# The Conference Theme

*New Challenges for "Smart" World*

# Advanced Program

## 6/5

## Tutorials (in Japanese)

**9:30-10:30** Fundamentals of GaN Transistors
Yasuo Ohno (e-Device Lab)

**Short Break (10:30-10:40)**

**10:40-11:40** Fundamentals of GaN Transistor Application Technology
Wataru Saito (Toshiba Corporation)

## Opening

**13:00-13:10** Opening Remarks by Yasuhisa Omura (Kansai University)

## Keynote Speeches

**13:10-13:50**

**K-1** **(p.18)** Low Energy Silicon Solution toward Smart and Sustainable Society
Toshiaki Masuhara (Low-power Electronics Association & Project)

**13:50-14:30**

**K-2** **(p.20)** Low-Power Ultrahigh-Speed Wireless Communication with Short-Millimeter-Wave CMOS Technology
Minoru Fujishima (Hiroshima University)

**Short Break (14:30-14:40)**

# Session A (Si Devices & Circuits)

**14:40-15:00**

**A-1** **(p.24)** Numerical Analysis of Light-Trapping Structure in Nanoimprinted-Textured Silicon Solar Cell

Seiya Yoshinaga[1], Yasuaki Ishikawa[1,2], Shinji Araki[1] and Yukiharu Uraoka[1,2] ([1]NAIST, [2]JST-CREST)

**15:00-15:20**

**A-2** **(p.26)** Distance Controlled Nanoparticles Using PEG-ferritin for New Functional Devices

Chao He[1,2], Ryoichi Honda[1], Hiroki Kamitake[1,2], Mutsunori Uenuma[1,2], Yasuaki Ishikawa[1,2], Ichiro Yamashita[1] and Yukiharu Uraoka[1,2] ([1]NAIST, [2]CREST)

**15:20-15:40**

**A-3** **(p.28)** Influence of a Pocket Doping in a Schottky Tunneling FET

Shilpi Guin, Avik Chattopadhyay, Anupam Karmakar and Abhijit Mallik (University of Calcutta, India)

**Short Break (15:40-15:50)**

**15:50-16:10**

**A-4** **(p.30)** The Effect of Supply Voltage Reduction to 5.8GHz Differential Dual-Modulus Prescaler

Takeshi Mitsunaka[1,2], Masafumi Yamanoue[1], Kunihiko Iizuka[1] and Minoru Fujishima[2] ([1]SHARP Corporation, [2]Hiroshima University)

**16:10-16:30**

**A-5** **(p.32)** A CMOS Image Sensor with Low Fixed Pattern Noise Suitable for Lensless Observation System of Digital Enzyme-linked Immunosorbent Assay (ELISA)

Hironari Takehara[1], Kiyotaka Sasagawa[1,3], Toshihiko Noda[1,3], Takashi Tokuda[1,3], Kazuya Miyazawa[1], Soo Hyeon Kim[2,3], Ryota Iino[2,3], Hiroyuki Noji[2,3] and Jun Ohta[1,3] ([1]NAIST, [2]The University of Tokyo, [3]JST-CREST)

**Short Break (16:30-16:40)**

# Poster Session
# Short Presentation – 2min. each (6/5, 16:40-18:00)

**PA-01** (p.36) Monte Carlo Simulation of Seebeck Coefficient of Si Nanostructure with Barrier Layers
Indra Nur Adisusilo[1], Kentaro Kukita[1] and Yoshinari Kamakura[1,2]
([1]Osaka University, [2]CREST)

**PA-02** (p.38) Scaling Scheme Prospect of XCT-SOI MOSFET Aiming at Medical Implant Applications Showing a Long Lifetime with a Small Battery
Daiki Sato and Yasuhisa Omura (Kansai University)

**PA-03** (p.40) Novel Solar Cell with MOS Diode for Improvement of Conversion Efficiency
Takahiro Kobayashi, Naoto Matsuo and Akira Heya
(University of Hyogo)

**PA-04** (p.42) Threshold voltage model for double gate p-IMOS
Heming Yao (Beihang University)

**PA-05** (p.44) Low Voltage High Linearity CMOS Up Conversion Mixer for LTE Applications
Yuan-Hao Shu and Jeng-Rern Yang (Yuan Ze University)

**PB-01** (p.46) Growth of a sputtered $Ta_2O_5$/ZnO film and its application to an ion-sensitive field-effect transistor
Kazuya Mukai[1], Takayuki Onaka[1], Kazuto Koike[1], Toshihiko Maemoto[1], Shigehiko Sasa[1], Mitsuaki Yano[1], Sadao Kadokura[2] and Yutaka Nakamitsu[2]
([1]Osaka Institute of Technology, [2]FTS Corporation)

**PB-02** (p.48) Type II band lineup in SAB-Based GaAs/Si Heterojunctions
Masashi Morimoto, Jianbo Liang, Shota Nishida, Tatsuya Miyazaki and Naoteru Shigekawa (Osaka City University)

**PB-03** (p.50) V/Al-based ohmic contact formation to n-GaN using low temperature annealing
Kouhei Tone, Hirokuni Tokuda and Masaaki Kuzuhara
(University of Fukui)

**PB-12** **(p.68)** High-voltage AlGaN/GaN HEMTs fabricated on free-standing GaN substrates
Kousuke Akira, Takashi Asano, Hirokuni Tokuda and Masaaki Kuzuhara (University of Fukui)

**PB-13** **(p.70)** Enhancement of photoluminescence due to one-dimensional photonic crystal
Kohei Shobudani, Masato Morifuji (Osaka University)

**PB-14** **(p.72)** Low Resistance Ohmic Contacts to n-InSb Employing Sn-Alloys
Kosuke Hosotani, Taihei Ito, Yuichiro Yasui, Koji Nakayama, Azusa Kdoda, Masayuki Mori and Koichi Maezawa (University of Toyama)

**PC-01** **(p.74)** Retinal Prosthesis of Frequency Modulation using Thin-Film Photo Transistors
Takayuki Kadonome, Atsushi Matsumura, Tsuyoshi Higashiyama, Shohei Oyama and Mutsumi Kimura (Ryukoku University)

**PC-02** **(p.76)** Fabrication of zinc oxide transparent thin film transistors on glass substrates by sol-gel method
Satoru Sasaki, Shigehiko Sasa, Ken-Ichi Ogata and Toshihiko Maemoto (Osaka Institute of Technology)

**PC-03** **(p.78)** Artificial Neural Network using Thin-Film Transistors － Working Confirmation of Asymmetric Circuit －
Yuki Yamaguchi, Ryohei Morita, Yusuke Fujita, Tomoaki Miyatani, Tomohiro Kasakawa and Mutsumi Kimura (Ryukoku University)

**PC-04** **(p.80)** Leakage Current Characteristics of New $SrBi_4Ti_4O_{15}$/Ca $Bi_4Ti_4O_{15}$ Thin-Film Capacitor with Excellent Electric Stability
Hideaki Kawahara[1], Naoya Tahara[1], Shuhei Nomura[1], Hiroshi Uchida[2], Kaoru Yamashita[1], Hiroshi Funakubo[3] and Minoru Noda[1]
([1]Kyoto Institute of Technology, [2]Sophia University, [3]Tokyo Institute of Technology)

**PS-01** **(p.98)** Multiple-Cell-Upset Hardened 6T SRAM Using NMOS-Centered Layout
Shusuke Yoshimoto[1], Koji Nii[2], Hiroshi Kawaguchi[1] and Masahiko Yoshimoto[1,3] ([1]Kobe University, [2]Renesas Electronics Corporation, [3]JST CREST)

**PS-02** **(p.100)** Evaluation for Temperature Dependence and Lifetime of 79GHz Power Amplifier
Chen Yang Li, Takeshi Yoshida, Kosuke Katayama, Mizuki Motoyoshi, Kyoya Takano, Shuhei Amakawa and Minoru Fujishima (Hiroshima University)

**PS-03** **(p.102)** Power-Noise Measurements of Small-Scale Inverter Chains
Yuji Harada[1], Kumpei Yoshikawa[1], Noriyuki Miura[1], Makoto Nagata[1], Akitaka Murata[2], Syuuji Agatsuma[2] and Kouji Ichikawa[2] ([1]Kobe University, [2]DENSO CORPORATION)

**PS-04** **(p.104)** Expansion of SRAM Operation Margin by Adaptive Voltage Supply
Kyohei Kishida[1], Tomohiro Tsujii[1], Hiroshi Makino[1], Tsutomu Yoshimura[1], Shuhei Iwade[1] and Yoshio Matsuda[2] ([1]Osaka Institute of Technology, [2]Kanazawa University)

**PS-05** **(p.106)** Impact of Skin Effect on Loss Modeling of On-Chip Transmission-Line for Terahertz Integrated Circuits
Akira Tsuchiya and Hidetoshi Onodera (Kyoto University)

**PS-06** **(p.108)** A Study of Optimization for Efficiency and Power Control in an Electromagnetic WPT System
Giichi Sakemi, Tsutomu Yoshimura and Naoyuki Fukuda
(Osaka Institute of Technology)

# Session B (Compound Semiconductor Devices)

**9:30-10:10 – Invited –**

**B-1** **(p.112)** Evolution of Power Amplifier for mobile applications
Satoshi Tanaka (Murata Manufacturing Co., Ltd.)

**Short Break (10:10-10:20)**

**10:20-10:40**

**B-2** **(p.114)** A Compact Isolated Gate Driver using GaN HFETs on Sapphire Substrate Integrated with a 5.8GHz Electro-Magnetic Resonant Coupler
Yasufumi Kawai, Shuichi Nagai, Noboru Negoro, Takeshi Fukuda, Tetsuzo Ueda, Nobuyuki Otsuka and Daisuke Ueda (Panasonic Corporation)

**10:40-11:00**

**B-3** **(p.116)** Development of SiC Power Devices and Modules for Automotive Motor Drive Use
Tristan Evans, Toshio Hanada, Yuki Nakano and Takashi Nakamura (ROHM Co., Ltd.)

**11:00-11:20**

**B-4** **(p.118)** Size and Geometric Effects on Conduction Band Structure of GaAs Nanowires
Hajime Tanaka, Naoya Morioka, Seigo Mori, Jun Suda, and Tsunenobu Kimoto (Kyoto University)

**11:20-11:40**

**B-5** **(p.120)** A 13.56 MHz Wireless Power Transmission Systems with Enhancement-Mode GaN High Electron Mobility Transistors
Yusuke Nakakohara, Junichi Kashiwagi, Tetsuya Fujiwara, Minoru Akutsu, Norikazu Ito, Kentaro Chikamatsu, Astushi Yamaguchi, and Ken Nakahara (ROHM Co., Ltd.)

## Lunch (11:40-13:00)

# Session C (Emerging Devices)

**13:00-13:40 – Invited –**

**C-1** **(p.124)** Atmospheric Pressure Processed InGaZnO Thin-Film Transistors
Mamoru Furuta, Toshiyuki Kawaharamura
(Kochi University of Technology)

**13:40-14:00**

**C-2** **(p.126)** Forming of $SiO_2$ Film by Spin-On Glass and $CO_3$ Laser Annealing for Gate Insulator of Polycrystalline Silicon Thin Film Transistors
Daisuke Hishitani[1], Masahiro Horita[1,2], Hiroshi Ikenoue[3], Yosuke Watanabe[4] and Yukiharu Uraoka[1,2]
([1]NAIST, [2]CREST, [3]Kyushu Univ., [4]GIGAPHOTON INC.)

**14:00-14:20**

**C-3** **(p.128)** Femtosecond Laser Irradiation to ZnS Phosphor for Inorganic Electroluminescent Displays
Kyohei Nabesaka[1], Yasuaki Ishikawa[1,3], Takahiro Doe[1], Nobuyoshi Taguchi[2], Yoichiroh Hosokawa[1] and Yukiharu Uraoka[1,3]
([1]NAIST, [2]Image Tech Inc., [3]CREST)

**14:20-14:40**

**C-4** **(p.130)** Evaluation of TaOx Nanoparticles for Resistive Random Access Memory
Keisuke Kado[1,2], Takahiro Ban[1,2], Mutsunori Uenuma[1,2] and Yasuaki Ishikawa[1,2] ([1]NAIST, [2]CREST)

**Short Break (14:40-14:50)**

**14:50-15:10**

**C-5** **(p.132)** Asymmetric AC Electrophoresis with Insulated Electrodes: Toward Positional Control of Micro- and Nanoscale Devices
Akihide Shibata[1], Kenji Komiya[1], Keiji Watanabe[1], Takuya Sato[1], Takeshi Shiomi[1], Hiroshi Kotaki[1], Paul Schuele[2], Mark Crowder[2], Changqing Zhan[2] and John Hartzell[2] ([1]Sharp Corporation, [2]Sharp Laboratories of America)

**15:10-15:30**

**C-6** **(p.134)** Research on Discrete Bipolar Switching Effect in Memristor Device
Zhensen Tang[1], Liang Fang[1], Rulin Liu[1], An Yan[1], Yaqing Chi[2] and Xun Yi[1] ([1]National University of Defense Technology, [2]National Key Laboratory of Science and Technology )

**15:30-15:50**

**C-7** **(p.136)** A Novel Discharge-Induced Airflow Device with Low Voltage Operation
Tomoshige Furuhi, Manabu Inoue, Kiyoshi Takagi and Akira Ando (Murata Manufacturing Co., Ltd.)

# Poster Viewing Session

**16:00-18:00** at Poster Room

# Closing

**18:10-18:30** Award and Closing: Akira Takahashi (Sharp Corporation)