

**Advance Program**

# **LEDIA'18**



**The 6th International Conference on Light-Emitting Devices  
and Their Industrial Applications**

**April 25–27, 2018, Pacifico Yokohama, Japan**

**Co-located with Optics & Photonics International Congress 2018**

**Sponsored by**

Akasaki Research Center (ARC), Nagoya University

**In cooperation with**

The Illuminating Engineering Institute of Japan (IEIJ)

Japan LED Association (JLEDS)

Optoelectronics Industry and Technology Development Association (OITDA)

The 125th Committee on Mutual Conversion between Light and Electricity, Japan Society for the Promotion of Science

The 162nd Committee on Wide Bandgap Semiconductor Photonic and Electronic Devices, Japan Society for the Promotion of Science

# CONFERENCE COMMITTEE

## Conference Chairs

**Chair:** Hiroshi Amano (Nagoya Univ., Japan)  
**Vice Chair:** Tohru Honda (Kogakuin Univ., Japan)

## Advisory Members

Isamu Akasaki (Meijo Univ., Nagoya Univ., Japan)  
Michal Boćkowski (Polish Academy of Sci., Poland)  
Detlef Hommel (Univ. Bremen / EIT+, Germany)  
Akihiko Yoshikawa (Chiba Univ., Japan)  
Bo Monemar (Liköping Univ./ Lund Univ., Sweden)

## Steering Committee

**Chair:** Yoshinao Kumagai (Tokyo Univ. Agri. & Tech., Japan)  
**Vice Chair:** Tetsuya Takeuchi (Meijo Univ., Japan)  
**Member:** Gen-ichi Hatakoshi (Waseda Univ., Japan)

## General Affairs Committee

**Chair:** Yoshio Honda (Nagoya Univ., Japan)

## Financial Committee

**Chair:** Tomoyuki Tanikawa (Tohoku Univ., Japan)

## Local Arrangement Committee

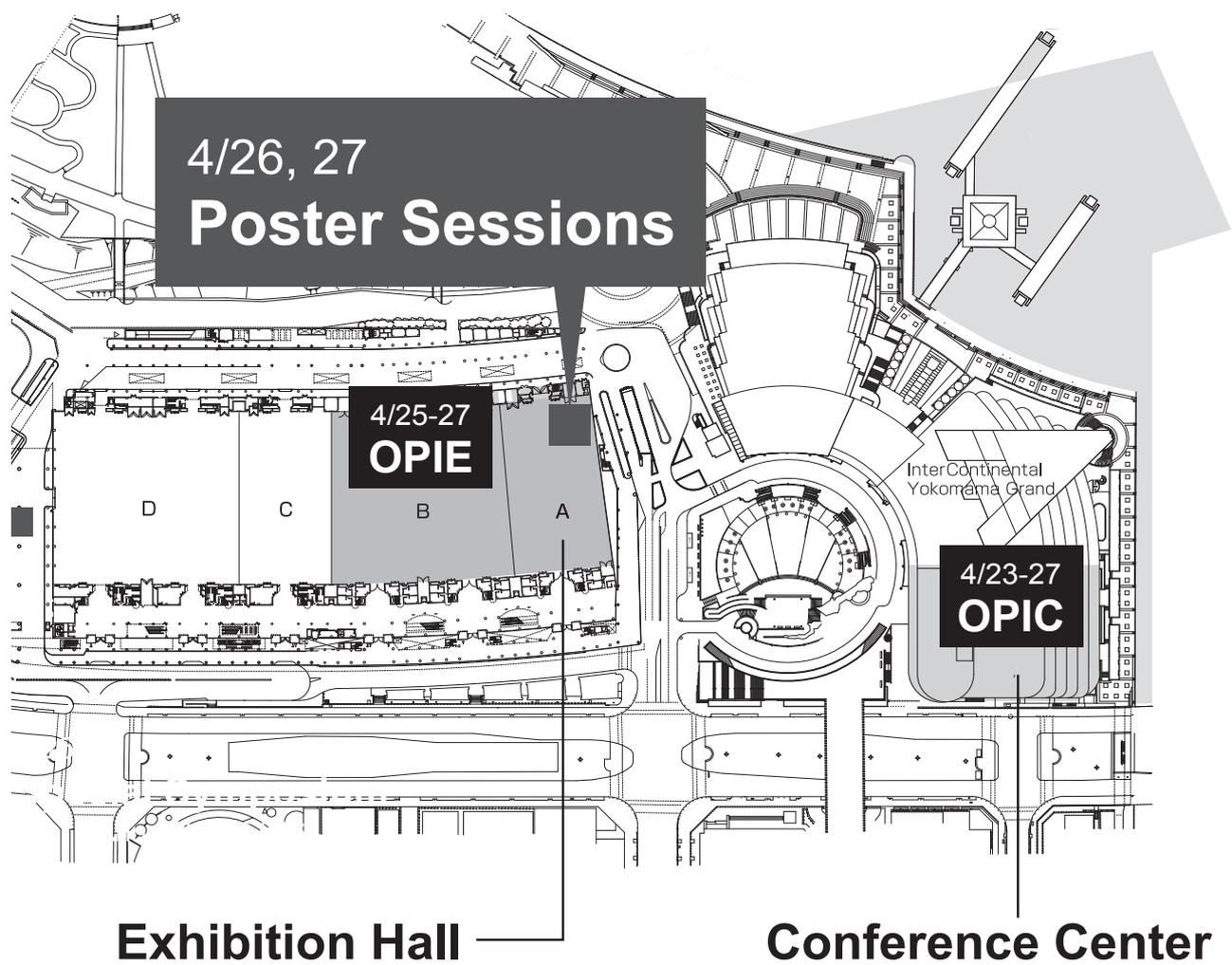
**Chair:** Hisashi Murakami (Tokyo Univ. Agri. & Tech., Japan)  
**Members:** Yoshio Honda (Nagoya Univ., Japan)  
Narihito Okada (Yamaguchi Univ., Japan)  
Tomohiro Yamaguchi (Kogakuin Univ., Japan)

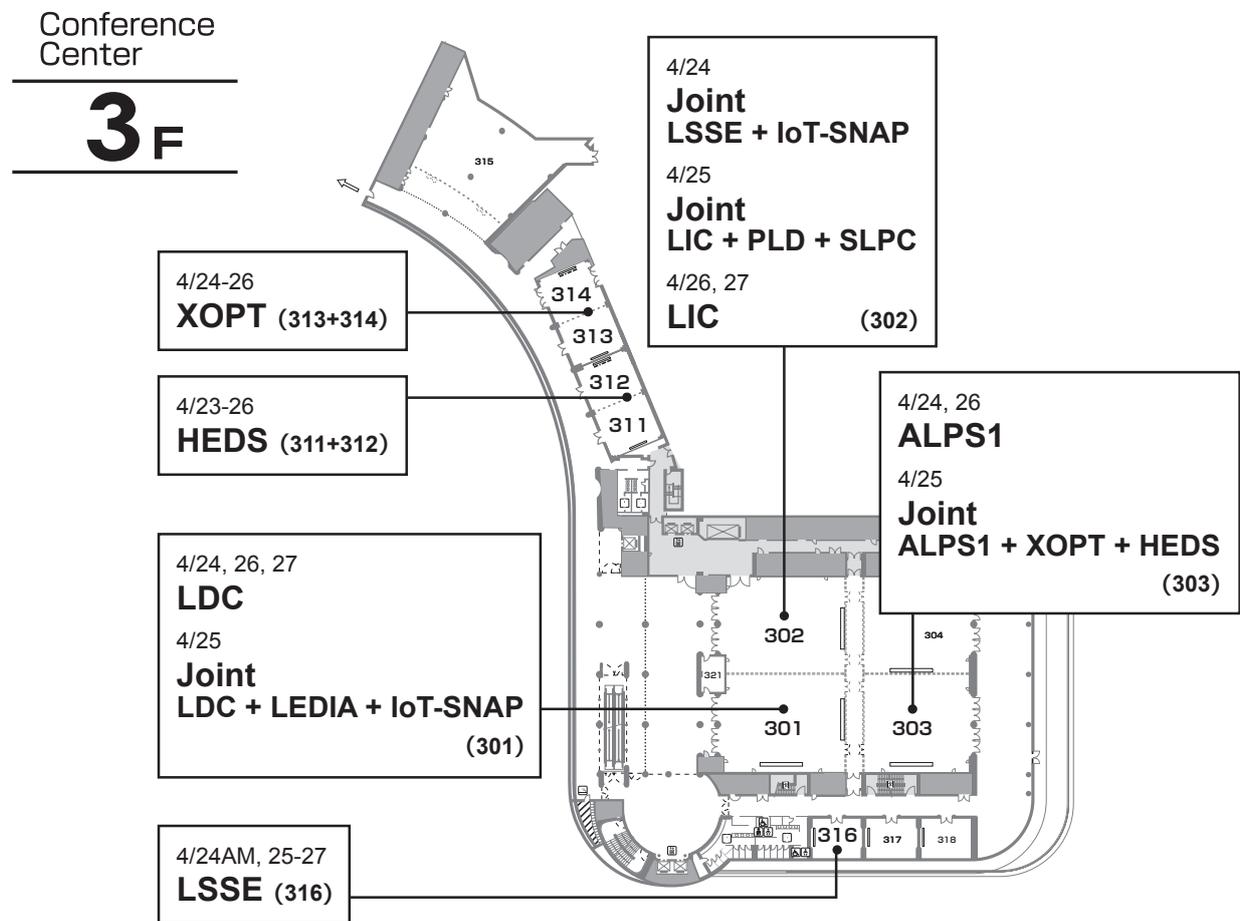
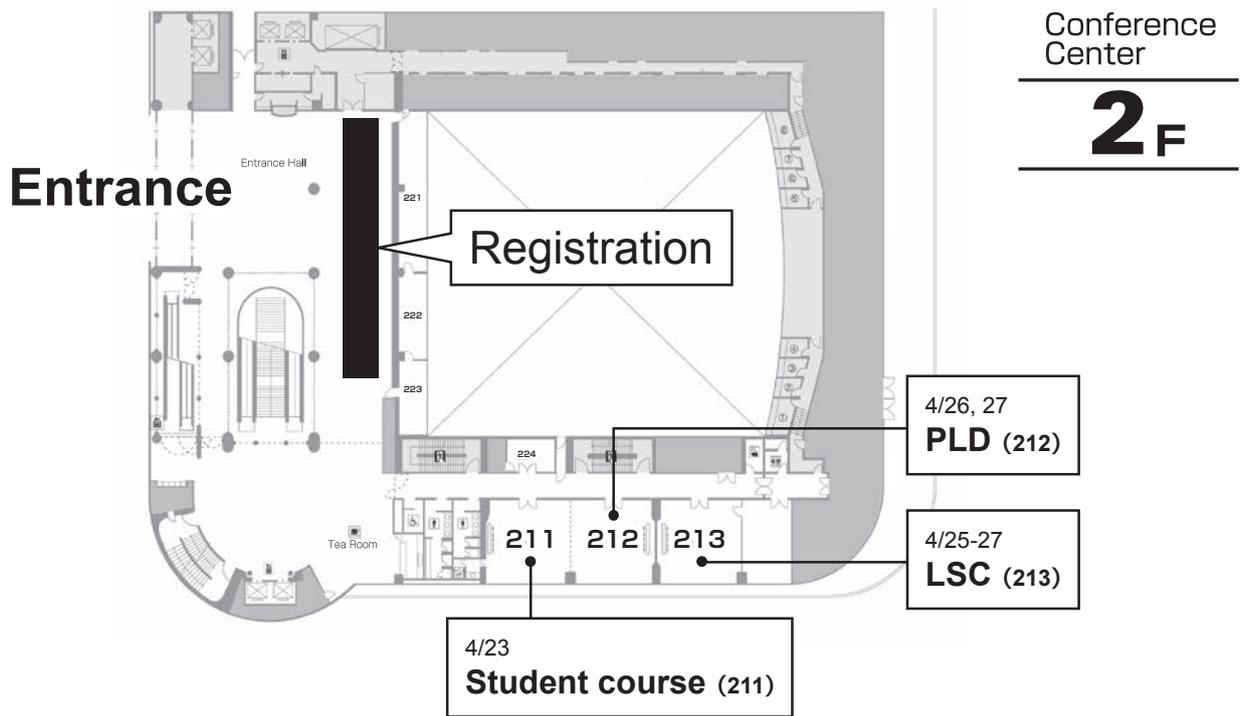
## Program Committee

**Chair:** Ryuji Katayama (Osaka Univ., Japan)  
**Members:** Jaehee Cho (Chnbuk National Univ., Korea)  
Gen-ichi Hatakoshi (Waseda Univ., Japan)  
Yoshio Honda (Nagoya Univ., Japan)  
Jong-Kyu Kim (Pohang Univ. Sci. & Tech., Korea)  
Young-Joo Kim (Yonsei Univ., Korea)  
Yoshinao Kumagai (Tokyo Univ. Agri. & Tech., Japan)  
Hisashi Murakami (Tokyo Univ. Agri. & Tech., Japan)  
Narihito Okada (Yamaguchi Univ., Japan)  
Tetsuya Takeuchi (Meijo Univ., Japan)  
Tomoyuki Tanikawa (Tohoku Univ., Japan)  
Jonathan Wierer (Lehigh Univ., USA)  
Tomohiro Yamaguchi (Kogakuin Univ., Japan)

# Floor Plan

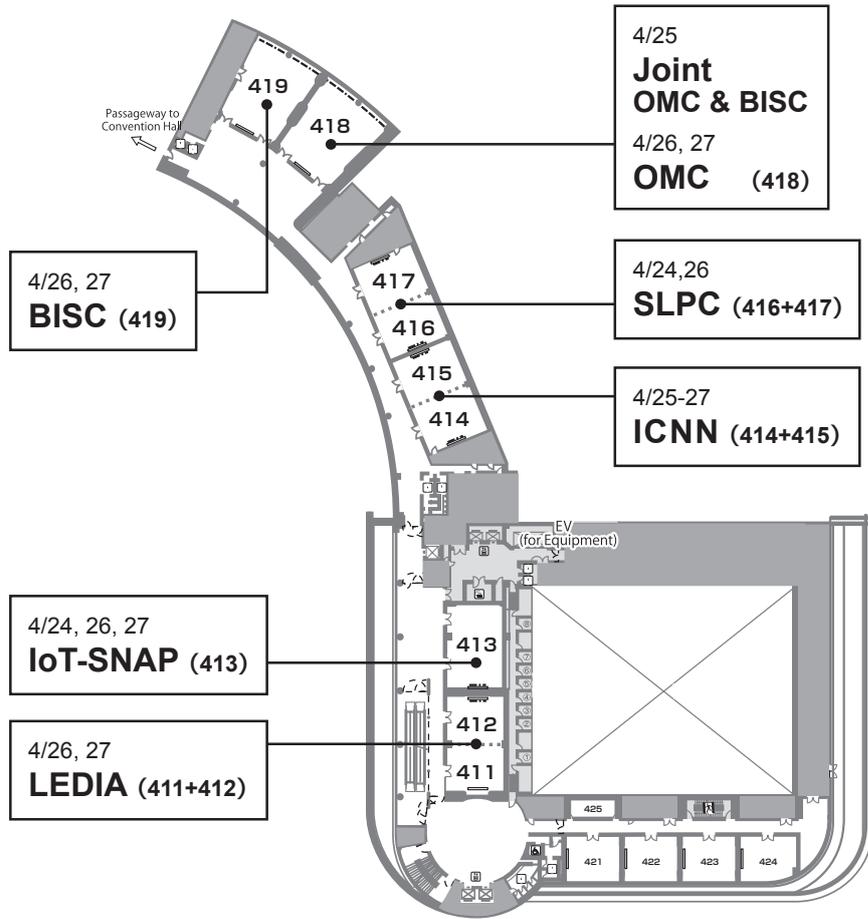
Pacifico Yokohama





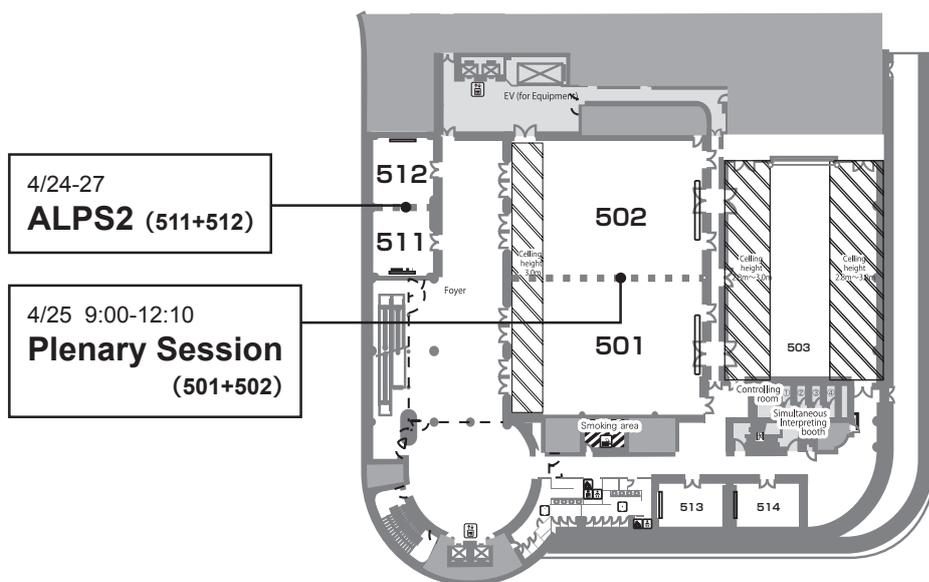
Conference Center

**4<sub>F</sub>**



Conference Center

**5<sub>F</sub>**



# PROGRAM AT A GLANCE

April 25 (Wed)		April 26 (Thu)		April 27 (Fri)	
		9:00	SESSION I ADVANCED DEVICES I	9:15	SESSION V CHARACTER- IZATIONS
		10:15	BREAK	10:30	BREAK
		10:45	SESSION II SHORT PRESENTATION	11:00	SESSION VI GROWTHS
		11:42	LUNCH	12:00	LUNCH
		13:00	SESSION II POSTER	13:00	SESSION VII ADVANCED PROCESSES
13:30	Opening				
13:45	IOT-LDC-LEDIA JOINT SESSION				
14:45	BREAK	14:30	SESSION III NOVEL APPLICATION & MATERIALS	14:45	BREAK
15:15	IOT-LDC-LEDIA JOINT SESSION	15:45	BREAK	15:15	SESSION VIII EXTENDED WAVELENGTH DEVICES
		16:15	SESSION IV ADVANCED DEVICES II	16:45	SESSION IX TUTORIAL
17:15				17:30	Closing
		17:45		17:45	

# ADVANCE PROGRAM

Wednesday, April 25, 2018

## JOINT SESSION <Room 301>

### Chairs:

**Atsushi Kanno**

*National Institute of Information and Communications Technology, Japan*

**Sunao Kurimura**

*National Institute of Material Science, Japan*

**Ryuji Katayama**

*Osaka University, Japan*

**13:30-13:45 Opening Remarks**

**13:45-14:15 IOT-LDC-LEDIA-1 *Invited***

**IoT Revolution and Business Opportunities in Emerging Market in ASEAN Region**

Huei Ee Yap

LP-Research Inc., Japan

**14:15-14:45 IOT-LDC-LEDIA-2 *Invited***

**Fiber-optic-based Life Cycle Monitoring of Aerospace Composite Structures: Toward Digitalization of Next Generation Aircraft**

Shu Minakuchi, Nobuo Takeda

University of Tokyo, Japan

**14:45-15:15 Break**

**15:15-15:45 IOT-LDC-LEDIA-3 *Invited***

**Laser Diode Based Underwater Optical Wireless Communication**

Takao Sawa<sup>1</sup>, Koji Tojo<sup>2</sup>, Naoki Nishimura<sup>2</sup>, Shin Ito<sup>3</sup>

<sup>1</sup>JAMSTEC, Japan, <sup>2</sup>Shimadzu Corp., Japan, <sup>3</sup>SAS Co., Ltd., Japan

**15:45-16:15 IOT-LDC-LEDIA-4 *Invited***

**Recent Progress of Retinal Imaging Laser Technology**

Mitsuru Sugawara

QD Laser, Japan

**16:15-16:45 IOT-LDC-LEDIA-5 *Invited***

**III-nitride Semiconductor Light Emitting Transistors**

Kazuhide Kumakura<sup>1</sup>, Junichi Nishinaka<sup>1</sup>, Hideki Yamamoto<sup>1</sup>

<sup>1</sup>NTT Basic Research Laboratories, NTT Corporation, Japan

**16:45-17:15 IOT-LDC-LEDIA-6 *Invited***

**High Photosensitivity HFET-type Nitride Based Photosensors**

Motoaki Iwaya<sup>1</sup> Tetsuya Takeuchi<sup>1</sup>, Satoshi Kamiyama<sup>1</sup>, Isamu Akasaki<sup>1,2</sup>

<sup>1</sup>Meijo University, Japan

<sup>2</sup>Akasaki Research Center, Nagoya University

**Thursday, April 26, 2018**

**SESSION I: ADVANCED DEVICES I <Room 411+412>**

**Chairs:**

**Jeehee Cho**

*Chonbuk National University, Korea*

**Hoi Wai Choi**

*The University of Hong Kong, Hong Kong*

**9:00-9:30 LEDIA1-1 *Invited***

**Development of Advanced Hybrid GaN-based Tunnel Junction LEDs**

James S. Speck<sup>1</sup>

<sup>1</sup>University of California, Santa Barbara, USA

**9:30-9:45 LEDIA1-2**

**Characterization of AlGaIn-Based Tunnel Junction Ultraviolet Light Emitting Diodes**

Yusuke Goto<sup>1</sup>, Hisanori Kojima<sup>1</sup>, Kazuyoshi Iida<sup>1</sup>, Myunghee Kim<sup>1</sup>, Norikatsu Koide<sup>1</sup>, Tetsuya Takeuchi<sup>1</sup>, Motoaki Iwaya<sup>1</sup>, Satoshi Kamiyama<sup>1</sup>, Isamu Akasaki<sup>1</sup>

<sup>1</sup>Meijo University, Japan

**9:45-10:00 LEDIA1-3**

**Electroluminescence enhancement for near-ultraviolet light emitting diodes with graphene/AZO-based current spreading layers**

Li Lin<sup>1</sup>, Yiyu Ou<sup>1</sup>, Xiaolong Zhu<sup>2</sup>, Berit Herstroem<sup>3</sup>, Flemming Jensen<sup>3</sup>, Haiyan Ou<sup>1</sup>

<sup>1</sup>Department of Photonics Engineering, Technical University of Denmark, Denmark

<sup>2</sup>Department of Micro- and Nanotechnology, Technical University of Denmark

<sup>3</sup>DTU Danchip, Technical University of Denmark

**10:00-10:15 LEDIA1-4**

**GaN metal–semiconductor–metal ultraviolet photodetector with a reduced-graphene oxide Schottky contact**

Bhishma Pandit<sup>1</sup>, Jaehee Cho<sup>1</sup>

<sup>1</sup>Chonbuk National University, Korea

**10:15-10:45 Break**

## SESSION II: SHORT PRESENTATION & POSTER SESSION

<Room 411+412>

**Chair: Hisashi Murakami**

*Tokyo University of Agriculture and Technology, Japan*

**10:45-10:48 LEDIAp2-1**

**AlGaIn-based deep UV flip-chip light emitting diode with AlN/Al reflector**

Tae Hoon Park<sup>1</sup>, Tae Ho Lee<sup>1</sup>, Tae Geun Kim<sup>1</sup>

<sup>1</sup>Korea University, Korea

**10:48-10:51 LEDIAp2-2**

**The Effect of the Metallic Nano-Grating for 365nm Polarized UV-LED**

Eun-Kyung Chu<sup>1</sup>, Nam-Woo Kang<sup>1</sup>, Beom-Rae Noh<sup>1</sup>, Hee-Jung Choi<sup>1</sup>, Yung-Ju Kwon<sup>2</sup>, Kyoung-Kook Kim<sup>1</sup>

<sup>1</sup>Dept. of Advanced Convergence Technology, Korea Polytechnic University, Korea

<sup>2</sup>Dept. of Nano Optical Engineering, Korea Polytechnic University, Korea

**10:51-10:54 LEDIAp2-3**

**Wide Band Gap Transparent Conductive Oxides of Oxide/Metal/Oxide Triple-Layer Structure based on Fluorine Tin Oxide**

Si-Won Kim<sup>1</sup>, Gyu-Jae Yohn<sup>1</sup>, Soae Jeong<sup>1</sup>, Beom-Rae Noh<sup>1</sup>, So-Yeon Park<sup>2</sup>, Suyeon Son<sup>2</sup>, Kyoung-Kook Kim<sup>1,2</sup>

<sup>1</sup>Convergence Technology, Korea Polytechnic University, Korea

<sup>2</sup>Dept. of Nano Optical Engineering, Korea Polytechnic University, Korea

**10:54-10:57 LEDIAp2-4**

**Efficient blue micro-light-emitting diodes using SiO<sub>x</sub>-based glass electrode**

Kyung Rock Son<sup>1</sup>, Byeong Ryong Lee<sup>1</sup>, Tae Ho Lee<sup>1</sup>, Sang Hoon Oh<sup>1</sup>

<sup>1</sup>School of Electrical Engineering, Korea University, Korea

**10:57-11:00 LEDIAp2-5**

**Self-Standing ZnO Nanotube/SiO<sub>2</sub> Core-Shell Arrays for High Photon Extraction Efficiency in III-Nitride Emitter**

Hee-Jung choi<sup>1</sup>, Semi Oh<sup>2</sup>, Soo-Hyun Kang<sup>1</sup>, Kab Ha<sup>1</sup>, Eun-Kyung Chu<sup>1</sup>, Won-Seok Lee<sup>3</sup>, Soon-Hwan Kwon<sup>3</sup>, Kyoung-Kook Kim<sup>1</sup>

<sup>1</sup>Dept. of Advanced Convergence Technology, Korea Polytechnic University, Korea

<sup>2</sup>Dept. of Materials Science & Technology (GIST), Korea

<sup>3</sup>Dept. of Nano Optical Engineering, Korea

**11:00-11:03 LEDIAp2-6**

**Improved light extraction efficiency of GaN-based near ultraviolet light-emitting diodes using TiO<sub>2</sub>/HfO<sub>2</sub> DBR electrode with Conductive Filaments**

Sanghoon Oh<sup>1</sup>, Kyung Rock Son<sup>1</sup>, Tae Geun Kim<sup>1</sup>

<sup>1</sup>School of Electrical Engineering, Korea University, Korea

**11:03-11:06 LEDIAp2-7**

**Thermal annealing effect of Ti buffer layer for the growth of GaN film**

Tzu-Ting Lin<sup>1</sup>, Shih-Hao Chan<sup>1</sup>, Shao-Ze Tseng<sup>1</sup>, Sheng-Hui Chen<sup>1</sup>

<sup>1</sup>National Central University, Taiwan

**11:06-11:09 LEDIAp2-8**

**Characterizations and Growth of ZnO: B Films Grown by Low-Pressure Chemical Vapor Deposition on Glass Substrates**

Wei-Ming Lee<sup>1</sup>, Ying-Hsiang Wang<sup>1</sup>, Chin-Yi Tsai<sup>1</sup>, Shih-Wei Feng<sup>1</sup>, Chien-Hsun Chen<sup>2</sup>, Hsiang-Chen Wang<sup>3</sup>, Li-Wei Tu<sup>4</sup>

<sup>1</sup>Department of Applied Physics, National University of Kaohsiung, Kaohsiung, Taiwan

<sup>2</sup>Green Energy and Environment Research Labs, Industrial Technology Research Institute, Hsinchu, Taiwan

<sup>3</sup>Graduate Institute of Opto-Mechatronics, National Chung Cheng University, Taiwan

<sup>4</sup>Department of Physics and Center for Nanoscience and Nanotechnology, National Sun Yat-Sen University, Kaohsiung, Taiwan

**11:09-11:12 LEDIAp2-9**

**A study on p-type Conductivity of Phosphorus-doped ZnO Thin Film using RF Sputtering and Annealing**

So-yeon Park<sup>1</sup>, Si-Won Kim<sup>2</sup>, Gyu-Jae Yohn<sup>2</sup>, Hee-Jung Choi<sup>2</sup>, Yebin Im<sup>1</sup>, Kyoung-Kook Kim<sup>1,2</sup>

<sup>1</sup>Dept. of Nano Optical Engineering, Korea Polytechnic University, Korea

<sup>2</sup>Dept. of Advanced Convergence Technology, and Research Institute of Advanced Convergence Technology, Korea Polytechnic University, Korea

**11:12-11:15 LEDIAp2-10**

**Photoluminescence investigation of near white light-emitting zinc stannate-based phosphors**

Mu-Tsun Tsai<sup>1</sup>, Chih-Chuan Chan<sup>1</sup>, Chien-Hung Lin<sup>1</sup>

<sup>1</sup>Department of Materials Science Engineering, National Formosa University, Taiwan

**11:15-11:18 LEDIAp2-11**

**Highly efficient photonic conversion mediums based on polymer complexes for applications in light emitting devices**

Petronela Horlescu<sup>1</sup>, Corneliu S. Stan<sup>1</sup>, Simona E. Bacaïta<sup>1</sup>

<sup>1</sup>Gheorghe Asachi Technical University, Romania

**11:18-11:21 LEDIAp2-12**

**Numerical and Experimental Investigations for Deposited Nanosilver Tracks on Polyimide Films with Heterostructures**

Chia-Yen Chan<sup>1</sup>, Kuan-Cheng Shih<sup>2</sup>, Yu-Hsin Lin<sup>1</sup>

<sup>1</sup>Instrument Technology Research Center, National Applied Research Laboratories, Taiwan

<sup>2</sup>Kingley Rubber Industrial Co., Ltd., Taiwan

**11:21-11:24 LEDIAp2-13**

**Effect of the Oxygen Concentration on Electrical Properties of GaN Crystals**

### **Grown with the Na-flux Point Seed Method**

K. Endo<sup>1</sup>, T. Yamada<sup>1</sup>, H. Kubo<sup>1</sup>, K. Murakami<sup>1</sup>, M. Imanishi<sup>1</sup>, M. Yoshimura<sup>1</sup>, and Y. Mori<sup>1</sup>

<sup>1</sup>Osaka University, Japan

### **11:24-11:27 LEDIAp2-14**

#### **The effect of nitrogen pressure on Threading Dislocation Density during the Na-flux GaN Growth using Point Seed Technique**

Yuki Sawada<sup>1</sup>, Takumi Yamada<sup>1</sup>, Kosuke Murakami<sup>1</sup>, Keisuke Kakinouchi<sup>1</sup>, Kosuke Nakamura<sup>1</sup>, Kanako Okumura<sup>1</sup>, Tomoko Kitamura<sup>1</sup>, Yasuhiro Unoki<sup>1</sup>, Masayuki Imanishi<sup>1</sup>, Masashi Yoshimura<sup>1</sup>, and Yusuke Mori<sup>1</sup>

<sup>1</sup>Osaka University, Japan

### **11:27-11:30 LEDIAp2-15**

#### **Reduction of Li impurity in the freestanding GaN substrate fabricated using the sapphire dissolution technique in the Na-flux growth**

Takumi Yamada<sup>1</sup>, Masayuki Imanishi<sup>1</sup>, Kosuke Murakami<sup>1</sup>, Kosuke Nakamura<sup>1</sup>, Mamoru Imade<sup>1</sup>, Masashi Yoshimura<sup>1</sup>, and Yusuke Mori<sup>1</sup>

<sup>1</sup>Osaka University, Japan

### **11:30-11:33 LEDIAp2-16**

#### **Sol-Gel-Derived Hole-Transporting NiO<sub>x</sub> Films for Perovskite CsPbBr<sub>3</sub> Green Light-Emitting Diodes**

Chun-Yuan Huang<sup>1</sup>, Shyh-Jer Huang<sup>2</sup>, Yi-Hsiu Hsieh<sup>1</sup>

<sup>1</sup>National Taitung University, Taiwan

<sup>2</sup>National Cheng Kung University, Taiwan

### **11:33-11:36 LEDIAp2-17**

#### **Optically Readable GaN-based Micro-LEDs Using NiO-based ReRAM as an N-Type Contact layer for Micro-LED Display**

Byeong Ryong Lee<sup>1</sup>, Ju Hyun Park<sup>1</sup>, Hyun Tae Kim<sup>1</sup>, Kyung Rock Son<sup>1</sup>, Tae Geun Kim<sup>1</sup>

<sup>1</sup>Korea University, Korea

### **11:36-11:39 LEDIAp2-18**

#### **Optical and Device Characteristics of InGaN/GaN Light Emitting Diodes with Multilayer Graphene as Transparent and Current Spreading Electrodes**

Ying-Hsiang Wang<sup>1</sup>, Wei-Ming Lee<sup>1</sup>, Shih-Wei Feng<sup>1</sup>, Hsiang-Chen Wang<sup>2</sup>

<sup>1</sup>Department of Applied Physics, National University of Kaohsiung, Taiwan

<sup>2</sup>Graduate Institute of Opto-Mechatronics, National Chung Cheng University, Taiwan

### **11:39-11:42 LEDIAp2-19**

#### **High Efficiency UV-Emitters with Micro-Hole Pattern and ITO Nanoparticles**

Beom-Rae Noh<sup>1</sup>, Joon-Sung Kwon<sup>1</sup>, Nam-Woo Kang<sup>1</sup>, Eun-Kyung Chu<sup>1</sup>, Si-Won Kim<sup>1</sup>, Kwang-Gyun Im<sup>2</sup>, Kyoung-Kook Kim<sup>1</sup>

<sup>1</sup>Department of Advanced Convergence Technology, Korea

<sup>2</sup>Department of Nano Optical Engineering, Korea

**11:42-13:00 Lunch Break**

**13:00-14:30 Poster Session <Exhibition Hall A>**

**SESSION III: NOVEL APPLICATION & MATERIALS <Room 411+412>**

**Chairs:**

**Ryuji Katayama**

*Osaka University, Japan*

**Je Won Kim**

*Namseoul University, Korea*

**14:30-15:00 LEDIA3-1            *Invited***

**LED Technology for Dental Applications**

Paul Michael Petersen<sup>1</sup>

<sup>1</sup>Technical University of Denmark, Denmark

**15:00-15:15 LEDIA3-2**

**Organosilicon-Functionalized Carbon Dots Based White LED**

Yunfeng Wang<sup>1,2</sup>, Zhengmao Yin<sup>3</sup>, Chuanjian Zhou<sup>2</sup>, Zheng Xie<sup>1</sup>, Shuyun Zhou<sup>1</sup>

<sup>1</sup>Technical Institute of Physics and Chemistry, Chinese Academy of Science, China

<sup>2</sup>The HongKong Polytechnic University, China

<sup>3</sup>College of Materials Science and Engineering, Qingdao University of Science and Technology, China

**15:15-15:30 LEDIA3-3**

**Solution Processed All Inorganic Quantum Dots Light Emitting Diodes with UV Ozone Treatment**

Hsin-Chieh Yu<sup>1,2</sup>, Yiyang Shen<sup>2</sup>, Hoang-Tuan Vu<sup>2</sup>, Chih-Chiang Yang<sup>2</sup>, Chun-Yuan Huang<sup>3</sup>

<sup>1</sup>Institute of Lighting and Energy Photonics, College of Photonics, National Chiao Tung University, Taiwan

<sup>2</sup>Advanced Optoelectronic Technology Center, National Cheng Kung University, Taiwan

<sup>3</sup>Department of Applied Science, National Taitung University, Taiwan

**15:30-15:45 LEDIA3-4**

**Photonic conversion mediums based on polymer embedded Carbon Dots for applications in light emitting/solar energy harvesting devices**

Corneliu S. Stan<sup>1</sup>, Petronela Horlescu<sup>1</sup>, Catalina A. Peptu<sup>1</sup>

<sup>1</sup>Gheorghe Asachi Technical University, Romania

**15:45-16:15 Break**

## **SESSION IV: ADVANCED DEVICES II <Room 411+412>**

**Chairs:**

**James S. Speck**

*UCSB, USA*

**Gen-ichi Hatakoshi**

*Waseda University, Japan*

**16:15-16:45 LEDIA4-1            *Invited***

**GaN Monolithic Integration for Lighting and Display**

Hoi Wai Choi<sup>1</sup>

<sup>1</sup>The University of Hong Kong, Hong Kong

**16:45-17:00 LEDIA4-2**

**Fabrication of 10x10 array structure of micro-LED display using Si micro-cup substrate**

Ryosuke Nawa<sup>1</sup>, Takeyoshi Onuma<sup>1</sup>, Tomohiro Yamaguchi<sup>1</sup>, Tohru Honda<sup>1</sup>

<sup>1</sup>Kogakuin University, Japan

**17:00-17:15 LEDIA4-3**

**GaAsP Tunable Single-Mode Semiconductor Laser using Periodically Slotted Structure with Simplified Fabrication Process**

So Kusumoto<sup>1</sup>, Masahiro Uemukai<sup>1</sup>, Ryuji Katayama<sup>1</sup>

<sup>1</sup>Osaka University, Japan

**17:15-17:45 LEDIA4-4            *Invited***

**Nano-Mold & Nano Structured LEDs**

Je Won Kim<sup>1</sup>

<sup>1</sup>Namseoul University, Korea

**Friday, April 27, 2018**

## **SESSION V: CHARACTERIZATIONS <Room 411+412>**

**Chairs:**

**Tetsuo Narita**

*Toyota Central R&D Labs. Inc., Japan*

**Jong Kyu Kim**

*Pohang University of Sci. and Technol., Korea*

**9:15-9:45    LEDIA5-1            *Invited***

**Nondestructive Analysis of Threading Dislocations in GaN by Multiphoton-Excitation Photoluminescence**

Tomoyuki Tanikawa<sup>1</sup>

<sup>1</sup>Institute for Materials Research, Tohoku University, Japan

**9:45-10:00    LEDIA5-2**

**Degradation of electro-optical parameters and electromigration of hydrogen in (In)AlGaIn-based UVB LEDs**

Johannes Glaab<sup>1</sup>, Jan Ruschel<sup>1</sup>, Tim Kolbe<sup>1</sup>, Arne Knauer<sup>1</sup>, Jens Rass<sup>1</sup>, Neysha Lobo Ploch<sup>1</sup>, Markus Weyers<sup>1</sup>, Michael Kneissl<sup>1,2</sup>, Sven Einfeldt<sup>1</sup>

<sup>1</sup>Ferdinand-Braun-Institut, Germany

<sup>2</sup>Technische Universität Berlin, Berlin, Germany

### **10:00-10:15 LEDIA5-3**

#### **Microstructure of GaN fin LEDs: Characterization of Structural and Optical Properties by STEM-CL**

Gordon Schmidt<sup>1</sup>, F. Bertram<sup>1</sup>, P. Veit<sup>1</sup>, T. Hampel<sup>1</sup>, J. Hartmann<sup>2</sup>, F. Steib<sup>2</sup>, H. Zhou<sup>2</sup>, J. Ledig<sup>2</sup>, S. Fündling<sup>2</sup>, H.-H. Wehmann<sup>2</sup>, A. Waag<sup>2</sup>, J. Cristen<sup>1</sup>

<sup>1</sup>Otto-von-Guericke-University Magdeburg, Germany

<sup>2</sup>Technische Universität Braunschweig, Germany

### **10:15-10:30 LEDIA5-4**

#### **Spectroscopic ellipsometry study on p-type NiO films**

Mizuki Ono<sup>1</sup>, Kohei Sasaki<sup>2,3</sup>, Tomohiro Yamaguchi<sup>1</sup>, Masataka Higashiwaki<sup>3</sup>, Akito Kuramata<sup>2</sup>, Shigenobu Yamakoshi<sup>2</sup>, Tohru Honda<sup>1</sup>, Takeyoshi Onuma<sup>1,3</sup>

<sup>1</sup>Kogakuin University, Japan

<sup>2</sup>Tamura Corporation, Japan

<sup>3</sup>National Institute of Information and Communications Technology, Japan

### **10:30-11:00 Break**

## **SESSION VI: GROWTHS <Room 411+412>**

**Chair:**

**Tomoyuki Tanikawa**

*Institute for Materials Research, Tohoku University, Japan*

### **11:00-11:30 LEDIA6-1      *Invited***

#### **Formation mechanism of singular structure in AlInN layer grown on *m*-GaN substrate by MOVPE**

Yuya Inatomi<sup>1</sup>, Akira Kusaba<sup>1</sup>, Yoshihiro Kangawa<sup>1,2,3</sup>, Kazunobu Kojima<sup>4</sup>, Shigefusa Chichibu<sup>4</sup>

<sup>1</sup>Department of Aeronautics and Astronautics, Kyushu University, Japan

<sup>2</sup>RIAM, Kyushu University, Japan

<sup>3</sup>IMaSS, Nagoya University, Japan

<sup>4</sup>IMRAM, Tohoku University, Japan

### **11:30-11:45 LEDIA6-2**

#### **Thermodynamic and experimental analyses of $\beta$ -Ga<sub>2</sub>O<sub>3</sub> growth by ozone molecular beam epitaxy**

Natsuki Ueda<sup>1</sup>, Yohei Sawada<sup>1</sup>, Keita Konishi<sup>1</sup>, Yoshiaki Nakata<sup>2</sup>, Masataka Higashiwaki<sup>2</sup>, Yoshinao Kumagai<sup>1</sup>

<sup>1</sup>Tokyo University of Agriculture and Technology, Japan

<sup>2</sup>National Institute of Information and Communications Technology, Japan

**11:45-12:00 LEDIA6-3**

**Heteroepitaxial growth of  $\epsilon$ -Ga<sub>2</sub>O<sub>3</sub> thin films on c-plane sapphire and GaN templates by HVPE**

Mayuko Sato<sup>1</sup>

<sup>1</sup>Tokyo University of Agriculture and Technology, Japan

**12:00-13:00 Lunch**

## **SESSION VII: ADVANCED PROCESSES <Room 411+412>**

**Chairs:**

**Malgorzata Iwinska**

*UNIPRESS, Poland*

**Tomohiro Yamaguchi**

*Kogakuin University, Japan*

**13:00-13:30 LEDIA7-1**      *Invited*

**High Purity in HVPE Method as an Advantage Used for Controllable Doping of GaN - Influence of Different Dopants on Electrical, Optical, and Structural Properties of GaN Crystals**

Malgorzata Iwinska<sup>1</sup>

<sup>1</sup>Institute of High Pressure Physics Polish Academy of Sciences (Unipress), Poland

**13:30-13:45 LEDIA7-2**

**AlN templates for low threading dislocation density GaN-on-Si: A solution to boost the adoption of GaN-on-Si for LEDs and  $\mu$ LEDs**

Fabrice Semond<sup>1</sup>, S. Rennesson<sup>1</sup>, G. Gommé<sup>1</sup>, E. Frayssinet<sup>1</sup>, P. Vennéguès<sup>1</sup>, J. Massies<sup>1</sup>

<sup>1</sup>Université Côte d'Azur, CRHEA-CNRS, France

**13:45-14:00 LEDIA7-3**

**Fabrication of Polarity-Inverted GaN Heterostructure by Surface-Activated Wafer Bonding and Silicon Removal**

Takuya Onodera<sup>1</sup>, Masahiro Uemukai<sup>1</sup>, Kazuya Takahashi<sup>2</sup>, Motoaki Iwaya<sup>2</sup>, Isamu Akasaki<sup>2</sup>, Yusuke Hayashi<sup>3</sup>, Hideto Miyake<sup>3</sup>, Maki Kushimoto<sup>4</sup>, Heajeong Cheong<sup>5</sup>, Yoshio Honda<sup>5</sup>, Hiroshi Amano<sup>4,5</sup>, Ryuji Katayama<sup>1</sup>

<sup>1</sup>Graduate School of Engineering, Osaka University, Japan

<sup>2</sup>Faculty of Science and Technology, Meijo Univ., Japan

<sup>3</sup>Graduate School of Regional Innovation Studies, Mie Univ., Japan

<sup>4</sup>Department of Electronics, Nagoya Univ., Japan

<sup>5</sup>Institute of Materials and Systems for Sustainability, Nagoya Univ., Japan

**14:00-14:15 LEDIA7-4**

**Structural recovery of Mg-ion-implanted N-polar bulk GaN substrates by high-temperature heat treatment**

Sakiko Yamanobe<sup>1</sup>, Kento Yoshida<sup>1</sup>, Keita Konishi<sup>1</sup>, Shinya Takashima<sup>2</sup>, Masaharu Edo<sup>2</sup>, Yoshinao Kumagai<sup>1</sup>

<sup>1</sup>Tokyo University of Agriculture and Technology, Japan

<sup>2</sup>Fuji Electric Co., Ltd., Japan

**14:15-14:45 LEDIA7-5**      *Invited*

**P-type Conduction of Mg-ion Implanted N-polar GaN and the Optical Investigation**

Tetsuo Narita<sup>1</sup>

<sup>1</sup>Toyota Central R&D Labs. Inc., Japan

**14:45-15:15 Break**

## **SESSION VIII: EXTENDED WAVELENGTH DEVICES <Room 411+412>**

**Chairs:**

**Bao-Ping Zhang**

*Xiamen University, China*

**Young-Joo Kim**

*Yonsei University, Korea*

**15:15-15:45 LEDIA8-1**      *Invited*

**Arrays of Truncated Cone AlGaIn Deep-Ultraviolet Light-Emitting Diodes for Efficient Outcoupling of in-Plane Emission**

Jong Kyu Kim<sup>1</sup>

<sup>1</sup>Pohang University of Science and Technology, Korea

**15:45-16:00 LEDIA8-2**

**Design of Transverse Quasi-Phase-Matched AlN Waveguide for Deep UV Second Harmonic Generation**

Shuhei Yamaguchi<sup>1</sup>, Masahiro Uemukai<sup>1</sup>, Kazuya Takahashi<sup>2</sup>, Motoaki Iwaya<sup>2</sup>, Isamu Akasaki<sup>2</sup>, Yusuke Hayashi<sup>3</sup>, Hideto Miyake<sup>3</sup>, Tomoya Yamada<sup>1</sup>, Yasufumi Fujiwara<sup>1</sup>, Ryuji Katayama<sup>1</sup>

<sup>1</sup>Osaka University, Japan

<sup>2</sup>Faculty of Science and Technology, Meijo University, Japan

<sup>3</sup>Graduate School of Regional Innovation Studies, Mie University, Japan

**16:00-16:15 LEDIA8-3**

**Demonstration of red vertical-microcavity LEDs with Eu-doped GaN as an active layer**

Keishi Shiomi<sup>1</sup>, Tomohiro Inaba<sup>1</sup>, Jun Tatebayashi<sup>1</sup>, Yasufumi Fujiwara<sup>1</sup>

<sup>1</sup>Osaka University, Japan

**16:15-16:45 LEDIA8-4**      *Invited*

**Fabrication of VCSELs Emitting in the 'Green Gap'**

Bao-Ping Zhang<sup>1</sup>

<sup>1</sup>Department of Electronic Engineering, Xiamen University, China

## **SESSION IX: TUTORIAL SESSION <Room 411+412>**

**Chair:**

**Yoshinao Kumagai**

*Tokyo University of Agriculture and Technology, Japan*

**16:45-17:30 LEDIA9-1            *Invited***

**Modeling and Process Design of III-nitride MOVPE**

Yoshihiro Kangawa<sup>1</sup>

<sup>1</sup>RIAM, Kyushu University, Japan

**17:30-17:45 Closing Remarks**

## 13:00-14:30 LEDIAp-1

### **AlGaIn-based deep UV flip-chip light emitting diode with AlN/Al reflector**

Tae Hoon Park<sup>1</sup>, Tae Ho Lee<sup>1</sup>, Tae Geun Kim<sup>1</sup>

<sup>1</sup>Korea University, Korea

## 13:00-14:30 LEDIAp-2

### **The Effect of the Metallic Nano-Grating for 365nm Polarized UV-LED**

Eun-Kyung Chu<sup>1</sup>, Nam-Woo Kang<sup>1</sup>, Beom-Rae Noh<sup>1</sup>, Hee-Jung Choi<sup>1</sup>, Yung-Ju Kwon<sup>2</sup>, Kyoung-Kook Kim<sup>1</sup>

<sup>1</sup>Dept. of Advanced Convergence Technology, Korea Polytechnic University, Korea

<sup>2</sup>Dept. of Nano Optical Engineering, Korea Polytechnic University, Korea

## 13:00-14:30 LEDIAp-3

### **Wide Band Gap Transparent Conductive Oxides of Oxide/Metal/Oxide Triple-Layer Structure based on Fluorine Tin Oxide**

Si-Won Kim<sup>1</sup>, Gyu-Jae Yohn<sup>1</sup>, Soae Jeong<sup>1</sup>, Beom-Rae Noh<sup>1</sup>, So-Yeon Park<sup>2</sup>, Suyeon Son<sup>2</sup>, Kyoung-Kook Kim<sup>1,2</sup>

<sup>1</sup>Convergence Technology, Korea Polytechnic University, Korea

<sup>2</sup>Dept. of Nano Optical Engineering, Korea Polytechnic University, Korea

## 13:00-14:30 LEDIAp-4

### **Efficient blue micro-light-emitting diodes using SiO<sub>x</sub>-based glass electrode**

Kyung Rock Son<sup>1</sup>, Byeong Ryong Lee<sup>1</sup>, Tae Ho Lee<sup>1</sup>, Sang Hoon Oh<sup>1</sup>

<sup>1</sup>School of Electrical Engineering, Korea University, Korea

## 13:00-14:30 LEDIAp-5

### **Self-Standing ZnO Nanotube/SiO<sub>2</sub> Core-Shell Arrays for High Photon Extraction Efficiency in III-Nitride Emitter**

Hee-Jung choi<sup>1</sup>, Semi Oh<sup>2</sup>, Soo-Hyun Kang<sup>1</sup>, Kab Ha<sup>1</sup>, Eun-Kyung Chu<sup>1</sup>, Won-Seok Lee<sup>3</sup>, Soon-Hwan Kwon<sup>3</sup>, Kyoung-Kook Kim<sup>1</sup>

<sup>1</sup>Dept. of Advanced Convergence Technology, Korea Polytechnic University, Korea

<sup>2</sup>Dept. of Materials Science & Technology (GIST), Korea

<sup>3</sup>Dept. of Nano Optical Engineering, Korea

## 13:00-14:30 LEDIAp-6

### **Improved light extraction efficiency of GaN-based near ultraviolet light-emitting diodes using TiO<sub>2</sub>/HfO<sub>2</sub> DBR electrode with Conductive Filaments**

Sanghoon Oh<sup>1</sup>, Kyung Rock Son<sup>1</sup>, Tae Geun Kim<sup>1</sup>

<sup>1</sup>School of Electrical Engineering, Korea University, Korea

## 13:00-14:30 LEDIAp-7

### **Thermal annealing effect of Ti buffer layer for the growth of GaN film**

Tzu-Ting Lin<sup>1</sup>, Shih-Hao Chan<sup>1</sup>, Shao-Ze Tseng<sup>1</sup>, Sheng-Hui Chen<sup>1</sup>

<sup>1</sup>National Central University, Taiwan

**13:00-14:30 LEDIAp-8**

**Characterizations and Growth of ZnO: B Films Grown by Low-Pressure Chemical Vapor Deposition on Glass Substrates**

Wei-Ming Lee<sup>1</sup>, Ying-Hsiang Wang<sup>1</sup>, Chin-Yi Tsai<sup>1</sup>, Shih-Wei Feng<sup>1</sup>, Chien-Hsun Chen<sup>2</sup>, Hsiang-Chen Wang<sup>3</sup>, Li-Wei Tu<sup>4</sup>

<sup>1</sup>Department of Applied Physics, National University of Kaohsiung, Kaohsiung, Taiwan

<sup>2</sup>Green Energy and Environment Research Labs, Industrial Technology Research Institute, Hsinchu, Taiwan

<sup>3</sup>Graduate Institute of Opto-Mechatronics, National Chung Cheng University, Taiwan

<sup>4</sup>Department of Physics and Center for Nanoscience and Nanotechnology, National Sun Yat-Sen University, Kaohsiung, Taiwan

**13:00-14:30 LEDIAp-9**

**A study on p-type Conductivity of Phosphorus-doped ZnO Thin Film using RF Sputtering and Annealing**

So-yeon Park<sup>1</sup>, Si-Won Kim<sup>2</sup>, Gyu-Jae Yohn<sup>2</sup>, Hee-Jung Choi<sup>2</sup>, Yebin Im<sup>1</sup>, Kyoung-Kook Kim<sup>1,2</sup>

<sup>1</sup>Dept. of Nano Optical Engineering, Korea Polytechnic University, Korea

<sup>2</sup>Dept. of Advanced Convergence Technology, and Research Institute of Advanced Convergence Technology, Korea Polytechnic University, Korea

**13:00-14:30 LEDIAp-10**

**Photoluminescence investigation of near white light-emitting zinc stannate-based phosphors**

Mu-Tsun Tsai<sup>1</sup>, Chih-Chuan Chan<sup>1</sup>, Chien-Hung Lin<sup>1</sup>

<sup>1</sup>Department of Materials Science Engineering, National Formosa University, Taiwan

**13:00-14:30 LEDIAp-11**

**Highly efficient photonic conversion mediums based on polymer complexes for applications in light emitting devices**

Petronela Horlescu<sup>1</sup>, Corneliu S. Stan<sup>1</sup>, Simona E. Bacaïta<sup>1</sup>

<sup>1</sup>Gheorghe Asachi Technical University, Romania

**13:00-14:30 LEDIAp-12**

**Numerical and Experimental Investigations for Deposited Nanosilver Tracks on Polyimide Films with Heterostructures**

Chia-Yen Chan<sup>1</sup>, Kuan-Cheng Shih<sup>2</sup>, Yu-Hsin Lin<sup>1</sup>

<sup>1</sup>Instrument Technology Research Center, National Applied Research Laboratories, Taiwan

<sup>2</sup>Kingley Rubber Industrial Co., Ltd., Taiwan

**13:00-14:30 LEDIAp-13**

**Effect of the Oxygen Concentration on Electrical Properties of GaN Crystals Grown with the Na-flux Point Seed Method**

K. Endo<sup>1</sup>, T. Yamada<sup>1</sup>, H. Kubo<sup>1</sup>, K. Murakami<sup>1</sup>, M. Imanishi<sup>1</sup>, M. Yoshimura<sup>1</sup>, and Y.

Mori<sup>1</sup>

<sup>1</sup>Osaka University

**13:00-14:30 LEDIAp-14**

**The effect of nitrogen pressure on Threading Dislocation Density during the Na-flux GaN Growth using Point Seed Technique**

Yuki Sawada<sup>1</sup>, Takumi Yamada<sup>1</sup>, Kosuke Murakami<sup>1</sup>, Keisuke Kakinouchi<sup>1</sup>, Kosuke Nakamura<sup>1</sup>, Kanako Okumura<sup>1</sup>, Tomoko Kitamura<sup>1</sup>, Yasuhiro Unoki<sup>1</sup>, Masayuki Imanishi<sup>1</sup>, Masashi Yoshimura<sup>1</sup>, and Yusuke Mori<sup>1</sup>

<sup>1</sup>Grad. Sch. of Eng., Osaka Univ.

**13:00-14:30 LEDIAp-15**

**Reduction of Li impurity in the freestanding GaN substrate fabricated using the sapphire dissolution technique in the Na-flux growth**

Takumi Yamada<sup>1</sup>, Masayuki Imanishi<sup>1</sup>, Kosuke Murakami<sup>1</sup>, Kosuke Nakamura<sup>1</sup>, Mamoru Imade<sup>1</sup>, Masashi Yoshimura<sup>1</sup>, and Yusuke Mori<sup>1</sup>

<sup>1</sup>Grad. Sch. of Eng., Osaka Univ.

**13:00-14:30 LEDIAp-16**

**Sol-Gel-Derived Hole-Transporting NiO<sub>x</sub> Films for Perovskite CsPbBr<sub>3</sub> Green Light-Emitting Diodes**

Chun-Yuan Huang<sup>1</sup>, Shyh-Jer Huang<sup>2</sup>, Yi-Hsiu Hsieh<sup>1</sup>

<sup>1</sup>National Taitung University, Taiwan

<sup>2</sup>National Cheng Kung University, Taiwan

**13:00-14:30 LEDIAp-17**

**Optically Readable GaN-based Micro-LEDs Using NiO-based ReRAM as an N-Type Contact layer for Micro-LED Display**

Byeong Ryong Lee<sup>1</sup>, Ju Hyun Park<sup>1</sup>, Hyun Tae Kim<sup>1</sup>, Kyung Rock Son<sup>1</sup>, Tae Geun Kim<sup>1</sup>

<sup>1</sup>Korea University, Korea

**13:00-14:30 LEDIAp-18**

**Optical and Device Characteristics of InGaN/GaN Light Emitting Diodes with Multilayer Graphene as Transparent and Current Spreading Electrodes**

Ying-Hsiang Wang<sup>1</sup>, Wei-Ming Lee<sup>1</sup>, Shih-Wei Feng<sup>1</sup>, Hsiang-Chen Wang<sup>2</sup>

<sup>1</sup>Department of Applied Physics, National University of Kaohsiung, Taiwan

<sup>2</sup>Graduate Institute of Opto-Mechatronics, National Chung Cheng University, Taiwan

**13:00-14:30 LEDIAp-19**

**High Efficiency UV-Emitters with Micro-Hole Pattern and ITO Nanoparticles**

Beom-Rae Noh<sup>1</sup>, Joon-Sung Kwon<sup>1</sup>, Nam-Woo Kang<sup>1</sup>, Eun-Kyung Chu<sup>1</sup>, Si-Won Kim<sup>1</sup>, Kwang-Gyun Im<sup>2</sup>, Kyoung-Kook Kim<sup>1</sup>

<sup>1</sup>Department of Advanced Convergence Technology, Korea

<sup>2</sup>Department of Nano Optical Engineering, Korea

# PRESENTATION GUIDELINES

## TIME ALOTTED FOR PRESENTATION:

INVITED TALK:	25-minute talk + 5-minute discussion
CONTRIBUTED ORAL TALK:	10-minute talk + 5-minute discussion
POSTER PRESENTATION:	90-minute poster presentation + 3-minute short presentation

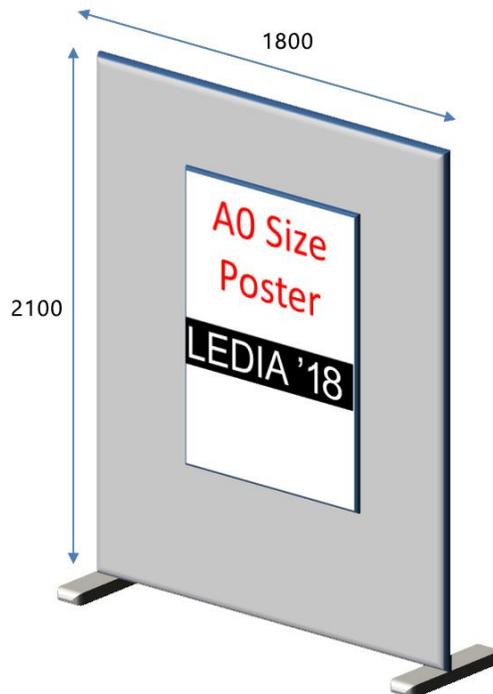
## POSTER PRESENTATIONS:

The size of the poster board is 180 cm in a width and 210 cm in a height. We recommend the authors to use A0 size (84.1 cm in a width, 118.9 cm in a height) paper/cloth to prepare their posters.

On the poster board, only the paper number will be labeled, so that the paper title, author names, and affiliations should be prepared by the authors. Necessary tools for pinning the posters will be provided.

Before the poster session, 3 minutes short oral presentation will be planned. A PC video projector will be available. Please prepare your presentation in Adobe PDF file format. **Submit the electrical PDF file through the online system by April 20, 2018.**

\*Notice: The authors of the short presentation must be finished their talk within 3 minutes and the presentation must be given by using PC provided at the conference room.



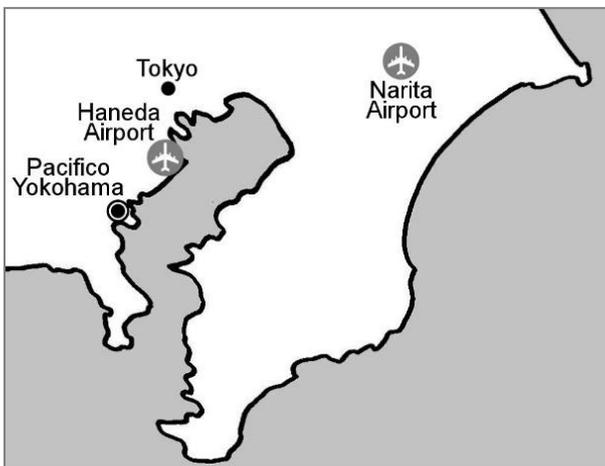
# LOCATION OF CONFERENCE SITE

## FROM OVERSEA

The LEDIA '18 takes place at Pacifico Yokohama, Yokohama city, Kanagawa prefecture, JAPAN. Yokohama city, the center of Kanagawa prefecture is located in the south of Tokyo. Pacifico Yokohama is conveniently located about 30 minutes from Tokyo International Airport (Haneda) and about 100 minutes from Narita International Airport. Direct Airport Limousine to Pacifico Yokohama is available.

For more information, please visit the following URL:

<http://www.pacifico.co.jp/english/destination/access/tabid/502/Default.aspx>



## Access from the nearest stations

- 1. Minato Mirai Line:** 3-minute walk from “Minato Mirai Station”
- 2. JR or Subway Line:** 12-minute walk, 7 minutes by bus or 5 minutes by taxi from “Sakuragicho Station”
- 3. Sea Bass (boat):** 10 minutes from “Yokohama Station”

## Pacifico Yokohama

1-1-1 Minato Mirai, Nishi-ku, Yokohama 220-0012, Japan

<http://www.pacifico.co.jp/english/>

# PACIFICO YOKOHAMA MAP

1-1-1 Minatomirai, Nishi-ku, Yokohama  
220-0012, Japan  
Information ☎ +81(45)221-2155  
URL: <http://www.pacifico.co.jp>

On foot

