Non-Invasive Plasma Density Measurement: the MOLE and TUSI Probe

Si Jun Kim[1], Sang Ho Lee[2], Ha Jeong Choi[1], Jang Jae Lee[1], Young Seok Lee[1], In Ho Seong[1], Han Sol Choi[1], Jin Ho Lee[1], Min Su Choi[1], and Shin Jae You[1]

[1]Chungnam Nat'l Univ., Korea, [2]Korea Inst. of Machinery and Materials, Korea

[WB3-2] 13:40-14:00

Plasma Diagnostic by Optical Emission Spectroscopy on TiN MHM Magnetron Sputtering

Byeonghwa Jeong[1], Jaeeun Huh[2], Dohyun Oh[2], Sang Ho Lee[2], and Geun Young Yeom[1]

[1]Sungkyunkwan Univ., Korea, [2]ULVAC KOREA, Ltd., Korea

[WB3-3] 14:00-14:20

Plasma Information Variable of Electron Temperature (PI-Te) Analysis by Deconvolution of Optical Signals

Jihoon Park[1], Ji-Won Kwon[1], Sang-Won Ryu[1], Jaemin Song[1], Jihwan Park[2], Yongjin Kim[2], and Gon-Ho Kim[1]

[1]Seoul Nat'l Univ., Korea, [2]SK Hynix, Korea

[WB3-4] 14:20-14:40

Development of Flat Cutoff Probe for Real-Time Electron Density Measurement

Hee Jung Yeom[1], Jung Hyung Kim[1], Shin Jae You[2], and Hyo-Chang Lee[1]

[1]KRISS, Korea, [2]Chungnam Nat'l Univ., Korea

[WC3] Plasmas for Nanomaterial Synthesis	
Date / Time	January 20 (Wed.), 2021 / 13:20-15:00
Place	Channel C
Session Chair(s)	Oi Lun Li (Pusan Nat'l Univ., Korea) Goo Hwan Jeong (Kangwon Nat'l Univ., Korea)

[WC3-1] Invited **13:20-13:50**

Plasma-Assisted Nanomaterials for Photoelectrochemical and Electrocatalytic Water Splitting Applications: Ab Initio Study

Heechae Choi

Univ. of Cologne, Germany

[WC3-2] **13:50-14:10**

Investigation of Distributed Dust from Tungsten during Transient High Heat Flux

Ki-Baek Roh[1], Myeong-Geon Lee[1], Hyoung Chan Kim[2], and Gon-Ho Kim[1]

[1]Seoul Nat'l Univ., Korea, [2]KFE, Korea

[WC3-3] Invited **14:10-14:40**

Low-Temperature Synthesis of Monolayer Graphene Using a Microwave-Excited Blowing Plasma

Jaeho Kim, Hirotomo Itagaki, and Hajime Sakakita

AIST, Japan

[WC3-4] **14:40-15:00**

Hollow Porous Gold Nanoshells with Structural Tunability Synthesized by Plasma Etching of Colloid Templates

Joon Heon Kim

GIST, Korea

[WA4] Energy Harvesting, Storage and Conversion II	
Date / Time	January 20 (Wed.), 2021 / 15:20-17:00
Place	Channel A
Session Chair(s)	Dong Gun Lim (Korea Nat'l Univ. of Transportation, Korea)

[WA4-1] Invited **15:20-15:50**

Non-Precious Metal-Based Electrocatalysts for High-Efficiency Anion Exchange Membrane Water Electrolyzer

Jooyoung Lee and Sung Mook Choi

KIMS, Korea

[WA4-2] Invited **15:50-16:20**

Infrared Thermography and Surface Acoustic Wave Sensor for Energy System and Toxic Gas Monitoring

Joo-Hyung Kim[1], Jun-Su Lee[1], Gang-Min Lim[2], Ju-Sik Kim[3], Jinuk Kim[1], and Hyewon Park[1]

[1]Inha Univ., Korea, [2]ATG, Korea, [3]Korea Hydro and Nuclear Power Co., Korea

[WA4-3] **16:20-16:40**

Growing Hexagonal Boron Nitride Films on Various Substrate Materials Using RF Sputtering

Duc-Quang Hoang[1], Khang Dinh Pham[2], Minh Hoat Do[3], and Vinh-Ai Dao[3]

[1]Ton Duc Thang Univ., Vietnam, [2]Military Inst. of Mechanical Engineering, Vietnam, [3]Duy Tan Univ., Vietnam

[WA4-4] **16:40-17:00**

Low Temperature Fabrication of SiN_x Films Using Multi Hollow Discharge SiH_4+N_2 Plasma

Yusuke Sasaki

Kyushu Univ., Japan

[WC4] Plasma Process for Environmental Issues	
Date / Time	January 20 (Wed.), 2021 / 15:20-17:00
Place	Channel C
Session Chair(s)	Oi Lun Li (Pusan Nat'l Univ., Korea)

[WC4-1] Invited **15:20-15:50**

Plasma-Modified Catalysts and Catalysis: Application to Greenhouse Gas Utilization

Tomohiro Nozaki, Zunrong Sheng, and Xiaozhong Chen

Tokyo Inst. of Tech., Japan

[WC4-2] **15:50-16:10**

Effect of Humidity on ZnO Nanowire Structures Synthesized by Atmospheric Pressure Microwave Plasma System

Byeong-Joo Lee, Sung-Il Jo, Woo-Young Lee, Seong-Gyu Heo, and Goo-Hwan Jeong

Kangwon Nat'l Univ., Korea

[WC4-3] Invited **16:10-16:40**

Plasma-Catalytic Conversion of Air Pollutants: Investigation of Reaction Process and Synergy Mechanism

Daiqi Ye, Junliang Wu, Peirong Chen, Haomin Chen, Limin Chen, and Mingli Fu

South China Univ. of Tech., China

[WC4-4] **16:40-17:00**

Digital Twin Development of a CCP Dry Etcher for 300 mm Wafers

Junghoon Joo[1], Hyoungcheol Kwon[2], Jong-Won Park[2], and Sung Kye Park[2]

[1]Kunsan Nat'l Univ., Korea, [2]SK hynix, Korea

[WA5] Plasma Medicine	
Date / Time	January 20 (Wed.), 2021 / 17:20-18:30
Place	Channel A
Session Chair(s)	Antony Ananth (Sungkyunkwan Univ., Korea)

[WA5-1] **17:20-17:40**

Bactericidal Properties of Plasma Activated Water Mist

Elena Sysolyatina[1], Alexandra Lavrikova[2], Roman Loleyt[3], Elena Vasilieva[1], Mariam Abdulkadieva[4], Svetlana Ermolaeva[1], and Aleksey Sofronov[3]

[1]Gamaleya Nat'l Research Centre of Epidemiology And Microbiology, Russia, [2]Comenius Univ., Slovakia, [3]Kinetika Lab, Russia, [4]JIHT RAS, Russia

[WA5-2] Invited **17:40-18:10**

Bioscience Application for Non-Thermal Atmospheric Pressure Biocompatible Plasma (NBP)

Ihn Han, Mahmuda Akter, and Eun Ha Choi

Kwangwoon Univ., Korea

[WA5-3] **18:10-18:30**

Evaluation of Cold Atmospheric Pressure Plasma Effect on Inactivation of SARS-CoV-2 Virus

Milad Rasouli and Elaheh Amini

Kharazmi Univ., Iran

[WC5] Plasmas for Energy Related Issues	
Date / Time	January 20 (Wed.), 2021 / 17:20-18:00
Place	Channel C
Session Chair(s)	Goo Hwan Jeong (Kangwon Nat'l Univ., Korea) Oi Lun Li (Pusan Nat'l Univ., Korea)

[WC5-1] **17:20-17:40**

Synergetic Structure of Sulfur-Doped Disordered Carbon for Sodium-Ion Exchange

Hanvin Kim and Nozomi Takeuchi

Tokyo Inst. of Tech., Japan

[WC5-2] **17:40-18:00**

Tungsten Coating on GraphiteTileby PECVD Technique as a Fusion Grade Material for Aditya-U Tokamak

Jayshree Sharma[1], Sachin Singh Chauhan[2], Uttam Sharma[2], Joydeep Ghosh[3], and Amulya Sanyasi[3]

[1]Shri Vaishnav Inst. of Management, India, [2]Shri Vaishnav Vidyapeeth Vishwavidyalaya, India, [3]Inst. of Plasma Research, India

Poster Sessions

01 : Plasma Bioscience & Medicine

[P01-01]

A Study on the Characteristics of Plasma Source with Structure Stabilizing Bubbles in Aqueous Solution

Ju Sung Kim and Eun Ha Choi

Kwangwoon Univ., Korea

[P01-02]

Study of Non-Thermal Atmospheric Plasma and MiRNA in Melanoma Cells

Pradeep Bhartiya[1], Neha Kaushik[2], Linh Nguyen[1], Nagendra Kumar Kaushik[1], and Eun Ha Choi[1]

[1]Kwangwoon Univ., Korea, [2]Univ. of Suwon, Korea

[P01-03]

Non-Thermal Atmospheric Pressure Plasma Treatment Properties for Room Disinfection

Se Hoon Ki and Eun Ha Choi

Kwangwoon Univ., Korea

[P01-04]

Effect of Gauze Layer on Sterilization Using Atmospheric-Pressure Non-Thermal Plasma Pipette

Geunyoung Nam[1], Muhwan Kim[2], Yeonsook Jang[2], and Sungbo Cho[1]

[1]Gachon Univ., Korea, [2]Femto Sci. Inc., Korea

[P01-05]

Synergistic Effect of Cold Atmospheric Plasma and Photodynamic Treatment of Cancer Cells Using ROS-Sensitive Nanophotosensitizers

Chang Young Kim[1], Chang-Min Lee[1], Min-Suk Kook[2], Byung Hoon Kim[1], and Young-IL Jeong[1]

[1]Chosun Univ., Korea, [2]Chonnam Univ., Korea

[P01-06]

Reactive Oxygen Species Roles Generated by Cold Atmospheric Pressure Helium/Oxygen Plasma for Peri-Implantitis Treatment

Chang-Min Lee[1], Young-IL Jeong[1], Eunbyul Kook[1], Gwang-Min Heo[2], Min-Suk Kook[2], and Byung Hoon Kim[1]

[1]Chosun Univ., Korea, [2]Chonnam Nat'l Univ., Korea

[P01-07]

Nanotube and Nano-Mesh Formation on the Alpha and Beta Phase of Ti-xTa-Ag-Pt Alloys for Bio-Implant

Han-Cheol Choe

Chosun Univ., Korea

[P01-08]

Surface Characteristics of TiAlN-, ZrN-, and DLC-Coated Tools for Dental Use

Hyo-Jin Son, Mee-Kyoung Son, and Han-Cheol Choe
Chosun Univ., Korea

[P01-09]

RF-Sputtered Strontium Coatings on the Ti-35Nb-xTa Alloy Surface Doped with Ca and P for Biocompatibility

Hyun-Jun Kim and Han-Cheol Choe
Chosun Univ., Korea

[P01-10]

Sr-HA Coating Morphology on the Nanotube- and Nano-Mesh Formed Ti-6Al-4V Surface via RF-Magnetron Sputtering

Hye Ri Cho and Han-Cheol Choe
Chosun Univ., Korea

[P01-11]

Effects of Non-Thermal Biocompatible Plasma Treated Liquid on Ovarian Cancer Cells

Mahmuda Akter, Se Hoon Ki, Eun Ha Choi, and Ihn Han
Kwangwoon Univ., Korea

[P01-12]

Direct Plasma Treatment on Seeds to Improve the Germiation and Early Growth Processes

Rachmawati Hapsari Putri, Sagung Dewi Kencana, and Yu-Lin Kuo
Nat'l Taiwan Univ. of Sci. and Tech., Taiwan

02 : Plasma Processing for Semiconductor and Display Devices

[P02-01]

Atomic Layer Etching of Al_2O_3 Using Ligand Exchange with CF_4 and NF_3 Plasma in Inductively Coupled Plasmas

Jihyun Kim, Heeyeop Chae, Yongjae Kim, and Dahee Shim

Sungkyunkwan Univ., Korea

[P02-02]

Atomic Layer Etching Technology Using Radical Adsorption

Junho Jeong, Jiyoung Oh, Yunseok Lee, Eunchong Kang, and Kyoungnam Kim

Daejeon Univ., Korea

[P02-03]

Dry Etching Characteristics of ITO/Ag/ITO Multi-Layer Thin Film Using ECR Plasma Source based on HCl/H_2 Gas Mixture System

Seong Yong Kwon, Ho Won Yoon, Seung Min Shin, Sang Heon Lee, and Mun Pyo Hong

Korea Univ., Korea

[P02-04]

Development of an Atomic Layer Etching Simulator for Processing Equipment Commercialization

Young Seok Lee, Jang Jae Lee, Chulhee Cho, In Ho Seong, Si Jun Kim, and Shin Jae You

Chungnam Nat'l Univ., Korea

[P02-05]

The Effects of Oxygen Radical Pressure during Plasma-Enhanced ALD Al_2O_3 on Electrical Properties of a-IGTO Thin-Film Transistors

Jae Kyeong Jeong and Cheol Hee Choi

Hanyang Univ., Korea

[P02-07]

Effect of Bias Pulsing on Selective Etching of TiO_2

Jong Woo Hong, Geun Young Yeom, and Hee Ju Kim

Sungkyunkwan Univ., Korea

[P02-08]

Etch Characteristics of Ovonic Threshold Switch (OTS) Material Using Hydrogen-Based Plasmas for Phase Change Memory (PCM) Devices

Doo San Kim and Geun Young Yeom

Sungkyunkwan Univ., Korea

[P02-09]

Plasma Etching of Silicon Oxide with Fluoroether and Fluoroalcohol in Dual Frequency Superimposed Capacitively Coupled Plasmas

Hojin Kang, Jun-Hyun Kim, Yongjae Kim, and Heeyeop Chae
Sungkyunkwan Univ., Korea

[P02-10]

Fabrication of Large Area, Ordered Nanoporous Structures on Various Substrates for Potential Electro-Optic Applications

Hong Sub Jee and Jaehyeong Lee
Sungkyunkwan Univ., Korea

[P02-11]

Low-Global Warming Potential $C_4H_3F_7O$ Isomers for the Plasma Etching of SiO_2 and Si_3N_4 and Poly-Si Films

Heeyeop Chae, Seoeun Kim, Yebin Lee, and Seonghyeon Lee
Sungkyunkwan Univ., Korea

[P02-12]

Kinetic Mechanism of Reactive Oxygen/Nitrogen Species for Plasma Assisted Greenhouse Gas Replacement

Seonbyul Lee, Su-Rin An, Ye-Jin Kim, and Sang Jeen Hong
Myongji Univ., Korea

[P02-13]

Surface Analysis of Low-k Dielectrics after Amorphous Carbon Layer Strip Process

Minkyu Park, Min Ho Kim, Wan Soo Song, and Sang Jeen Hong
Myongji Univ., Korea

[P02-14]

Selective Surface Treatment of Al-Doped Zinc Oxide Thin Films Using Atmospheric Plasma Jet

Haechang Lee, Kirak Kim, Younggon Choi, Sang Jik Kwon, and Eou-Sik Cho
Gachon Univ., Korea

[P02-15]

Improvement in Device Performance of A-InGaZnO Transistors by the Insertion of a Copper Source/Drain Electrode and an MoTi Diffusion Barrier

Chang Kyu Lee[1], Jin Lee Kim[1], Min Jae Kim[2], Sang Ho Lee[1], and Jae Kyeong Jeong[2]
[1]ULVAC KOREA, Ltd., Korea, [2]Hanyang Univ., Korea

[P02-16]

Effect of Hard Mask Deposition/Strip Process Temperature on SiCOH Low-k Dielectric Film

Min Ho Kim, Wan Soo Song, and Sang Jeen Hong
Myongji Univ., Korea

[P02-17]

Angular Dependence of Si_3N_4 Etch Rates in Various Fluorocarbon Plasmas

Jun-Hyun Kim[1], Sanghyun You[2], and Chang-Koo Kim[2]

[1]Sungkyunkwan Univ., Korea, [2]Ajou Univ., Korea

[P02-18]

Optical Monitoring of Glow Discharged Atmospheric Pressure Plasma in Photoresist Strip Process

Sujin Lee, Hyukjoon Kwoen, and Sang Jeen Hong

Myongji Univ., Korea

[P02-19]

Plasma Etching of SiO_2 Using Hydrofluoroethers

Sanghyun You[1], Jun-Hyun Kim[2], and Chang-Koo Kim[1]

[1]Ajou Univ., Korea, [2]Sungkyunkwan Univ., Korea

[P02-20]

CF_4/O_2 Plasma Etching Properties of Low Dielectric Constant Films Deposited by Plasma Chemical Vapor Deposition Using the Tetrakis(Trimethylsilyloxy) silane Precursor

Yoon Soo Park, Hyuna Lim, Namwuk Baek, Seunghun Park, Jihwan Cha, Taesoon Jang, Shin Won Kang, and Donggeun Jung

Sungkyunkwan Univ., Korea

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Bohyeon Jeon and Byoungdeog Choi

Sungkyunkwan Univ., Korea

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Woo Jae Kim, Hee Tae Kwon, Ji Hwan Kim, Gi Won Shin, Bum Soo On, Yeon Soo Park, In Young Bang, and Gi-Chung Kwon

Kwangwoon Univ., Korea

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The Effect of Forming Gas Annealing on C-V Characteristics of Dry Oxidized Al/SiO_2/Si Capacitors

Hyuntaek Woo and Byoungdeog Choi

Sungkyunkwan Univ., Korea

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Linh Nhat Nguyen, Eun Ha Choi, and Geon Joon Lee
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Woo-Young Lee, Seong-Gyu Heo, Byeong-Joo Lee, Sung-Il Jo, and Goo-Hwan Jeong
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Nitrogen Doping on Graphene Using Inductively Coupled Plasma and their Optical Diagnosis for Suppressed Defect Formation

Sung-Il Jo, Byeong-Joo Lee, and Goo-Hwan Jeong
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Pusan Nat'l Univ., Korea

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Duksun Han, Yonghyun Kim, Young-Woo Kim, Jong-Bae Park, Dae Chul Kim, and Jongsik Kim

KFE, Korea

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In Ho Seong, Jang Jae Lee, Si Jun Kim, Yeong Seok Lee, and Shin Jae You
Chungnam Nat'l Univ., Korea

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Sungkyunkwan Univ., Korea

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In-Yong Park, Dae-Wong Kim, Min Hur, Woo-Seok kwang, Jae-Ok Lee, and Sang Ho Lee

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Shoki Abe, Katsuyuki Takahashi, Seiji Mukaigawa, Koichi Takaki, and Ken Yukimura
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June Young Kim, Jinyoung Choi, Y. S. Hwang, and Kyoung Jae Chung
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Eun Seok Choe[1,2], Jung-Hyung Kim[1], Dong-Wook Kim[2], and Hyo-Chang Lee[1]
[1]KRISS, Korea, [2]Chungnam Nat'l Univ., Korea

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[1]Chungnam Nat'l Univ., Korea, [2]Nanotech Optoelectronics Research Center, Korea

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Dalian Univ. of Tech., China

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A Particle-in-Cell Simulation for the Investigation of the Sputtering Yield Profile of DC Magnetron Sputtering System during the Target Erosion

Heesung Park[1], Young Hyun Jo[2], Min Young Hur[2], Jae Wan Kim[1], and Hae June Lee[1]

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Sora Lee[1], Yejin Shon[1], Deuk-Chul Kwon[2], and Hee Hwan Choe[1]

[1]Korea Aerospace Univ., Korea, [2]KFE, Korea

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Geunwoo Go[1], Jaeyoung Choi[1], Sung-Ryul Huh[2], Y. S. Hwang[1], June Young Kim[1], and Kyoung Jae Chung[1]

[1]Seoul Nat'l Univ., Korea, [2]KAERI, Korea

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Yejin Shon[1], Sora Lee[1], Deuk-Chul Kwon[2], and Hee Hwan Choe[1]

[1]Korea Aerospace Univ., Korea, [2]KFE, Korea

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Jae Wang Ban[1], Hee Jung Yeom[1], Jung-Hyung Kim[1], Shin Jae You[2], and Hyo-Chang Lee[1]
[1]KRISS, Korea, [2]Chungnam Nat'l Univ., Korea

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Chan-Won Park[1,2], Jung-Hyung Kim[1], and Hyo-Chang Lee[1]
[1]KRISS, Korea, [2]Chungnam Nat'l Univ., Korea

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Hajun Dang[1], Sunggyu Park[2], and Jaebum Choo[1]
[1]Chung-Ang Univ., Korea, [2]KIMS, Korea

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Won Jong Yoo[1], Kwangro Lee[1], and Kyung Joon Han[2]
[1]Sungkyunkwan Univ., Korea, [2]Palogen Inc., Korea

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Minseok Song, Yuanrui Qi, Dong Hyun Lee, In Hwan Kim, Vu Binh Nam, Dae Ho Lee, Sang Jik Kwon, and Eou-Sik Cho
Gachon Univ., Korea

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Pusan Nat'l Univ., Korea

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Jinwon Bae, Myeongjoon Kim, Kwanghwi Kim, and Jonghyun Seo

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Sungkyunkwan Univ., Korea

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A New Hybrid Stretchable Substrate above 20% Strain for Stretchable-and-Flexible-Substrate-Based Systems

Ah-Young Park, Jae Hak Lee, Jun Yeob Song, Seongheum Han, and Seungman Kim
KIMM, Korea

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SnO_2 Nanowires Deposited by Insulating Amorphous Carbon Layers for Enhanced NO_2 Sensing at Room Temperature

Hyoun Woo Kim, Jae Hoon Bang, Seungmin Han, Ha Young Lee, and Ka Yoon Shin
Hanyang Univ., Korea

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Enhanced Synaptic Properties of Hybrid Channel Field-Effect Transistor with Reduced Graphene Oxide-ZnO Nanorods

Jaewon Lee, Yurim Lee, Junaid Sultan Muhammad, and Nae Eung Lee
Sungkyunkwan Univ., Korea

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Stretchable, Stable, Room-Temperature Operable Toxic Gas Sensor Composed of Reduced Graphene Oxide and MOF-Derived $ZnFe_2O_4$ Hollow Octahedron

Atanu Bag, Mohit Kumar, Dong-Bin Moon, Adeela Hanif, Dae-Ho Yoon, and Nae Eung Lee
Sungkyunkwan Univ., Korea

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Room-Temperature Operable and Stretchable Nitrogen Dioxide Gas Sensor based on Reduced Graphene Oxide and Zinc Oxide Nanorods Composite

Dong-Bin Moon, Atanu Bag, Han-Byeol Lee, Montri Meeseepong, Dong-Hyun Lee, and Nae Eung Lee
Sungkyunkwan Univ., Korea

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Stretchable Substrate with Skin-Like Mimicking Mechanical Behaviors Using Spaghetti-Like Multi-Nanofiber Network of Stiff and Elastic Components

Adeela Hanif, Atanu Bag, Arsalan Zabeeb, Dong-Bin Moon, Surjeet Kumar, Sajal Shrivastava, and Nae Eung Lee
Sungkyunkwan Univ., Korea

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Ultratransparent Conductive Polymer/Metal Grid Hybrid Electrodes for ITO-Free Organic Solar Cells

Joo Won Han and Yong Hyun Kim

Pukyong Nat'l Univ., Korea

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Multi-Layer Nano-Composite Transmitters for Laser-Ultrasonic Generation of Pulse Burst

Pilgyu Sang and Hyoung Won Baac

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Increased Output of Shingled PV Modules through UV Area Transmission

Jae Hyeong Lee, Jang Won Yoo, Hong Sub Jee, and Jae Sung Bae

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Improved Photovoltaic Performance of Inverted Polymer Solar Cells Using Multifunctional Quantum-Dots Monolayer with High Uniformity

Byung Joon Moon[1], Sukang Bae[2], and Byung Hee Hong[1]

[1]Seoul Nat'l Univ., Korea, [2]KIST, Korea

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Preparation of ZnO film Modified by Hydrogen Reduction as the Anode Materials of Lithiumion Battery

Seokwon Lee, Gukpeel Lee, Jung Hyun Kim, Young Park, and Won Seok Choi

Hanbat Nat'l Univ., Korea

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Analysis of Injection Molding for Fast Curing of Gas Insulated Switchgear Spacer

Jae Sung Bae, Won Chang Lee, In Ju Baek, Hong Sub Jee, and Jae Hyeong Lee

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High Performance Triboelectric Nanogenerators Using High Permittivity $CaCu_3Ti_4O_{12}$ Particle-Induced Internal Polarization Amplification

Dabin Kim, Jihye Kim, and Sang-Woo Kim

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[P09-09]

Chemical Deposition of Tin Nanoparticle on Highly Porous Carbon-Coated Graphite and its Electrochemical Characterization as an Anode for Lithium Ion Batteries

Joongpyo Shim and Ho-Jung Sun

Kunsan Nat'l Univ., Korea

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Impact of V-Shaped Ga Grading on Flexible Cu(In, Ga)Se_2 Solar Cell via Na Diffusion: An Observation of Active Defects Using Thermal Admittance Spectroscopy

Vishwa Bhatt[1], Sung-Tae Kim[2], Manjeet Kumar[1], Ho-Jung Jeong[3], Jae-Hyung Jang[2], and Ju Hyung Yun[1]
[1]Incheon Nat'l Univ., Korea, [2]Gwangju Inst. of Sci. and Tech., Korea, [3]Korea Photonics Tech. Inst., Korea

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Jeong Eun Park, Won Seok Choi, Jae Joon Jang, Eun Ji Bae, and Donggun Lim
Korea Nat'l Univ. of Transportation, Korea

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Optimization of Flexible CIGS Solar Cell Process with Shingled Structure Using Epoxy-Based ECA

Won Seok Choi, Jeong Eun Park, Jae Joon Jang, Eun Ji Bae, Minkyu Ju, and Donggun Lim
Korea Nat'l Univ. of Transportation, Korea

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Simple and Scalable Synthesis of Sulfurized Polyacrylonitrile Cathode for RT Na/S Batteries

Huihun Kim, Milan Sadan, Changhyeon Kim, Eunji Song, Jimin Yun, Kwon-Koo Cho, Ki-Won Kim, Jou-Hyeon Ahn, and Hyo-Jun Ahn
Gyeongsang Nat'l Univ., Korea

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High Rate Nickel Monosulfide Anode for Sodium-Ion Batteries

Milan K. Sadan, Huihun Kim, Changhyeon Kim, Minjun Seong, Minyeong Jeon, Kwon-Koo Cho, Jou-Hyeon Ahn, and Hyo-Jun Ahn
Gyeongsang Nat'l Univ., Korea

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Miscibility Control of PEDOT:PSS for Solution Processed Hole Transpor Layer in Organic Solar Cells

Souk Yoon Kim, Jahandar Muhammad, Soyeon Kim, and Dong Chan Lim
KIMS, Korea

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Hybrid Electrode Fabricated Using PEDOT:PSS/Metal Mesh for Application to ITO-Free and Flexible Organic Photovoltaics

Eun Joo Seo, Soyeon Kim, and Dong Chan Lim
KIMS, Korea

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Mitigating the Undesirable Chemical Reaction between Organic Molecules for Highly Efficient Flexible Organic Photovoltaics

Adi Prasetio[1], Muhammad Jahandar[1], Soyeon Kim[1], Jinhee Heo[1], Yong Hyun Kim[2], and Dong Chan Lim[1]
[1]KIMS, Korea, [2]Pukyong Nat'l Univ., Korea

[P09-19]

Optical and Water-Repellent Characteristics of an Anti-Reflection Protection Layer for Perovskite Solar Cells Fabricated in Ambient Air

Dong In Kim, Ji Won Lee, Rak Hyun Jeong, Ju Won Yang, Seong Park, and Jin Hyo Boo

Sungkyunkwan Univ., Korea

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On the Performance of Micro-Tubular Solid Oxide Fuel Cells Made by Aqueous Electrophoretic Deposition

Jih-Sheng Chen, Fu-An Yu, and Jyh-Shiarn Cherng

Ming Chi Univ. of Tech., Taiwan

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Highly Active Ni/MnO_2 Catalysts for Plasma-Catalytic CO_2 Methanation

Daiqi Ye and Jingjing Li

South China Univ. of Tech., China

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CO_2 Reduction Pathways in a Packed Bed DBD Reactor: A Combined Analysis of Operando Surface and Gas Phase Reaction

Yuhai Sun[1], Junliang Wu[1], Yaolin Wang[2], Ni Wang[2], Limin Chen[1], Peirong Chen[1], Mingli Fu[1], Xin Tu[2], and Yuhai Sun[1]

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[P10-02]

Effect of Etching Power under Argon Atmosphere on the Morphological and Wetting Characteristics of Nanocrystalline Iron Disilicide Films Formed via Facing-Targets Direct Current Sputtering

Peerasil Charoenyuenyao[1], Nathaporn Promros[1], Nathakorn Borwornpornmatee[1], Rawiwan Chaleawpong[1], Rungrueang Phatthanakun[2], Phongsaphak Sittimart[3], and Tsuyoshi Yoshitake[3]

[1]King Mongkut's Inst. of Tech. Ladkrabang, Thailand, [2]Synchrotron Light Research Inst. (Public Organization), Thailand, [3]Kyushu Univ., Japan

[P10-03]

Impedance Profile and Equivalent Circuit Model under Temperature Change of p-Type Si/n-Type ß-$FeSi_2$ Heterojunctions Synthesized by Facing-Targets Direct-Current Sputtering

Rawiwan Chaleawpong[1], Nathaporn Promros[1], Peerasil Charoenyuenyao[1], Nattakorn Borwornpornmetee[1], Pattarapol Sittisart[1], Phongsaphak Sittimart[2], and Tsuyoshi Yoshitake[2]

[1]King Mongkut's Inst. of Tech. Ladkrabang, Thailand, [2]Kyushu Univ., Japan

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Wetting and Surface Morphology of Fe_3Si Films Created by Facing-Targets Direct-Current Sputtering

Nattakorn Borwornpornmetee[1], Nathaporn Promros[1], Peerasil Charoenyuenyao[1], Rawiwan Chaleawpong[1], Phongsaphak Sittimart[2], and Tsuyoshi Yoshitake[2]

[1]King Mongkut's Inst. of Tech. Ladkrabang, Thailand, [2]Kyushu Univ., Japan

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Improvement of Performance and Reliability in QDLED after Minimizing the Phenomenon of Exciton Quenching

Eunkyu Shin, Junekyun Park, Sanghyun Lee, and Yonghan Roh

Sungkyunkwan Univ., Korea

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Prediction and Structure Characterization of Sweetness Molecules

Junho Lee, Seon Bin Song, and Joonsuk Huh

Sungkyunkwan Univ., Korea

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Highly Stability of APTES-Coated $CsPbBr_3$ Core-Shell QDs for High LED Performance Devices

Cuc Kim Trinh, Hanleem Lee, and Chang-Lyoul Lee

GIST, Korea

[P10-08]

PWM Controlled Micro LED Display with Low Temperature Poly-Crystalline Oxide Thin-Film Transistors

Taesoo Kim and Jaehong Jeon

Korea Aerospace Univ., Korea

[P10-09]

Efficient Blue Luminescent Materials for Organic Light Emitting Diodes (OLEDs) based on Dimethylindenoarene Substituted Phenylanthracene Derivatives

Beomsu Jang[1], Giwoong Han[1], Kiju Kim[2], Kyomin Hwang[2], Youngkwan Kim[2], and Seungsoo Yoon[1]

[1]Sungkyunkwan Univ., Korea, [2]Hongik Univ., Korea

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Electrical Characteristics of $Cu(In,Ga)Se_2$ Solar Cells with Photo-Sintered Buffer Layer

Jaehyeong Lee, Vu Minh Han Cao, Jae Sung Bae, Hong Sub Jee, Byungyou Hong, and Junsin Yi

Sungkyunkwan Univ., Korea

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Recombination Rate and Internal Field Efficiency of Staggered InGaN/GaN Light Emitting Diodes with Left and Right Steps

Bong-Hwan Kim, Woo-Pyo Hong, Jong-Jae Kim, and Seoung-Hwan Park

Daegu Catholic Univ., Korea

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Effect of Y Addition on Microstructures and Tensile Properties of Al-Mg Based Alloys

Young-Ok Yoon, Seong-Ho Ha, Shah Abdul Wahid, Bong-Hwan Kim, Hyun-Kyu Lim, and Shae K. Kim

KITECH, Korea

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Young-Ok Yoon, Seong-Ho Ha, Shah Abdul Wahid, Bong-Hwan Kim, Hyun-Kyu Lim, and Shae K. Kim

KITECH, Korea

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Tridib Kumar Sinha, Jin Hwan Lim, Tae-Hyun Nam, and Jeong Seok Oh

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Sanglok Park[1,2], Kyo-Dong Song[2], and Joo-Hyung Kim[1]

[1]Inha Univ., Korea, [2]Norfolk State Univ., USA

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Segregation and Morphological Change of Si Phase during Directional Solidification of Al-Si Alloys

Young-Kyun Kim[1], Geon-Hong Kim[1], Seong-Ho Ha[2], Shah Abdul Wahid[2], and Jin-Kyu Lee[3]

[1]Inst. for Advanced Engineering, Korea, [2]Korea Inst. of Industrial Tech., Korea, [3]NICE LMS Co., Ltd., Korea

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Young-Kyun Kim[1], Jin-Kyu Lee[2], Seong-Ho Ha[3], and Shah Abdul Wahid[3]

[1]Inst. for Advanced Engineering, Korea, [2]NICE LMS Co., Ltd., Korea, [3]Korea Inst. of Industrial Tech., Korea

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Jin-Kyu Lee[1], Sun-Ki Kim[1], Young-Kyun Kim[2], Seong-Ho Ha[3], and Shah Abdul Wahid[3]

[1]NICE LMS Co., Ltd., Korea, [2]Inst. for Advanced Engineering, Korea, [3]Korea Inst. of Industrial Tech., Korea

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[1]NICE LMS Co., Ltd., Korea, [2]Inst. for Advanced Engineering, Korea, [3]Korea Inst. of Industrial Tech., Korea

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Shuanglei Li[1], Izaz Ur Rehman[1], Mi-Seon Choi[2], and Tae-Huyn Nam[1]

[1]Gyeongsang Nat'l Univ., Korea, [2]RIST, Korea

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KITECH, Korea

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Kyushu Univ., Japan

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Seiichi Urakawa, Kentaro Kaneshima, Ryota Narishige, Daisuke Yamashita, Kunihiro Kamataki, Takamasa Okumura, Kazunori Koga, Masaharu Shiratani, and Naho Itagaki

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Kyushu Univ., Japan

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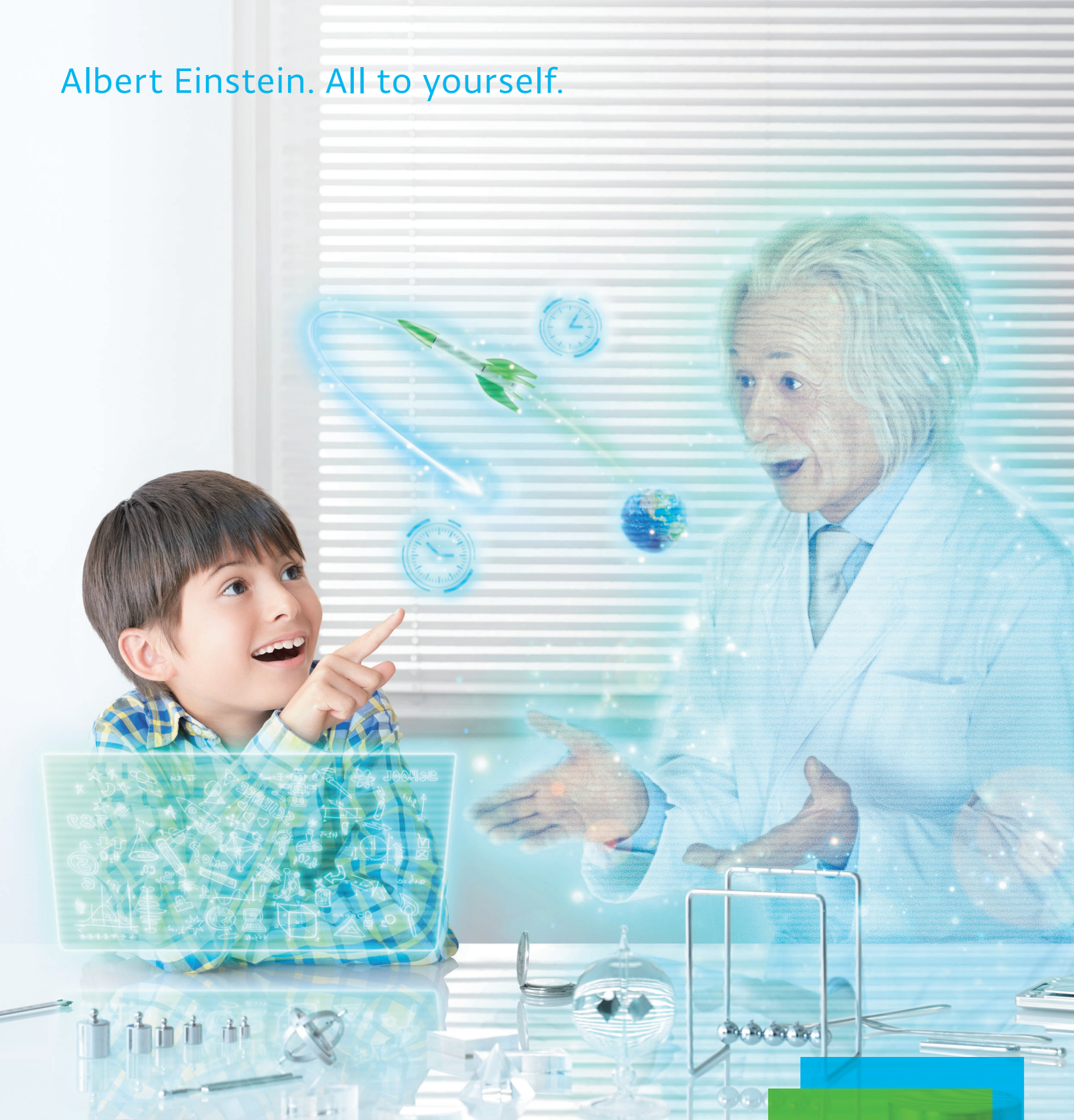
Albert Einstein. All to yourself.



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반도체 측정장비 연구실 [N-LAB (국가연구실)]

소개

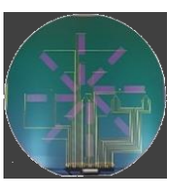
▶ 나노박막 광물성 측정분석, 첨단소자 제조공정 실시간 진단센서 개발, 진공 소재·부품·장비 특성평가 등 반도체·디스플레이 분야 국가 핵심 산업의 지속 성장과 기술 자립화를 위한 R&D 및 측정 서비스 수행

▶ 책임자 : 제갈원

소재부품장비 분야 보유 핵심기술

▶ 보유 핵심기술 연구그룹 역량

- 첨단소자 제조 공정진단 센서 개발 – 플라즈마, 온도, 압력, 공정가스, 오염입자 등
- 반도체 공정용 나노박막의 두께·형상 광측정장치 교정용 인증표준물질
- 반도체분야 테스트베드 (진공펌프, 플라즈마 특성평가)
- 반도체용 PR 소재 국산화를 위한 탈기체 특성 측정기술 지원
- 소재·부품·장비 관련 중소·중견기업 긴급 기술지원 30건 이상




대표 연구 성과

▶ 반도체 공정진단·물성측정 분야 주요 핵심품목 기술 자립화 지원

▶ 첨단산업 측정 난제 극복 R&D 수행

스마트펌프 첨단소재 연구단 [소재혁신선도 프로젝트]

소개

▶ 사업명 : 소재혁신선도 프로젝트 (과학기술정보통신부)

▶ 과제명 : 소형 스마트 건식진공펌프용 내마모·경량·내부식 융복합 핵심소재 기술개발

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·소형 건식진공펌프 성능 고도화(신소재 적용 및 기존소재 고도화, 진단센서 적용 등) 기술개발

·소형 스마트 건식진공펌프용 소재·부품·시스템 성능검증 및 상용화 적합성 평가기술개발

▶ 책임자 : 강상우

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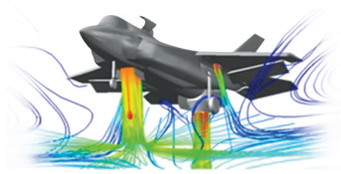

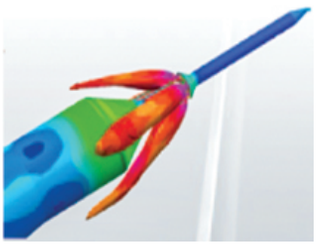

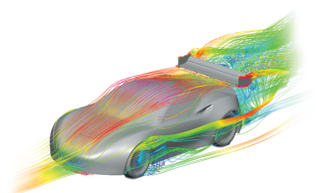

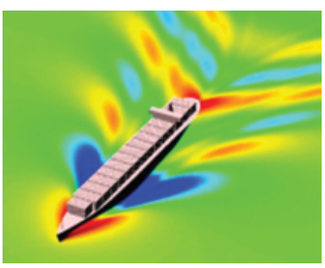

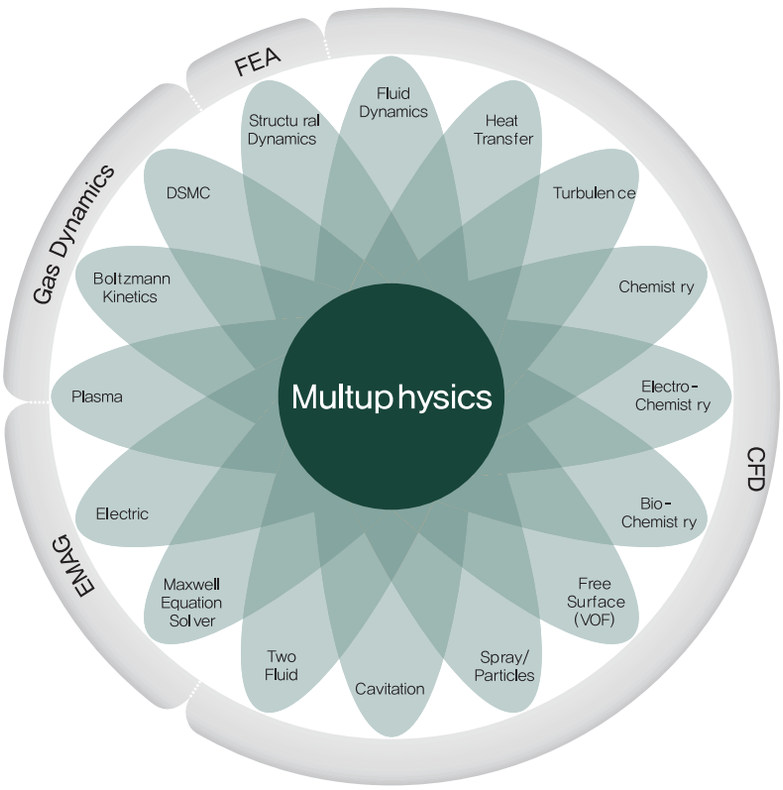

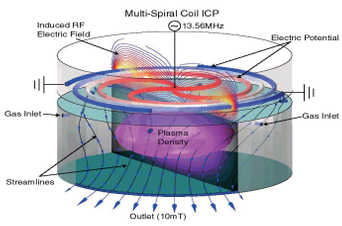

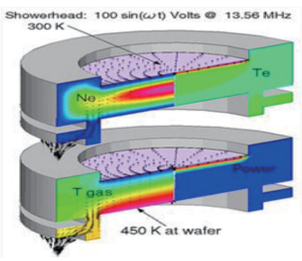

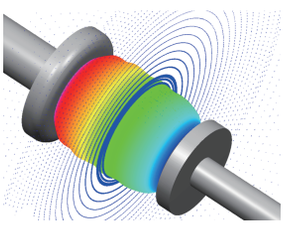

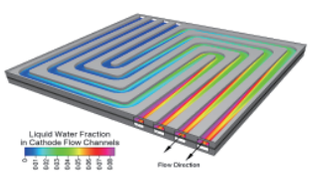

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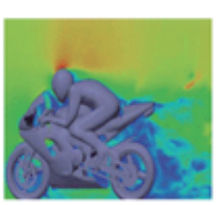

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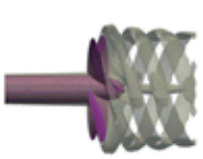

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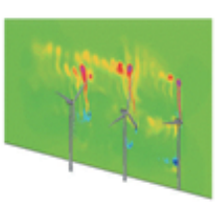

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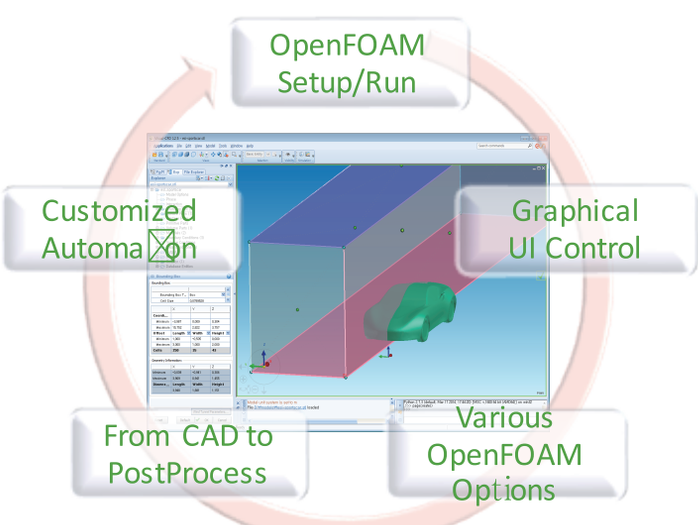

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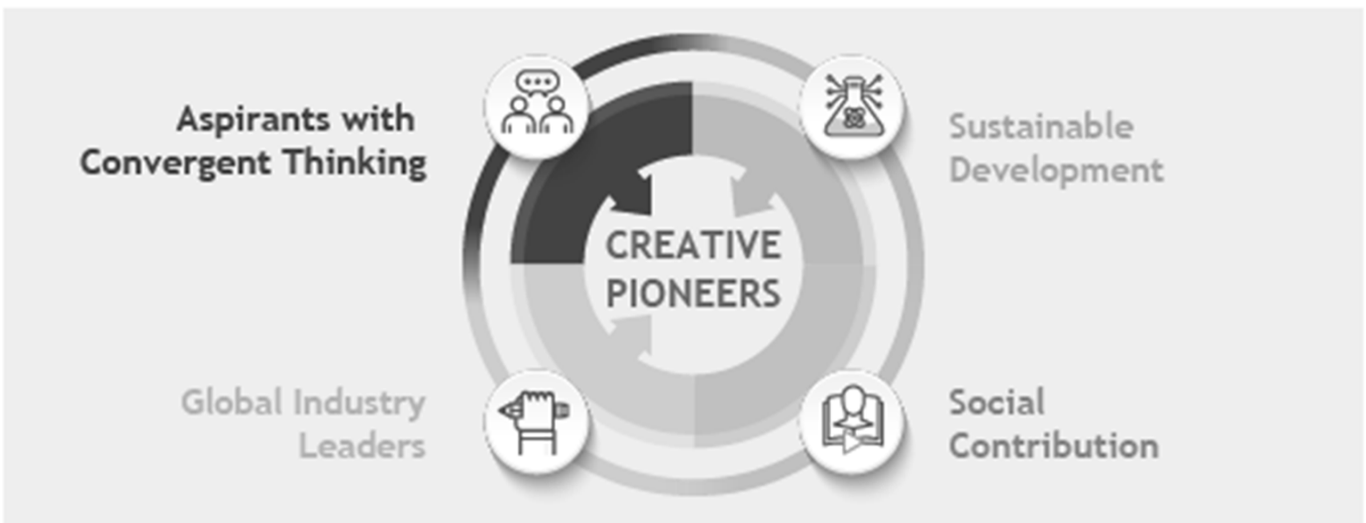

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