

Area 1&3: Joint Session**C-7: FinFETs and Multi-Gate FETs****10:45-12:15 2F Heisei <Nishi>**

Chair: N. Mori (Osaka Univ.)

H. Fukutome (Fujitsu Microelectronics Ltd.)

10:45 C-7-1 (Invited)

Characteristics and Integration Challenges of FinFET-based Devices for (Sub-)22nm Technology Nodes Circuit Applications

A. Veloso¹, M..J. H. Van Dal², N. Collaert¹, A. De Keersgieter¹, L. Witters¹, R. Rooyackers¹, A. Redolfi¹, S. Brus¹, R. Duffy², B. J. Pawlak², G. Vellianitis², B. Duriez², T. Mérelle², P. P. Absil¹, S. Biesemans¹, M. Jurczak¹, T. Hoffmann¹ and R. J. P. Lander², ¹IMEC and ²NXP-TSMC Res. Center (Belgium)**11:15 C-7-2**

High-Performance three-terminal FinFETs by Combination of Damage-Free Neutral-Beam Etching and Neutral-Beam Oxidation Technologies

K. Sano¹, M. Yonemoto¹, A. Wada¹, K. Endo², T. Matsukawa², M. Masahara² and S. Samukawa¹, ¹Tohoku Univ. and ²AIST (Japan)**11:35 C-7-3**

Investigation of Low-Energy Tilted Ion Implantation for FinFET Extension Doping

Y. X. Liu, T. Matsukawa, K. Endo, S. O'uchi, K. Sakamoto, J. Tsukada, Y. Ishikawa, H. Yamauchi and M. Masahara, AIST (Japan)

11:55 C-7-4

Impact of Attractive Ion in Undoped Channel on the Characteristics of Nanoscale Multi-Gate FETs: A 3D NEGF Study

Y. Kamakura, G. Mil'nikov, N. Mori and K. Taniguchi, Osaka Univ. (Japan)

Area 1&3: Joint Session**B-9: Device Reliability****15:20-17:10 2F Heisei <Naka>**

Chair: D. Hisamoto (Hitachi, Ltd.)

S. Tsujikawa (Sony Corp.)

15:20 B-9-1 (Invited)

On the Reliability of and Self-Compensation in Strained Transistors

M. A. Alam and A. E. Islam, *Purdue Univ. (USA)***15:50 B-9-2**

Decoupling method of BTI component from hot carrier degradation in ultra-thin HfSiON MOSFETs

A. Masada, I. Hirano, S. Fukatsu and Y. Mitani, *Toshiba Corp. (Japan)***16:10 B-9-3**Study of Negative V_{th} Shift in PBTI and Positive Shift in NBTI for Yttrium Doped HfO₂ Gate DielectricsM. Sato, S. Kamiyama, T. Matsuki, D. Ishikawa, T. Ono, T. Morooka, J. Yugami, K. Ikeda and Y. Ohji, *Selete (Japan)***16:30 B-9-4**

Forward Body Bias Enhanced NBTI Recovery on pMOSFETs

Y. He, G. Du, Y. X. Yang and G. Zhang, *Peking Univ. (China)***16:50 B-9-5**

The Simulation of ESD Protection Devices Fabricated in Multiple-Gate FETs

D. Hagishima and K. Matsuzawa, *Toshiba Corp. (Japan)***Area 1: Advanced Gate Stack / Si Processing & Material Science****B-6: Epitaxy****9:00-10:20 2F Heisei <Naka>**

Chair: Y. Tsunashima (Toshiba Corp.)

B. Mizuno (UJT Lab. Inc.)

9:20 B-6-2

Impact of Very Low Series Resistance due to Raised Metal S/D Structure with Very Low Contact Resistance Silicide for sub-100-nm nMOSFET

R. Kuroda, T. Isogai, H. Tanaka, Y. Nakao, A. Teramoto, S. Sugawa and T. Ohmi, *Tohoku Univ. (Japan)*

9:40 B-6-3

First LSI Applicable Thin SOI Films Formed by Lateral Solid Phase Epitaxy

H. Ishida, F. Aiso, M. Mizukami, K. Nishihara, T. Iguchi, D. Ichinose, A. Fukumoto, T. Suzuki, F. Arai and I. Mizushima, *Toshiba Corp. (Japan)*

10:00 B-6-4

High Hole Mobilities in Single-Crystalline Ge Thin-Films on Insulating Substrate Formed by SiGe Mixing-Triggered Directional Melting-Growth

K. Toko, T. Tanaka, T. Sadoh and M. Miyao, *Kyushu Univ. (Japan)*

10:20-10:35 Break

Area 1: Advanced Gate Stack / Si Processing & Material Science

B-7: Ge-MOS**10:35-12:15 2F Heisei <Naka>**

Chair: Y. Tsunashima (Toshiba Corp.)

Y. Nara (Fujitsu Microelectronics Ltd.)

10:35 B-7-1

High Electron Mobility Ge n-Channel MOSFETs with GeO₂ grown by High Pressure Oxidation

C. H. Lee¹, T. Nishimura^{1,2}, T. Tabata^{1,2}, K. Nagashio^{1,2}, K. Kita^{1,2} and A. Toriumi^{1,2}, ¹*Univ. of Tokyo*² and *CREST-JST (Japan)*

10:55 B-7-2

¹⁸O isotope tracing Study of GeO Desorption from GeO₂/

Ge Structure

S. Wang¹, K. Kita^{1,2}, T. Nishimura^{1,2}, K. Nagashio^{1,2} and A. Toriumi^{1,2}, ¹*Univ. of Tokyo* and ²*CREST-JST (Japan)*

11:15 B-7-3

Diffusion control of *n*-type impurities in Ge using co-doping technique for ultra-shallow and highly doped *n*⁺/*p* junction in Ge *n*MOSFETs

M. Koike¹ and K. Tatsumura², ¹*MIRAI-Toshiba and* ²*Toshiba Corp. (Japan)*

11:35 B-7-4

Effects of MIS Interfacial Layers on Interface Trap Density near Conduction Band Edge in Ge MIS Structures

N. Taoka¹, W. Mizubayashi¹, Y. Morita¹, S. Migita¹, H. Ota¹ and S. Takagi^{1,2}, ¹*MIRAI-AIST* and ²*Univ. of Tokyo (Japan)*

11:55 B-7-5

Spectroscopic Ellipsometry Study on Defects Generation in GeO₂/Ge stacks

K. Kita^{1,2}, M. Yoshida¹, T. Nishimura^{1,2}, K. Nagashio^{1,2} and A. Toriumi^{1,2}, ¹*Univ. of Tokyo* and ²*CREST-JST (Japan)*

12:15-13:15 Lunch

Area 1: Advanced Gate Stack / Si Processing & Material Science

B-8: Doping Technology**13:15-15:05 2F Heisei <Naka>**

Chair: B. Mizuno (UJT Lab. Inc.)

J. Yugami (Selete)

13:15 B-8-1 (Invited)

Process Condition Dependence of Random V_T Variability in NFETs and PFETs

T. Tsunomura¹, A. Nishida¹, K. Takeuchi¹, S. Inaba¹, S. Kamohara¹, K. Terada², T. Hiramoto^{1,3} and T. Mogami¹, ¹*MIRAI-Selete*, ²*Hiroshima City Univ.* and ³*Univ. of Tokyo (Japan)*

13:45 B-8-2

Comprehensive Design Methodology of Extension Profile to Suppress Boron TED in High Performance High-k/Metal SiGe pMOSFETS

C. Y. Kang¹, Y. H. Kim², M. S. Park³, J. W. Oh¹, B. G. Min⁴, K. S. Lee⁴, S. K. Banerjee², P. Majhi¹, H. H. Tseng¹ and R. Jammy¹, ¹SEMATECH, ²Univ. of Texas at Austin, ³POSTECH and ⁴Jusung Engineering (USA)

14:05 B-8-3

Leakage Reduction by Thermal Annealing of NiPtSi Silicided Junctions and Anomalous Spider-Web of In-Layer Pt Network

M. Tsuchiaki and A. Nishiyama, *Toshiba Corp. (JAPAN)*

14:25 B-8-4

Concentration of Active Dopants at NiSi/Si Interface Segregated by "Snowplow" Effect for Schottky Barrier Height Tuning

S. Migita, Y. Morita, N. Taoka, W. Mizubayashi and H. Ota, *MIRAI-AIST (Japan)*

14:45 B-8-5

Activation of B and As in Ultra Shallow Junction with Heating and Cooling Rates Controlled Millisecond Annealing Induced by Thermal Plasma Jet

K. Matsumoto, S. Higashi, H. Furukawa, T. Okada, H. Murakami and S. Miyazaki, *Hiroshima Univ. (Japan)*

Area 2: Characterization and Materials Engineering for Interconnect Integration

D-8: Advanced Material/Process Technology**13:15-15:05 3F Sakura**

Chair: M. Nihei (Fujitsu Labs. Ltd.)

M. Matsuura (Renesas Tech. Corp.)

13:15 D-8-1 (Invited)

Carbon Nanomaterials for Next-Generation Interconnects and Passives: Physics, Status and Prospects

K. Banerjee, H. Li and C. Xu, *Univ. of California-Santa*

Barbara (USA)

13:45 D-8-2

High Current Reliability of Carbon Nanotube Via Interconnects

M. Sato, T. Hyakushima, A. Kawabata, T. Nozue, S. Sato, M. Nihei and Y. Awano, *MIRAI-Selete (Japan)*

14:05 D-8-3

Effect of UV Photons and Radicals for Low-Frequency Line-Edge Roughness (LER) of ArF Photo-resist during Fluorocarbon plasma etching

B. Jinnai¹, E. Soda^{1,2}, K. Koyama¹, S. Saito² and S. Samukawa¹, ¹Tohoku Univ. and ²Selete (Japan)

14:25 D-8-4

Hard Mask through UV Light-induced Damage to Low-k Film During Plasma Process for Dual Damascene

N. Matsunaga^{1,2}, H. Okumura¹, B. Jinnai¹ and S. Samukawa¹, ¹Tohoku Univ. and ²Toshiba Corp. (Japan)

14:45 D-8-5

Super-Low-k SiOCH Film (k=1.9) with High Water Resistance and High Thermal Stability Formed by Neutral-Beam-Enhanced-CVD

T. Sasaki¹, S. Yasuhara¹, T. Shimayama², K. Tajima², H. Yano², S. Kadomura², M. Yoshimaru², N. Matsunaga² and S. Samukawa¹, ¹Tohoku Univ. and ²STARC (Japan)

15:05-15:15 Break

Area 2: Characterization and Materials Engineering for Interconnect Integration

D-9: Characterization and Reliability for Low-k Materials**15:15-17:05 3F Sakura**

Chair: S. Ogawa (Selete)

K. Ito (Kyoto Univ.)

15:15 D-9-1 (Invited)

The Helium Ion Microscope for Interconnect Material

Imaging

W. Thompson¹, S. Ogawa², L. Stern¹, L. Scipioni¹,
J. Notte¹, L. Farkas¹ and L. Barriss¹, ¹*Carl Zeiss SMT and*
²*Selete (USA)*

15:45 D-9-2

Relative Density Characterization of Patterned Low-k
material by VEELS

Y. Otsuka¹, Y. Shimizu¹, N. Kawasaki¹ and S. Ogawa²,
¹*Toray Res. Center, Inc. and* ²*Selete (Japan)*

16:05 D-9-3

Evaluation of Dielectric Constant through Direct CMP of
Porous Low-k Film

M. Kodera, T. Takahashi and G. Minamihaba, *Toshiba*
Corp. (Japan)

16:25 D-9-4

Prediction of Abnormal Etching Profile at High-Aspect-
Ratio Via/ Hole Etching by using On-wafer Monitoring
System

H. Ohtake¹, S. Fukuda¹, B. Jinnai¹, T. Tatsumi² and
S. Samukawa¹, ¹*Tohoku Univ. and* ²*OKI Semiconductor*
Miyagi Co. Ltd. (Japan)

16:45 D-9-5

Integration and dielectric reliability of 30nm ½ pitch
structures in Aurora[®]LK HM

S. Demuynck¹, C. Huffman¹, M. Claes¹, S. Suhard¹,
J. Versluijs¹, H. Volders¹, N. Heylen¹, K. Kellens¹,
K. Croes¹, H. Struyf¹, G. Vereecke¹, P. Verdonck¹,
D. De Roest², J. Beynet², H. Sprey² and G. P. Beyer¹,
¹*IMEC and* ²*ASM Belgium (Belgium)*

Area 3: CMOS Devices /Device Physics

C-6: High-k/Metal-Gate

9:00-10:20 2F Heisei <Nishi>

Chair: S. Hayashi (Panasonic Corp.)
K. Horita (Renesas Tech. Corp.)

9:00 C-6-1

Optimization of Bulk⁺/SON Integration for Low Stand-by
Power (LstP) Applications

F. Boeuf¹, G. Bidal^{1,2}, S. Denorme¹, J. L. Huguenin^{1,2},
S. Monfray¹, D. Chanemougame¹, N. Loubet¹ and
T. Skotnicki¹, ¹*STMicroelectronics and* ²*IMEP-LAHC*
MINATEC (France)

9:20 C-6-2

Sub-30 nm CMOSFET with Ni(Pt)-FUSI/SiON Gate
Stack

H. Fukutome, K. Okubo, S. Akiyama, N. Idani, H. Ohta,
K. Kawamura, Y. Momiyama and S. Satoh, *Fujitsu*
Microelectronics Ltd. (Japan)

9:40 C-6-3

Novel Single Metal Gate CMOS Integration with Effective
Workfunction Modulation by a Differential Spacer:

Manipulation of Oxygen Vacancy

Y. H. Kim, K. Schonenberg, T. Ando, D. Neumayer,
R. Mo, H. Bu, J. Sleight, E. Cartier, N. Moumen,
R. Jha, W. Yan, Y. Liang, V. Narayanan, M. P. Chudzik and
S. Guha, *IBM (USA)*

10:00 C-6-4

High Performance High-K Metal-Gate Poly-Si TFTs with
Subthreshold Swing < 200 mV/dec for Monolithic 3D
Integrated Circuits Applications

M. H. Lee¹, K. J. Chen¹, S. C. Weng¹, W. H. Liu¹,
M. J. Yang², C. T. Shih³, L. S. Lee³ and M. J. Kao³,
¹*National Taiwan Normal Univ.*, ²*National Nano Device*
Labs. and ³*Indus. Tech. Res. Inst. (Taiwan)*

Area 3: CMOS Devices /Device Physics

C-8: Transport Physics

13:15-14:35 2F Heisei <Nishi>

Chair: N. Mori (Osaka Univ.)
T. Tanaka (Fujitsu Microelectronics Ltd.)

13:15 C-8-1

Impact of Coulomb Scattering on the Characteristics of Nanoscale Devices

F. Boeuf¹, G. Ghibaudo² and T. Skotnicki¹,
¹STMicroelectronics and ²IMEP-LAHC MINATEC(France)

13:35 C-8-2

Comprehensive Study on Electron Mobility and Band Gap in Tensile Strained Ge

M. Ono and T. Tezuka, *MIRAI-Toshiba (Japan)*

13:55 C-8-3

Inversion-Layer Mobility Limited by Coulomb Scattering on Si (100), (110) and (111) n-MOSFETs

Y. Nakabayashi¹, T. Ishihara¹, T. Numata¹, K. Uchida² and S. Takagi³, ¹Toshiba Corp., ²Tokyo Tech and ³Univ. of Tokyo (Japan)

14:15 C-8-4

Experimental Study on Hall Factor in Ultrathin-Body SOI n-MOSFETs

S. Kobayashi¹, M. Saitoh¹, Y. Nakabayashi¹, T. Ishihara¹, T. Numata¹ and K. Uchida², ¹Toshiba Corp. and ²Tokyo Tech (Japan)

Area 4: Advanced Memory Technology

G-6: FeRAM/MRAM**9:00-10:40 4F Hirose <Nishi>**

Chair: T. Eshita (Fujitsu Microelectronics Ltd.)
H. Hada (NEC Corp.)

9:00 G-6-1 (Invited)

Overview and Future Challenges of High Density FeRAM

I. Kunishima, Y. Shimojo, A. Konno, J. Nishimura, T. Okada, H. Nakaki, Y. Yamada, S. Kitazaki, H. Furuhashi, Y. Minami, H. Kanaya, S. Shuto, K. Tomioka, K. Natori, K. Yamakawa, S. Shiratake, D. Takashima, T. Hamamoto, Y. Watanabe and A. Nitayama, *Toshiba Corp. (Japan)*

9:30 G-6-2

A Negative Word-line Voltage Step-Down Erase Pulse Scheme with $\Delta V_{TH} = \frac{1}{6} \Delta V_{ERASE}$ for Enterprise SSD Application Ferroelectric(Fe)-NAND Flash Memories
R. Yajima¹, T. Hatanaka¹, M. Takahashi², S. Sakai² and K. Takeuchi¹, ¹Univ. of Tokyo and ²AIST (Japan)

9:50 G-6-3 (Invited)

Advancements and Future Challenges of Spin Torque Transfer MRAM

H. Yoda¹, T. Kishi¹, M. Yoshikawa¹, T. Nagase¹, K. Nishiyama¹, E. Kitagawa¹, T. Daibou¹, M. Amano¹, N. Shimomura¹, S. Takahashi¹, T. Kai¹, M. Nakayama¹, H. Aikawa¹, S. Ikegawa¹, M. Nagamine¹, J. Ozeki¹, S. Yuasa², M. Oogane³, S. Mizukami³, Y. Ando³, Y. Suzuki⁴, Y. Nakatani⁵, T. Miyazaki³ and K. Ando², ¹Toshiba Corp., ²AIST, ³Tohoku Univ., ⁴Osaka Univ. and ⁵Univ. of Electro-communications (Japan)

10:20 G-6-4

Effect of Self-heating on TDDDB in Ultra-thin MgO Magnetic Tunnel Junctions for Spin MRAM

K. Hosotani, M. Nagamine, T. Ueda, H. Aikawa, S. Ikegami, Y. Asao, H. Yoda and A. Nitayama, *Toshiba Corp. (Japan)*

10:40-10:45 Break

Area 4: Advanced Memory Technology

G-7: ReRAM**10:45-12:15 4F Hirose <Nishi>**

Chair: K. Ishihara (Sharp Corp.)
M. J. Tsai (Industrial Tech. Res. Inst.)

10:45 G-7-1 (Invited)

Switching Mechanism of TaOx ReRAM

Z. Wei, Y. Kanzawa, K. Arita, Y. Katoh, S. Muraoka, S. Mitani, S. Fujii, K. Katayama, T. Ninomiya and T. Takagi, *Panasonic Corp. (Japan)*

11:15 G-7-2

Physical model for reset state of Ta₂O₅/TiO₂ stacked ReRAM

Y. Sakotsubo, M. Terai, S. Kotsuji, T. Sakamoto and H. Hada, *NEC Corp. (Japan)*

11:35 G-7-3

High-Speed Multilevel Resistive RAM using RTO WO_x

W. C. Chien^{1,2}, Y. C. Chen¹, E. K. Lai^{1,3}, Y. Y. Lin¹, K. P. Chang¹, Y. D. Yao², P. Lin², S. F. Horng³, J. Gong³, S. C. Tsai¹, C. H. Lee¹, S. H. Hsieh¹, C. F. Chen¹, Y. H. Shih¹, K. Y. Hsieh¹, R. Liu¹ and C. Y. Lu¹, ¹*Macronix Int'l Co., Ltd.*, ²*National Chiao Tung Univ.* and ³*National Tsing Hua Univ. (Taiwan)*

11:55 G-7-4

Impact of Oxygen Vacancy on Interfacial Band Diagram Ti/Pr_{1-x}Ca_xMnO₃ Resistive Switching Junctions

S. Asanuma¹, H. Yamada¹, H. Akoh^{1,2} and A. Sawa¹, ¹*AIST* and ²*JST (Japan)*

Area 5: Advanced Circuits and Systems

D-6: Image Sensing Devices**9:00-10:30 3F Sakura**

Chair: S. Kawahito (Shizuoka Univ.)

T. Hamasaki (Texas Instruments Japan Ltd.)

9:00 D-6-1 (Invited)

Recent Progress in High-Resolution and High-Speed CMOS Image Sensor Technology

I. Takayanagi and J. Nakamura, *Aptina Japan, LLC. (Japan)*

9:30 D-6-2

Pixel Scaling in CMOS Image Sensors with Lateral Overflow Integration Capacitor

Y. Tashiro¹, S. Sakai¹, S. Kawada¹, R. Kuroda¹, N. Akahane², K. Mizobuchi² and S. Sugawa¹, ¹*Tohoku Univ.* and ²*Texas Instruments Japan Ltd. (Japan)*

9:50 D-6-3

WRGB LOFIC CMOS Image Sensor with Color-Independent Exposure and Widely-Spectral High Sensitivity

S. Kawada, S. Sakai, Y. Tashiro and S. Sugawa, *Tohoku Univ. (Japan)*

10:10 D-6-4

Current-Mode Multiple-Resolution Edge-Filtering CMOS Image Sensor Employing Self-Similitude Processing

N. Takahashi and T. Shibata, *Univ. of Tokyo (Japan)*

10:30-10:45 Break

Area 5: Advanced Circuits and Systems

D-7: Physical Subjects for Low-power Circuit/Device Design**10:45-12:05 3F Sakura**

Chair: T. Matsuoka (Osaka Univ.)

T. Koide (Hiroshima Univ.)

10:45 D-7-1

A Reference CMOS Circuit Structure for Evaluation of Dynamic Voltage Variation in Power Delivery Networks

T. Matsuno¹, D. Kosaka¹ and M. Nagata^{1,2}, ¹*Kobe Univ.* and ²*CREST-JST (Japan)*

11:05 D-7-2

Substrate Noise Analysis of Digital Circuits to Optimize Substrate-Contact Space

S. Komatsu¹, M. Yamaoka¹, Y. Kanno¹, Y. Yasu², K. Ishibashi² and K. Osada¹, ¹*Hitachi, Ltd.* and ²*Renesas Tech. Corp. (Japan)*

11:25 D-7-3

Within-Die/Wafer Variation Analysis of Basic CMOS Circuits based on Surface-Potential-Model HiSIM2

K. Johguchi, A. Kaya, S. Izumi, H. J. Mattausch, T. Koide and N. Sadachika, *Hiroshima Univ. (Japan)*

11:45 D-7-4

Random Telegraph Signal and Flicker Noise In CMOS Image Sensor using Column Source Follower Readout Circuits

T. Kohara¹, W. Lee¹, K. Mizobuchi² and S. Sugawa¹,
¹Tohoku Univ. and ²Texas Instruments Japan Ltd. (Japan)

Area 6: Compound Semiconductor Circuits, Electron Devices and Device Physics

G-8: GaN Processing and Interface Technologies

13:15-15:15 4F Hirose <Nishi>

Chair: A. Nakagawa (New Japan Radio Co., Ltd.)
S. Kuroda (Eudyna Devices Inc.)

13:15 G-8-1 (Invited)

Advances In High Power Density GaN Transistors
Y. F. Wu, *Transphorm Inc. (USA)*

13:45 G-8-2

Chemical and Electronic Properties of ALD-Al₂O₃/AlGaN Interfaces

Y. Hori¹, C. Mizue¹, K. Ooyama¹, M. Miczek² and
T. Hashizume¹, ¹Hokkaido Univ. and ²Silesian Univ. of
Tech. (Japan)

14:00 G-8-3

Metal-Gate/High-Permittivity Dielectric Stack on Gallium Nitride formed by Silane Surface Passivation and Metal-Organic Chemical Vapor Deposition

X. Liu, H. C. Chin, L. S. Tan and Y. C. Yeo, *National Univ. of Singapore (Singapore)*

14:15 G-8-4

Electrical Properties of Metal-Insulator-Semiconductor Capacitors on Freestanding GaN Substrate

E. Kim, N. Soejima, Y. Watanabe, M. Ishiko and T. Kachi,
Toyota Central R&D Labs., Inc. (Japan)

14:30 G-8-5

MIS Diode Characterization on n-GaN by C-V

Measurement at 150 °C

C. Y. Hu, H. Nokubo, M. Okada, J. P. Ao and Y. Ohno,
Univ. of Tokushima (Japan)

14:45 G-8-6

Low Resistivity V/Al/Mo/Au Ohmic Contacts on AlGaN/GaN Annealed at Low Temperatures

N. Yafune^{1,3}, M. Nagamori², F. Watanabe², K. Sakuno¹ and
M. Kuzuhara², ¹Sharp Corp., ²Univ. of Fukui and ³JRCM
(Japan)

15:00 G-8-7

Electrochemical Oxidation of GaN for Surface Control of GaN-based Device Structures

N. Harada, N. Shiozaki, E. Ogawa and T. Hashizume,
Hokkaido Univ. (Japan)

Area 7: Photonic Devices and Device Physics

I-6: Quantum Dot Devices

9:00-10:30 6F Kaede

Chair: O. Wada (Kobe Univ.)
M. Sugawara (Fujitsu Labs. Ltd.)

9:00 I-6-1 (Invited)

Quantum Dot Lasers. Commercial Challenges and Opportunities

A. Kovsh, *Innolume GmbH (Germany)*

9:30 I-6-2

Influence of Cavity Mode Emission on Single Photon Generation in Quantum-Dot-Cavity Systems

T. Tawara¹, H. Kamada¹, S. Hughes², H. Okamoto¹,
M. Notomi¹ and T. Sogawa¹, ¹NTT Corp. and ²Queen's
Univ. (Japan)

9:45 I-6-3

Optical Mode-selection of Quantum Dot Frequency Comb Laser for 1- μ m Waveband Optical Communications

N. Yamamoto¹, K. Akahane¹, T. Kawanishi¹, R. Katouf¹
and H. Sotobayashi^{1,2}, ¹NICT and ²Aoyama Gakuin Univ.

*(Japan)***10:00 I-6-4**

Quantum Dots in a Vertical Cavity for All-Optical Switching Devices

C. Y. Jin¹, O. Kojima¹, T. Kita¹, O. Wada¹, M. Hopkinson² and K. Akahane³, ¹*Kobe Univ.*, ²*Univ. of Sheffield* and ³*NICT (Japan)***10:15 I-6-5**

A GaAs/AlAs Multilayer Cavity with InAs Quantum Dots Embedded in Strain-relaxed Barriers for Planar-type Optical Kerr Gate Switches

T. Takahashi, T. Mukai, K. Morita, T. Kitada and T. Isu, *Univ. of Tokushima (Japan)***10:30-10:45 Break****Area 7: Photonic Devices and Device Physics****I-7: Photo Diodes****10:45-12:15 6F Kaede**Chair: R. Akimoto (AIST)
M. Ezaki (Toshiba Corp.)**10:45 I-7-1**

A 5 Gb/s CMOS Photodiode with High Responsivity of 2.49 A/W

G. Y. Chen, F. P. Chou, W. K. Huang and Y. M. Hsin, *National Central Univ. (Taiwan)***11:00 I-7-2**

A High-responsivity of 4.1 A/W Si PD with BJT Amplifier in Standard CMOS Process

F. P. Chou, G. Y. Chen and Y. M. Hsin, *National Central Univ. (Taiwan)***11:15 I-7-3**

Thermal Stability of Germanium Quantum Dots Phototransistors for Near Ultra-violet Applications

I. H. Chen, S. S. Tseng and P. W. Li, *National Central Univ. (Taiwan)***11:30 I-7-4**

Color Selective Design for Quantum Dot Infrared Photodetectors

J. H. Lee¹, Y. T. Chang¹, S. Y. Lin² and S. C. Lee¹, ¹*National Taiwan Univ.* and ²*Academia Sinica (Taiwan)***11:45 I-7-5**

Low-noise p-GaN/i-ZnO/n-ZnO:Al Ultraviolet Photodetectors using Vapor Cooling Condensation Technique

C. H. Chen, T. H. Lee, B. J. Li and C. T. Lee, *National Cheng Kung Univ. (Taiwan)***12:00 I-7-6**

Accurate Prediction of Photocurrent Response for High Performance Optoelectric Circuit Simulation

Y. Shintaku, S. Kusu, T. Miyoshi, M. Miyake, N. Sadachika, K. Konno, G. Suzuki and M. Miura-Mattausch, *Hiroshima Univ. (Japan)***12:15-13:15 Lunch****Area 7: Photonic Devices and Device Physics****I-8: LED II****13:15-15:15 6F Kaede**Chair: M. Ezaki (Toshiba Corp.)
H. Isshiki (The Univ. of Electro-Communications)**13:15 I-8-1**

High Efficiency Blue Light Emitting Diodes with Maskless Defects Passivation layer

C. H. Wang¹, M. H. Lo¹, P. M. Tu¹, C. W. Hung¹, S. C. Hsu², Y. J. Cheng^{1,2}, H. C. Kuo¹, H. W. Zan¹, S. C. Wang¹, C. Y. Chang¹ and C. M. Liu³, ¹*National Chiao Tung Univ.*, ²*Academia Sinica* and ³*Sino-American Silicon Products Inc. (Taiwan)***13:30 I-8-2**

Enhanced Luminescence Efficiency of InGaN/GaN Multiple Quantum Wells by A Strain Relief Layer and Proper Si Doping

P. C. Tsai, Y. K. Su and C. Y. Huang, *National Cheng Kung Univ. (Taiwan)*

14:00 I-8-4

Light Extraction Enhancement of Wafer-Bonded AlGaInP-based Light-Emitting Diodes with Micro- and Nano-Scale Patterned Surface

B. S. Cheng, Y. C. Lee, H. C. Kuo, T. C. Lu and S. C. Wang, *National Chiao Tung Univ. (Taiwan)*

14:15 I-8-5

Novel Stacked Polychromatic Light-emitting Diodes

K. N. Hui^{1,2}, X. H. Wang², Z. L. Li², P. T. Lai² and H. W. Choi², *¹State Univ. of New Jersey and ²Univ of Hong Kong (USA)*

14:30 I-8-6

Investigation of ZnO P-I-N Light-emitting Diodes

Y. H. Lin, L. W. Lai, L. R. Lou and C. T. Lee, *National Cheng Kung Univ. (Taiwan)*

14:45 I-8-7

Light-emitting Diode based on ZnO by Plasma Enhanced MOCVD Employing Microwave Exited Plasma

H. Asahara^{1,2}, D. Takamizu², A. Inokuchi^{1,3}, M. Hirayama¹, A. Teramoto¹ and T. Ohmi¹, *¹Tohoku Univ., ²ROHM Co., Ltd. and ³Tokyo Electron Ltd. (Japan)*

15:00 I-8-8

The Characteristics of Cavity Mode in Trilayer Dielectric/Metal/Dielectric Plasmonic Thermal Emitter

Y. W. Jiang, D. C. Tzuang, Y. T. Wu, M. W. Tsai and S. C. Lee, *National Taiwan Univ. (Taiwan)*

15:15-15:30 Break

Area 7: Photonic Devices and Device Physics

I-9: Nonlinear Optical Devices

15:30-16:45 6F Kaede

Chair: R. Akimoto (AIST)
O. Wada (Kobe Univ.)

15:30 I-9-1

Novel Second Harmonic Generation Optical Devices by using Nano-Domain Engineering

M. Minakata¹, H. Awano¹, M. Ohotsuka¹, F. Iwata¹ and T. Taniuchi², *¹Shizuoka Univ. and ²Tohoku Univ. (Japan)*

15:45 I-9-2

Strong Sum Frequency Generation in a GaAs/AlAs Coupled Multilayer Cavity Grown on a (113)B-oriented GaAs Substrate

F. Tanaka, T. Takahashi, K. Morita, T. Kitada and T. Isu, *Univ. of Tokushima (Japan)*

16:00 I-9-3

ZnO Channel Waveguides for Nonlinear Optic Applications

Y. Morales, T. Kita, A. Tsukazaki, M. Kawasaki, Y. Ohtera and H. Yamada, *Tohoku Univ. (Japan)*

16:15 I-9-4

Evidence of Carrier Accumulation Effects on the Response Enhancement in Thin-Film Electrochromic Devices

H. Yoshimura¹, Y. Tsuchiya², H. Mizuta² and N. Koshida¹, *¹Tokyo Univ. of Agri. and Tech. and ²Southampton Univ. (Japan)*

16:30 I-9-5

Accurate Measurement of Nonlinear Optical Coefficients of Gallium Nitride

M. Abe¹, H. Sato², J. Suda³, M. Yoshimura⁴, Y. Kitaoka⁴, Y. Mori⁴, I. Shoji² and T. Kondo¹, *¹Univ. of Tokyo, ²Chuo Univ., ³Kyoto Univ. and ⁴Osaka Univ. (Japan)*

Area 9: Physics and Applications of Novel Functional Materials and Devices

G-9: Physics and Applications of Graphene

15:30-17:15 4F Hirose <Nishi>

Chair: T. Fujisawa (Tokyo Tech)
Y. Takahashi (Hokkaido Univ.)

15:30 G-9-1 (Invited)

AFM Nanolithography of Grapheme

L. Rokhinson, L. Weng, L. Zhang and Y. P. Chen, *Purdue Univ. (USA)***16:00 G-9-2**

Graphene Channel Field-Effect Transistors with Schottky Tunneling Source and Drain

J. Zhu and J. C. S. Woo, *UCLA (USA)***16:15 G-9-3**

Computational Study of Edge Roughness Effect on the Device Performance of Graphene Nanoribbon Resonant Tunneling Diodes

S. B. Khalid, K. T. Lam and G. Liang, *National Univ. of Singapore (Singapore)***16:30 G-9-4**

Performance Evaluation of Graphene Nanoribbon Tunneling Field Effect Transistors

K. T. Lam¹, S. B. Kumar¹, S. K. Chin², D. W. Seah¹ and G. Liang^{1,2}, *¹National Univ. of Singapore and ²Inst. of High Performance Computing (Singapore)***16:45 G-9-5**

Self-Excitation of Terahertz Plasma Oscillations in Optically Pumped Graphene

V. Ryzhii^{1,3}, M. Ryzhii^{1,3}, A. Satou^{1,3}, E. M. Amine² and T. Otsuji^{1,2,3}, *¹Univ. of Aizu, ²Tohoku Univ. and ³CREST-JST (Japan)***Area 10: Organic Materials Science, Device Physics, and Applications****F-6: Organic Transistor****9:00-10:30 4F Hirose <Higashi>**Chair: H. Usui (Tokyo Univ. of Agriculture and Tech.)
K. Fujita (Kyushu Univ.)**9:00 F-6-1 (Invited)**

Roll-to-Roll Printable 13.56 MHz Operated RFID Tags on

Plastic Foils

M. Jung^{1,2}, J. Kim², N. Lim², J. Kim³, H. Kang², C. Lim^{1,2}, K. Lee¹, A. Leonard³, J. M. Tour³ and G. Cho^{1,2}, *¹Sunchon National Univ., ²Paru Co., and ³Rice Univ. (Korea)***9:30 F-6-2**

Fabrication of Flexible EPD Panel using the Solution Processable OTFT

M. W. Lee, M. Y. Lee, J. C. Choi, J. S. Park and C. K. Song, *Dong-A Univ. (Korea)***9:45 F-6-3**

Current Reduction Mechanism of Organic Thin Film Transistor

Y. Ishikawa, Y. Wada, K. Tsutsui and T. Toyabe, *Toyo Univ. (Japan)***10:00 F-6-4**

Characteristics of Top-Gate Type Ambipolar Organic Field-Effect Transistors using Polyfluorene Derivatives

H. Kajii, K. Koiwai, Y. Hirose and Y. Ohmori, *Osaka Univ. (Japan)***10:15 F-6-5**

Polymer Field Effect Transistors of Polyfluorene Prepared by Evaporative Spray Deposition using Ultradilute Solution

K. Sagane, M. Shakutsui and K. Fujita, *Kyushu Univ. (Japan)***10:30-10:45 Break****Area 10: Organic Materials Science, Device Physics, and Applications****F-7: Organic Electronics & Transistor****10:45-12:00 4F Hirose <Higashi>**Chair: Y. Majima (Tokyo Inst. of Tech.)
S. Aratani (Hitachi, Ltd.)**10:45 F-7-1**

Coulomb Blockade Electron Shuttle with Chemisorbed Au

Nanodot

Y. Azuma^{1,2}, N. Kobayashi^{1,2}, M. Kanehara^{2,3}, T. Teranishi^{2,3},
S. Chorley⁴, J. Prance⁴, C. G. Smith⁴ and Y. Majima^{1,2},
¹*Tokyo Tech*, ²*CREST-JST*, ³*Univ. of Tsukuba* and ⁴*Univ. of
Cambridge (Japan)*

11:00 F-7-2

Molecular relaxation dynamics in molecular tunnel
junctions

N. Clement¹, S. Pleutin¹, D. Guerin¹, D. Cahen² and
D. Vuillaume¹, ¹*CNRS IEMN* and ²*Weizmann Inst. Of Sci.
(France)*

11:15 F-7-3

Study of Injected Carrier Energetics in Organic-field-
effect-transistor by Charge Modulation Spectroscopy
R. Miyazawa, D. Taguchi, M. Weis, T. Manaka and
M. Iwamoto, *Tokyo Tech (Japan)*

11:30 F-7-4

Effect of SAM Modification on ITO Surface for UV-
Assisted Vapor Deposition of Carbazole Thin Films
Y. Umemoto¹, S. H. Kim¹, R. C. Advincula², K. Tanaka¹
and H. Usui¹, ¹*Tokyo Univ. Agri. and Tech.* and ²*Univ. of
Houston (Japan)*

11:45 F-7-5

Interface Trap Reduction based on Poly(styrene-co-methyl
methacrylate)/Hafnium Oxide Bilayer Dielectrics for Low
Voltage OTFT
T. H. Huang¹, Z. Pei¹, W. K. Lin¹, S. T. Chang¹ and
K. C. Liu², ¹*National Chung Hsing Univ.* and ²*Chang Gung
Univ. (Taiwan)*

12:00-13:15 Lunch

**Area 10: Organic Materials Science, Device Physics,
and Applications**

F-8: Organic Electronics & Photonics**13:15-15:15 4F Hirose <Higashi>**

Chair: H. Kajii (Osaka Univ.)

S. Aratani (Hitachi, Ltd.)

13:15 F-8-1

Liquid Phase Crystal Growth of an Alternating Co-
Oligomer Composed of Thiophene and Phenylene Rings
T. Yamao¹, Y. Nishimoto¹, H. Akagami¹, T. Katagiri^{1,2}
and S. Hotta¹, ¹*Kyoto Inst. of Tech.* and ²*Sumitomo Seika
Chemicals Co., Ltd. (Japan)*

13:30 F-8-2

Preparation of Electrospun Polymer Fibers using a Copper
Wire Electrode in a Capillary Tube
K. Shinbo, S. Onozuka, R. Hoshino, Y. Mizuno,
Y. Ohdaira, A. Baba, K. Kato and F. Kaneko, *Niigata Univ.
(Japan)*

13:45 F-8-3

Change and Field Modulation Spectroscopy on Pentacene
Thin-Film Devices
S. Haas¹, H. Matsui^{1,2}, T. Yamada¹ and T. Hasegawa¹, ¹*AIST
and* ²*Univ. of Tokyo (Japan)*

14:00 F-8-4

Surface Plasmon Resonance Sensor using Grating
Coupling Multimode Excitations
R. Yamazaki¹, A. Baba¹, K. Shinbo¹, K. Kato¹, F. Kaneko¹,
S. Samanta² and J. Locklin², ¹*Niigata Univ.* and ²*Univ. of
Georgia (Japan)*

14:15 F-8-5

Oriented Growth of Sexithiophene Induced by Edge of
Metal Electrodes
S. Ikeda¹, Y. Wada² and K. Saiki³, ¹*Tohoku Univ.*, ²*Toyo
Univ.* and ³*Univ. of Tokyo (Japan)*

14:30 F-8-6

Refractive Index Control of Organic-Inorganic Hybrid
Film Consisting of Ge-Ge Chain
A. Watanabe, S. Tadenuma, R. Fujii and T. Miyashita,
Tohoku Univ. (Japan)

14:45 F-8-7

Development of Computational Analysis Method for Carrier Transport Pathway in Light-Emitting Polymers
I. Yamashita¹, K. Serizawa¹, H. Onuma¹, A. Suzuki¹, H. Tsuboi¹, N. Hatakeyama¹, A. Endou¹, H. Takaba¹, M. Kubo¹, M. C. Williams^{1,2} and A. Miyamoto¹, ¹*Tohoku univ.* and ²*Univ. of Utah (Japan)*

15:00 F-8-8

High Efficiency Top-Emission Organic Light-Emitting Diodes
Y. N. Lai¹, W. C. Hsu¹, C. S. Lee², C. W. Wang³, T. Y. Lu¹, C. S. Ho¹ and W. F. Lai¹, ¹*National Cheng Kung Univ.*, ²*Feng Chia Univ.* and ³*National Chung Cheng Univ. (Taiwan)*

15:15-15:30 Break

Area 10: Organic Materials Science, Device Physics, and Applications

F-9: Organic Transistor & Light Emitting Diode**15:30-16:45 4F Hirose <Higashi>**

Chair: K. Kato (Niigata Univ.)
H. Kajii (Osaka Univ.)

15:30 F-9-1 (Invited)

Organic TFT-driven Flexible Displays
K. Nomoto, *Sony Corp. (Japan)*

16:00 F-9-2

Studies on Thermally Activated Delayed Fluorescence: Novel Exciton Formation Mechanism for OLEDs
A. Endo¹, M. Ogasawara¹, A. Takahashi², D. Yokoyama¹, Y. Kato¹ and C. Adachi¹, ¹*Kyushu Univ.* and ²*Sogo Pharmaceutical Co., Ltd. (Japan)*

16:15 F-9-3

Dual Electroluminescence from Hybrid p-n Junction LEDs Composed of Oxide and Organic Semiconductors
J. H. Na, M. Kitamura, M. Arita and Y. Arakawa, *Univ. of Tokyo (Japan)*

16:30 F-9-4

Color-Tunable Polymer Light-Emitting Diodes with Conjugated Polymer Homojunctions
C. Y. Huang, Y. K. Su, C. Y. Cheng, M. V. M. Rao, Y. C. Chen, T. S. Huang, T. C. Wen and T. F. Guo, *National Cheng Kung Univ. (Taiwan)*

Area 11: Micro/Nano Electromechanical and Bio-Systems (Devices)

J-6: NEMS and MEMS**9:00-10:15 6F Hagi**

Chair: M. Sasaki (Toyota Technological Inst.)
K. Ajito (NTT Corp.)

9:00 J-6-1

Fabrication Technique of Einzel Lens Array with RIE Process
E. Tomono, H. Miyashita, T. Ono and M. Esashi, *Tohoku univ. (Japan)*

9:15 J-6-2

Novel Design for Optical Scanner with Piezoelectric Film by MOCVD
H. Matsuo¹, Y. Kawai² and M. Esashi², ¹*The Nippon Signal Co., Ltd.* and ²*Tohoku Univ. (Japan)*

9:30 J-6-3

Nonlinear Spring of Thin Film Torsion Bar with Tension for Micromirror
M. Sasaki¹, S. Kumagai¹, M. Fujishima², K. Hane² and H. Miura², ¹*Toyota Technological Inst.* and ²*Tohoku Univ. (Japan)*

9:45 J-6-4

PZT Acoustic Energy Harvester Proposed for use in MEMS/IC Integrated Systems
H. Ichioka, S. Kimura, T. Sugou and Y. Nishioka, *Nihon Univ. (Japan)*

10:00 J-6-5

Design and Analysis of an In-Plane Resonant Nano-Electro-Mechanical Sensor for Sub-Attogram-Level Molecular Mass-Detection

F. A. Hassani¹, C. Cobianu², S. Armini³, V. Petrescu⁴, P. Merken⁴, D. Tsamados⁵, A. M. Ionescu⁵, Y. Tsuchiya¹ and H. Mizuta¹, ¹Univ. of Southampton, ²Honywell Romania SRL, ³IMEC, ⁴Stichting IMEC-NL and ⁵EPFL (UK)

10:15-10:45 Break

Area 11: Micro/Nano Electromechanical and Bio-Systems (Devices)

J-7: Bio Sensors and Bio Chips

10:45-12:15 6F Hagi

Chair: I. Yamashita (NAIST)

K. Sawada (Toyohashi Univ. of Tech.)

10:45 J-7-1 (Invited)

Ultrasonic standing wave manipulation of cells in microfluidic systems

T. Laurell, *Lund Univ. (Sweden)*

11:15 J-7-2

Detection of 28nm Diameter Superparamagnetic Beads by Magnetically- Induced Self-assembly with Micrometer-sized Magnetic Beads: A New Protocol for Magnetically-labeled Biosensing

Y. Morimoto, S. Sakamoto, H. Handa and A. Sandhu, *Tokyo Tech (Japan)*

11:30 J-7-3

Biohybird Chemical Sensor Composed of Microfluidic Device and Cell

N. Misawa, H. Mitsuno, R. Kanzaki and S. Takeuchi, *Univ. of Tokyo (Japan)*

11:45 J-7-4

A Multimodal CMOS Sensor Device with an On-Chip Mounted LED and Electrodes for Imaging of Fluorescence

and Electrical Potential in a Mouse Deep Brain

A. Tagawa¹, H. Minami¹, M. Mitani¹, T. Noda^{1,2}, K. Sasagawa^{1,2}, T. Tokuda^{1,2}, H. Tamura^{1,2}, Y. Hatanaka^{1,2}, Y. Ishikawa^{1,2}, S. Shiosaka^{1,2} and J. Ohta^{1,2}, ¹NAIST and ²CREST-JST (Japan)

12:00 J-7-5

Light Guide Array Structure for Spatial Resolution Improvement of Implantable Image Sensor

K. Sasagawa^{1,2}, M. Mitani¹, T. Noda^{1,2}, T. Tokuda^{1,2}, S. Shiosaka^{1,2} and J. Ohta^{1,2}, ¹NAIST and ²CREST-JST (Japan)

12:15-13:15 Lunch

Area 11: Micro/Nano Electromechanical and Bio-Systems (Devices)

J-8: Nanotechnology for Bio Sensing

13:15-15:15 6F Hagi

Chair: J. Ohta (NAIST)

M. Niwano (Tohoku Univ.)

13:15 J-8-1 (Invited)

Bio-Transducers for Biomedical Applications

K. Mitsubayashi, *Tokyo Medical and Dental Univ. (Japan)*

13:45 J-8-2

Selective Detection of Antigen-Antibody Reaction using Si Ring Optical Resonators

S. Yamatogi, M. Fukuyama, H. Ding, M. Nishida, C. Kawamoto, Y. Amemiya, T. Ikeda, T. Noda, S. Kawamoto, K. Ono, A. Kuroda and S. Yokoyama, *Hiroshima Univ. (Japan)*

14:00 J-8-3

Proposed a Progressive Type pH and Optical Fused Image Sensor

H. Nakazawa¹, M. Ishida^{1,2} and K. Sawada^{1,2}, ¹Toyohashi Univ. of Tech. and ²CREST-JST (Japan)

14:15 J-8-4

A Real Time Monitoring System using a Multi-Modal Sensor with EC Sensor Areas and a Temperature Sensor Area for Cows' Health Control

M. Futagawa¹, T. Iwasaki¹, M. Ishida², H. Takao^{1,3}, M. Ishida^{1,3} and K. Sawada^{1,3}, ¹*Toyohashi Univ. of Tech.*, ²*NILGS* and ³*CREST-JST (Japan)*

14:30 J-8-5

Integrated Bio-Photosensor Array with CMOS Cascade Source-Drain Follower

H. Matsumoto¹, J. Tsukada¹, H. Ozawa¹, S. Uno¹, K. Nakazato¹, N. Terasaki², N. Yamamoto², T. Hiraga², M. Iwai³, M. Konno³, K. Ito³ and Y. Inoue³, ¹*Nagoya Univ.*, ²*AIST* and ³*Tokyo Univ. of Sci. (Japan)*

14:45 J-8-6

Effect of Nanogap Structure on Dynamics of Supported Lipid Bilayer

Y. Kashimura, K. Furukawa and K. Torimitsu, *NTT Basic Res. Labs. (Japan)*

15:00 J-8-7

Simultaneous Electrophysiological and Infrared Spectroscopic Studies of Lipid Bilayer Formation

A. Oshima, A. Hirano-Iwata, K. Onodera, T. Taira, Y. Kimura and M. Niwano, *Tohoku Univ. (Japan)*

15:15-15:30 Break

Area 11: Micro/Nano Electromechanical and Bio-Systems (Devices)

J-9: Bio Nano Process**15:30-17:00 6F Hagi**

Chair: H. Tabata (Univ. of Tokyo)
K. Ajito (NTT Corp.)

15:30 J-9-1 (Invited)

Soft Bio-materials in Solid State Devices
K. Shiba, *Japanese Foundation for Cancer Res. (Japan)*

16:00 J-9-2

Fabrication of Nano-Scaled Structures using Genetically Engineered Tobamoviruses

M. Kobayashi¹, K. Onodera¹, Y. Watanabe² and I. Yamashita^{1,3}, ¹*NAIST*, ²*Univ. of Tokyo* and ³*Panasonic Corp. (Japan)*

16:15 J-9-3

New Functional Device Characteristics with 2-Dimensional Array of Si Nanodisks Fabricated by Combination of Bio-Template and Ultimate Top-down Etching

M. Igarashi¹, C. H. Huang¹, M. Tomura¹, M. Takeguchi², S. Horita³, Y. Uraoka⁴, T. Fuyuki⁴, I. Yamashita^{4,5}, T. Morie⁶ and S. Samukawa¹, ¹*Tohoku Univ.*, ²*NIMS*, ³*JAIST*, ⁴*NAIST*, ⁵*Panasonic Corp.* and ⁶*Kyushu Inst. of Tech. (Japan)*

16:30 J-9-4

A New Structure of Nanodisk (Stacked Nanodisk) Fabricated by Bio-nano-process and Defect-free Neutral Beam Etching

C. H. Huang¹, M. Igarashi¹, M. Tomura¹, M. Takeguchi², S. Horita³, Y. Uraoka⁴, T. Fuyuki⁴, I. Yamashita^{4,5} and S. Samukawa¹, ¹*Tohoku Univ.*, ²*NIMS*, ³*JAIST*, ⁴*NAIST* and ⁵*Panasonic Corp. (Japan)*

16:45 J-9-5

Integration Module of Microcoil Magnetic Manipulation with High Sensitivity CMOS Photosensor Detection in Bio-Analyses

C. Y. Chen, C. Y. Huang, C. J. Lin and Y. C. King, *National Tsing Hua Univ. (Taiwan)*

Area 12: Spintronic Materials and Devices

K-6: Spintronics (I): Spintronic Materials & Devices**9:00-10:30 6F Aoi**

Chair: K. Ito (Hitachi, Ltd.)
Y. Ohno (Tohoku Univ.)

9:00 K-6-1

Electrical Excitation, Manipulation and Detection of Spin Waves in a Py Strip

L. Bai¹, M. Kohda^{1,2} and J. Nitta¹, ¹*Tohoku Univ. and*
²*PRESTO-JST (Japan)*

9:15 K-6-2

Magnetoresistance of Magnetostatically Coupled Multilayered Rings

T. Miyawaki¹, Y. Watanabe¹, M. Kohda^{1,2}, K. Saito¹, S. Mitani¹, K. Takanashi¹ and J. Nitta¹, ¹*Tohoku Univ. and*
²*PRESTO-JST (Japan)*

9:30 K-6-3

Electrical Control of the Magnetic Properties in (Ga,Mn)As Channel in Electric Double Layer Transistor

M. Endo¹, D. Chiba^{1,2}, H. Shimotani^{1,3}, F. Matsukura^{1,2}, Y. Iwasa^{1,3} and H. Ohno^{1,2}, ¹*Tohoku Univ.*, ²*ERATO-JST and*
³*CREST-JST (Japan)*

9:45 K-6-4

Spin Orbit Interaction in an In_{0.53}Ga_{0.47}As / In_{0.7}Ga_{0.3}As Shallow Two Dimensional Electron Gas for Electrical Spin Injection and Detection

M. Kohda^{1,2}, T. Shibata¹ and J. Nitta¹, ¹*Tohoku Univ. and*
²*PRESTO-JST (Japan)*

10:00 K-6-5

Optical Study on Fast Magnetization Dynamics in Perpendicularly Magnetized Pt/Co/Pt Trilayer Films

S. Mizukami, E. P. Sajitha, D. Watanabe, F. Wu, M. Oogane, H. Naganuma, Y. Ando and T. Miyazaki, *Tohoku Univ. (Japan)*

10:15 K-6-6

Fine-Grain Power-Gating Scheme of a CMOS/MTJ-Hybrid Bit-Serial Ternary Content-Addressable Memory

S. Matsunaga, A. Matsumoto, M. Natsui, T. Endoh, H. Ohno and T. Hanyu, *Tohoku Univ. (Japan)*

10:30-10:45 Break

Area 12: Spintronic Materials and Devices

K-7: Spintronics (II): Magnetic Tunnel Junction

10:45-12:15 6F Aoi

Chair: H. Kano (Sony Corp.)

M. Yamamoto (Hokkaido Univ.)

10:45 K-7-1

CoFeB/MgO/CoFeB Magnetic Tunnel Junctions with Low Resistance-Area Product and High Magnetoresistance

H. D. Gan¹, K. Mizunuma¹, S. Ikeda¹, H. Yamamoto¹, K. Miura^{1,2}, H. Hasegawa¹, J. Hayakawa², F. Matsukura¹ and H. Ohno¹, ¹*Tohoku Univ. and* ²*Hitachi, Ltd. (Japan)*

11:00 K-7-2

CoFeB Inserted Perpendicular Magnetic Tunnel Junctions with CoFe/Pd Multilayers for High Tunnel Magnetoresistance Ratio

K. Mizunuma¹, J. H. Park¹, S. Ikeda¹, H. Yamamoto^{1,2}, K. Miura^{1,2}, H. Gan¹, H. Hasegawa¹, J. Hayakawa², K. Ito², F. Matsukura¹ and H. Ohno¹, ¹*Tohoku Univ. and* ²*Hitachi, Ltd. (Japan)*

11:15 K-7-3

Perpendicular-MgO-MTJs with fcc(111)-oriented CoPt superlattices

K. Yakushiji, H. Kubota, A. Fukushima, T. Nagahama, S. Yuasa and K. Ando, *AIST (Japan)*

11:30 K-7-4

Annealing Temperature Dependence of Critical Current and Thermal Stability Factor in MgO-Barrier Magnetic Tunnel Junctions with CoFeB based Synthetic Ferrimagnetic Recording Layer

J. Hayakawa¹, H. Yamamoto^{1,2}, S. Ikeda², H. Hasegawa², M. Yamanouchi¹, K. Ito¹, H. Takahashi¹ and H. Ohno², ¹*Hitachi, Ltd. and* ²*Tohoku Univ. (Japan)*

11:45 K-7-5

Spin-transfer Switching and Enhanced Thermal Stability of Magnetic Tunnel Junctions with CoFeB/Ru/CoFeB

Friday, October 9

Ferromagnetically-coupled Free Layer
H. Kubota, S. Yakata, A. Fukushima, K. Yakushiji, T. Seki,
S. Yuasa and K. Ando, *AIST (Japan)*

12:00 K-7-6

The Performance of Magnetic Tunnel Junction Integrated
on the Back-end Metal Line of CMOS Circuits

T. Endoh¹, F. Iga¹, S. Ikeda², K. Miura^{2,3}, J. Hayakawa³,
M. Kamiyanagi¹, H. Hasegawa², T. Hanyu⁴ and H. Ohno²,
¹*Tohoku Univ. and* ²*Hitachi, Ltd. (Japan)*

12:15-13:15 lunch

Area 12: Spintronic Materials and Devices

**K-8: Spintronics (III): Special Session on Spin-related
Phenomena and Future Devices**

13:15-15:15 6F Aoi

Chair: S. Seo (Samsung Advanced Inst. of Tech.)
K. Ando (AIST)

13:15 K-8-1 (Invited)

High-speed Magnetic Memory based on Spin-Torque
Domain Wall Motion

N. Ishiwata¹, S. Fukami¹, T. Suzuki¹, K. Nagahara¹,
N. Ohshima¹, Y. Ozaki², S. Saito¹, R. Nebashi¹,
N. Sakimura¹, H. Honjo¹, K. Mori¹, C. Igarashi¹, S. Miura¹
and T. Sugibayashi¹, ¹*NEC Corp. and* ²*NEC Electronics
Corp. (Japan)*

13:45 K-8-2 (Invited)

MOS/MTJ-Hybrid Circuit with Nonvolatile Logic-in-
Memory Architecture

M. Natsui and T. Hanyu, *Tohoku Univ. (Japan)*

14:15 K-8-3 (Invited)

Spin transfer Oscillations in MgO based Magnetic Tunnel
Junctions

J. Grollier¹, B. Georges¹, A. Dussaux¹,
A. K. Khvalkovskiy¹, V. Cros¹, A. Fert¹, A. Fukushima²,
M. Konoto², H. Kubota², R. Matsumoto², K. Yakushiji²,
S. Yuasa² and K. Ando², ¹*Unité Mixte de Physique CNRS/*

Friday, October 9

Thales and ²*AIST (France)*

14:45 K-8-4 (Invited)

Spin Injection, Transport, and Control in Silicon
I. Appelbaum, *Univ. of Maryland (USA)*

15:15-15:30 Break

Area 12: Spintronic Materials and Devices

**K-9: Spintronics (IV): Special Session on Spin-related
Phenomena and Future Devices**

15:30-16:45 6F Aoi

Chair: M. Tanaka (Univ. of Tokyo)
K. Ando (AIST)

15:30 K-9-1 (Invited)

Silicon Spintronics

R. Jansen¹, *Univ. of Twente (Netherlands)*

16:00 K-9-2 (Invited)

Graphene Spintronics

M. Shiraishi^{1,2}, ¹*Osaka Univ. and* ²*PRESTO-JST (Japan)*

16:30 K-9-3

Spin-Transfer-Torque-Induced RF Oscillation for Fe/Cr/Fe
Layers with an Antiferromagnetic Coupling Field

T. Seki, H. Tomita, T. Yamane, M. Shiraishi, T. Shinjo and
Y. Suzuki, *Osaka Univ. (Japan)*

Area 13: Applications of Nanotubes and Nanowires

E-6: Semiconductor Nanowires (I)

9:00-10:30 3F Keyaki

Chair: J. Motohisa (Hokkaido Univ.)
S. Sato (Fujitsu Labs. Ltd.)

9:00 E-6-1 (Invited)

Metal-free Elementary Semiconductor Nanowires:
Synthesis and Device Applications

D. Whang and S. Hwang, *Sungkyunkwan Univ. (Korea)*

9:30 E-6-2

Theoretical Study on Thermoelectric Properties of Ge and Si Nanowires

W. Huang, C. S. Koong and G. Liang, *National Univ. of Singapore (Singapore)*

9:45 E-6-3

Shell Strain Effects on Valence Band Structure and Transport Property in Ge/Si_{1-x}Ge_x Core-Shell Nanowire

H. Xu, Y. Zhao, Y. He, C. Fan, G. Du, X. Liu, R. Han and J. Kang, *Peking Univ. (China)*

10:00 E-6-4

RF Characterization and Equivalent Circuit Modeling of Ge Nanowires

J. H. Ahn¹, M. G. Kang¹, B. S. Kim², J. Lee², D. H. Hwang¹, D. J. Lee¹, H. T. Kim¹, S. W. Hwang¹, D. Whang² and D. Ahn³, ¹*Korea Univ.*, ²*Sungkyunkwan Univ.* and ³*Univ. of Seoul (Korea)*

10:15 E-6-5

Device and Circuit Co-Design Strategy for Radio Frequency (RF) Applications based on Silicon Nanowire (SNW) MOSFETs

S. Cho, H. S. John, I. H. Park, J. H. Lee, H. Shin and B. G. Park, *Seoul National Univ. (Korea)*

10:30-10:45 Break

Area 13: Applications of Nanotubes and Nanowires

E-7: Si Nanowires**10:45-12:15 3F Keyaki**

Chair: K. Nishiguchi (NTT Basic Res. Labs.)
S. Akita (Osaka Prefecture Univ.)

10:45 E-7-1

Performance Improvement of Poly-Si Nanowire Transistors Featuring In-Situ Doped Source/Drain

W. C. Chen¹, H. C. Lin^{1,2}, Y. C. Chang¹ and T. Y. Huang¹, ¹*National Chiao Tung Univ.* and ²*National Nano Device Lab. (Taiwan)*

11:00 E-7-2

Series Resistance Behavior Extracted from Silicon Nanowire Transistors using the Y-function Technique

R. H. Baek¹, C. K. Baek², S. W. Jung³, Y. Y. Yeoh⁴, D. W. Kim⁴, J. S. Lee^{1,3}, D. M. Kim² and Y. H. Jeong^{1,3}, ¹*POSTECH*, ²*KIAS*, ³*NCNT* and ⁴*Samsung Electronics Corp. (Korea)*

11:15 E-7-3

A Theoretical Study of Electron-Modulated-Acoustic-Phonon Interactions in Silicon Nanowire MOSFETs

J. Hattori^{1,3}, S. Uno^{1,3}, N. Mori² and K. Nakazato^{1,3}, ¹*Nagoya Univ.*, ²*Osaka Univ.* and ³*SORST-JST (Japan)*

11:30 E-7-4

Impact of adequate selection of channel direction on (001) and (110) wafer orientation for strained nanowire transistors

A. Seike¹, H. Takai¹, I. Tsuchida¹, J. Masuda², D. Kosemura², A. Ogura², T. Watanabe¹ and I. Ohdomari¹, ¹*Waseda Univ.* and ²*Meiji Univ. (Japan)*

11:45 E-7-5

Systematic Study on Size Dependences of Transport Parameters for Ballistic Nanowire-FET with Effective Mass Approximation

Y. Lee¹, K. Kakushima¹, K. Shiraishi², K. Natori¹ and H. Iwai¹, ¹*Tokyo Tech* and ²*Univ. of Tsukuba (Japan)*

12:00 E-7-6

Silicon Nanowire Array Solar Cell Prepared by Metal-induced Electroless Etching with a Novel Processing Technology

H. D. Um¹, H. S. Seo¹, J. Y. Jung^{1,2}, S. W. Jee¹, S. A. Moiz¹ and J. H. Lee¹, ¹*Hanyang Univ.* and ²*ADP engineering Corp. (Korea)*

12:15-13:15 Lunch

Area 13: Applications of Nanotubes and Nanowires**E-8: Carbon Nanotubes and Graphene****13:15-15:15 3F Keyaki**

Chair: N. Aoki (Chiba Univ.)

Y. Ohno (Nagoya Univ.)

13:15 E-8-1

Photo-Response of Carbon Nanotube FETs with Thick Piezoelectric Gate Insulator

N. Nei¹, T. Ikeyama¹, T. Arie^{1,2} and S. Akita^{1,2}, ¹*Osaka Prefecture Univ. and* ²*CREST-JST (Japan)***13:30 E-8-2**

Electric Characterization of Carbon Nanotubes Grown at Low Temperature by Remote Plasma Chemical Vapor Deposition for LSI Interconnects

M. Iizuka¹, D. Yokoyama¹, K. Ishimaru¹, I. Yuitho¹, T. Takeuchi¹, S. Sato², M. Nihei², Y. Awano² and H. Kawarada¹, ¹*Waseda Univ. and* ²*MIRAI-Selete (Japan)***13:45 E-8-3**

Quantum Transport Calculations of Carbon Nanotube based Materials

K. Hirose¹, H. Ishii² and N. Kobayashi³, ¹*NEC Corp.,* ²*Univ. of Tokyo and* ³*Univ. of Tsukuba (Japan)***14:00 E-8-4**Fe/Ge Catalyzed Carbon Nanotube Growth on HfO₂ for Nano-Sensor ApplicationsT. Uchino¹, G. N. Ayre¹, D. C. Smith¹, J. L. Hutchison², C. H. de Groot¹ and P. Ashburn¹, ¹*Univ. of Southampton and* ²*Univ. of Oxford (UK)***14:15 E-8-5**

Multi-walled Carbon Nanotube-Dispersed Resin Films for Remote Strain Measurement

K. Ohsaki, H. Fuji, M. Ohnishi, K. Suzuki and H. Miura, *Tohoku Univ. (Japan)***14:30 E-8-6**Electrolyte-Gated Graphene Field-Effect Transistors
Y. Ohno, K. Maehashi, Y. Yamashiro and K. Matsumoto, *Osaka Univ. (Japan)***14:45 E-8-7**

Study of Metal/Graphene Contact with Different Electrode Geometry

K. Nagashio, T. Nishimura, K. Kita and A. Toriumi, *Univ. of Tokyo (Japan)***15:00 E-8-8**

Formation of Quantum Dots in Graphene with Constrictions

Y. Yamashiro, Y. Ohno, K. Maehashi, K. Inoue and K. Matsumoto, *Osaka Univ. (Japan)***15:15-15:30 Break****Area 13: Applications of Nanotubes and Nanowires****E-9: Semiconductor Nanowires (II)****15:30-17:15 3F Keyaki**

Chair: K. Ishibashi (RIKEN)

K. Maehashi (Osaka Univ.)

15:30 E-9-1 (Invited)

Identification of Single Boron Acceptors in Nanowire MOSFETs

Y. Ono¹, M.A.H. Khalafalla¹, S. Horiguchi², K. Nishiguchi¹ and A. Fujiwara¹, ¹*NTT Basic Research Lab. and* ²*Akita Univ. (Japan)***16:00 E-9-2**

An Analytical Compact Model of Ballistic Cylindrical Nanowire MOSFET

T. Numata¹, S. Uno¹, K. Nakazato¹, Y. Kamakura² and N. Mori², ¹*Nagoya Univ. and* ²*Osaka Univ. (Japan)***16:15 E-9-3**

Random Telegraph Signal and Low Frequency Noise in Silicon Charge-Sensitive Electrometers

Friday, October 9

N. Clement¹, K. Nishiguchi², A. Fujiwara² and
D. Vuillaume¹, ¹*IEMN and* ²*NTT Basic Res. Labs. (France)*

16:30 E-9-4

Single-electron Counting Statistics of Shot Noise in
Nanowire Si MOSFETs

K. Nishiguchi, Y. Ono and A. Fujiwara, *NTT Basic Res.
Labs. (Japan)*

Area 14: Power Electronics

H-6: Power Devices and Applications

9:00-10:30 6F Kiri

Chair: S. Matumoto (NTT Energy and Environment
Systems Labs.)
M. Mori (Hitachi, Ltd.)

9:00 H-6-1 (Invited)

Current Status and Technology Trends of Grid-Interactive
Inverter for PV Application
S. Nishi, *Sharp Corp. (Japan)*

9:30 H-6-2

Analysis of Hot Carrier Degradation for LDMOS under
Gate Pulse Stress

K. Furuya¹, T. Nitta², T. Katayama¹, K. Hatasako²,
T. Kuroi² and S. Maegawa², ¹*Renesas Semiconductor Eng.
Corp. and* ²*Renesas Tech. Corp. (Japan)*

9:45 H-6-3

Current Distribution Analysis of IGBT Cells
H. Long, M. R. Sweet, N. Luther-King and
E. M. S. Narayanan, *Univ. of Sheffield (UK)*

10:00 H-6-4

High-Temperature Diamond SBDs
H. Umezawa and S. Shikata, *AIST (Japan)*

10:15 H-6-5

Lateral Back-to-back-diode for Low-Capacitance
Transient Voltage Suppressor

Friday, October 9

C. C. Chen, S. H. Dai, J. J. Peng, C. J. Lin and Y. C. King,
Natioanl Tsing Hua Univ. (Taiwan)

10:30-10:45 Break

Area 14: Power Electronics

H-7: Materials for Power Devices

10:45-12:15 6F Kiri

Chair: M. Ishiko (Toyota Central R&D Labs., Inc.)
N. Iwamuro (Fuji Electric Device Tech. Co.,Ltd.)

10:45 H-7-1 (Invited)

Technology Trends of CZ-Silicon Substrates for Power
Devices

K. Kashima, *Covalent Materials Corp. (Japan)*

11:15 H-7-2 (Invited)

Silicon Carbide Wafer Technologies for Power Devices
S. Nishizawa, *AIST (Japan)*

11:45 H-7-3

Polytype-Stabilized Solution Growth of 3C-SiC
T. Ujihara, K. Seki, R. Tanaka and Y. Takeda, *Nagoya
Univ. (Japan)*

12:00 H-7-4

Large-scale Quantum Chemical Molecular Dynamics
Study on the SiC/SiO₂ Interface for SiC-based Devices
J. P. Yacapin, A. Suzuki, H. Tsuboi, N. Hatakeyama,
A. Endou, H. Takaba, M. Kubo and A. Miyamoto, *Tohoku
Univ. (Japan)*

12:15-13:15 Lunch

Area 14: Power Electronics

H-8: New Approaches to High-efficiency Solor Cells

13:15-15:00 6F Kiri

Chair: A. Masuda (AIST)
T. Minemoto (Ritsumeikan Univ.)

13:15 H-8-1 (Invited)

Towards a Better Understanding of Silicon Heterojunction

Solar Cells

S. De Wolf, J. Damon-Lacoste, L. Fesquet, G. Choong and C. Ballif, *EPFL (Switzerland)*

13:45 H-8-2

A new approach to increase efficiency of thin Si solar cells with scatterer

A. Yanai, R. Ichikawa, Y. Ishikawa and K. Wada, *Univ. of Tokyo (Japan)*

14:00 H-8-3

Epitaxial Growth and Photoresponse Properties of BaSi₂ Layers toward Si-based High-Efficiency Solar Cells

Y. Matsumoto¹, D. Tsukada¹, R. Sasaki¹, M. Takeishi¹, T. Saito¹ and T. Suemasu^{1,2}, *¹Univ. of Tsukuba and ²JST-PRESTO (Japan)*

14:15 H-8-4

Orientation Control of Large Grain Poly-Si on Glass by Interfacial Oxide Layer Controlled Al-Induced Crystallization

M. Kurosawa, N. Kawabata, T. Sadoh and M. Miyao, *Kyushu Univ. (Japan)*

14:30 H-8-5

III-V Coupled Quantum Well Solar Cells: Predicted Performances and Growth Challenges

M. Sugiyama, W. Yu, Y. Wang, R. Onitsuka, M. Deura and Y. Nakano, *Univ. of Tokyo (Japan)*

14:45 H-8-6

Development and Application of Multiscale Simulator for Dye-Sensitized Solar Cells

M. Onodera¹, K. Ogiya¹, A. Suzuki¹, H. Tsuboi¹, N. Hatakeyama¹, A. Endou¹, H. Takaba¹, M. Kubo¹, M. C. Williams² and A. Miyamoto¹, *¹Tohoku Univ. and ²Univ. of Utah (Japan)*

15:00-15:30 Break

Area 14: Power Electronics

H-9: Materials Science for Solar Cells

15:30-17:00 6F Kiri

Chair: N. Usami (Tohoku Univ.)

Stefaan De Wolf (Ecole Polytechnique Fédérale de Lausanne)

15:30 H-9-1 (Invited)

Defect Characterization of CIS-related Compound Solar Cells by Admittance Spectroscopy and DLTS

P. L. Zabierowski, *Warsaw Univ. of Tech. (Poland)*

16:00 H-9-2

Potential Profiles around Grain Boundary Studied by Photoassisted Kelvin Probe Force Microscopy on Cu(InGa)Se₂ Solar Cells

M. Takihara¹, T. Minemoto², Y. Wakisaka² and T. Takahashi¹, *¹Univ. of Tokyo and ²Ritsumeikan Univ. (Japan)*

16:15 H-9-3

Electronic Structure and Characteristics of Chemical Bonds in CuInSe₂, CuGaSe₂ and CuAlSe₂

T. Maeda and T. Wada, *Ryukoku Univ. (Japan)*

16:30 H-9-4

Lift-off Process for Flexible Cu(In,Ga)Se₂ Solar Cells

T. Minemoto, T. Anegawa, S. Osada and H. Takakura, *Ritsumeikan Univ. (Japan)*

16:45 H-9-5

A Computational Investigation of Relationship Between Shear Stress and Multicrystal Structure in Si

I. Takahashi, N. Usami, K. Kutsukake, K. Morishita and K. Nakajima, *Tohoku Univ. (Japan)*