

WORKSHOP SCIENTIFIC PROGRAM

Thursday, November 8, 2007

Session 0: Opening Session 09:50-10:00 (4F Conference Room)

09:50-10:00 **Introductory**
Junichi Murota,
Laboratory for Nanoelectronics and Spintronics, Research Institute of Electrical
Communication, Tohoku Univ., Japan

Session I: Invited Session (1) 10:00-12:00 (4F Conference Room)

- 10:00-10:30 I-01: **“Current Topics of SiGe Heterodevices”**, . . . 1
Erich Kasper,
Institut für Halbleitertechnik, Univ. Stuttgart, Germany
- 10:30-11:00 I-02: **“Base Doping and Dopant Profile Control of SiGe NPN and PNP
HBTs”**, . . . 5
Bernd Tillack, Bernd Heinemann, Dieter Knoll, Holger Rücker and Yuji Yamamoto,
IHP, Germany
- 11:00-11:30 I-03: **“N type dopant control in PNP HBT base layers”**, . . . 7
Roger Loo,
IMEC, Belgium
- 11:30-12:00 I-04: **“ArF-Excimer Laser Assisted Processing of Group IV Thin Film
Semiconductors: From Amorphous Hydrogenated Films to
Heteroepitaxial Alloys”**, . . . 9
Stefano Chiussi¹, F. Gontad¹, J.C. Conde¹, P. González¹, J. Serra¹, E. López², C. Serra²,
León¹,
¹Departamento de Física Aplicada, E.T.S.I. Industriales, ²C.A.C.T.I., Univ. Vigo, Spain.

12:00-13:30 **Lunch**

Session II: Invited Session (2) 13:30-15:00 (4F Conference Room)

- 13:30-14:00 I-05: **“Influence of SGOI Crystal Quality on Device Characteristics in
Strained Si MOSFETs”**, . . . 11
Naoharu Sugiyama, N. Sugiyama, T. Numata, T. Irisawa, N. Hirashita, and S. Takagi^{1,2}
MIRAI -ASET, ¹MIRAI-AIST, ²Univ. Tokyo, Japan
- 14:00-14:30 I-06: **“Si Bicrystal Structures for Multijunction Single-Electron Devices”**, . . . 13
Michiharu Tabe, R. Nuryadi, T. Ishino, Y. Kasai, D. Nagata, K. Ebisawa and H. Ikeda,
Research Institute of Electronics, Shizuoka Univ., Japan
- 14:30-15:00 I-07: **“Novel-Functional Single-Electron Device Using Nanodot Array
and Multiple Input Gates”**, . . . 15
Yasuo Takahashi¹, Takuya Kaizawa¹, Masashi Arita¹, Akira Fujiwara², Yukinori Ono² and
Hiroshi Inokawa³
¹Graduate School of Information Science and Technology, Hokkaido University, ²NTT
Basic Research Laboratories, NTT Corporation, ³Research Institute of Electronics,
Shizuoka University, Japan

15:00-15:30 **Break**

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Session III: Invited Session (3) 15:30-16:30 (4F Conference Room)

- 15:30-16:00 I-08: **“Instability of a SiGe/Si-Hetero-Interface in Hetero-Channel MOSFETs Due to Joule Heating”**, . . . 17
Toshiaki Tsuchiya,
Shimane Univ., Japan
- 16:00-16:30 I-09: **“On the control of GeO₂/Ge and metal/Ge interfaces”**, . . . 19
Akira Toriumi, Tomonori Nishimura and Koji Kita,
Department of Materials Engineering, Univ. Tokyo, Japan

Banquet : 18:00-20:00 (Hotel Bel Air 1F)

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Session IV: Short Oral Presentation 09:00-10:20 (4F Conference Room)

- 09:00-09:04 P-01: **“Selective Etching of SiGe by HCl by RPCVD”**, . . . 21
Yuji Yamamoto, Klaus Köpke, Rainer Kurps and Bernd Tillack,
IHP, Germany
- 09:04-09:08 P-02: **“Structural and Magnetic Properties of Ferromagnetic Silicide
Fe₃Si on Ge(111) Substrate”**, . . . 23
Yu-ichiro Ando¹, Koji Ueda¹, Mamoru Kumano¹, Taizoh Sadoh¹, Satoshi Yoshimura¹,
Yukio Nozaki¹, Kazumasa Narumi², Yoshihito Maeda³ and Masanobu Miyao¹,
¹Department of Electronics, Kyushu University, ²Advanced Science Research Cent.,
Japan Atomic Energy Agency, ³Department of Energy Science and Technology, Kyoto
University, Japan
- 09:08-09:12 P-03: **“Orientation Control of CoPt Thin Film by MgO Template”**, . . . 25
T. Matsumoto, M. Kurosawa, K. Ueda, T. Sadoh, and M. Miyao,
Department of Electronics, Kyushu Univ., Japan
- 09:12-09:16 P-04: **“Densely Assembled Quantum Wells on Ge/Si(001) Hetero-Epitaxial
Surface”**, . . . 27
Yasuyuki Oikawa and Hiroyuki Hirayama,
Department of Materials Science and Engineering, Tokyo Inst. Technol., Japan
- 09:16-09:20 P-05: **“Tensile Strained Ge Layers Grown on Compositionally Step-
Graded Ge_{1-x}Sn_x Buffer Layers”**, . . . 29
Yosuke Shimura, Shotaro Takeuchi, Akira Sakai, Osamu Nakatsuka, Masaki Ogawa and
Sigeaki Zaima,
Graduate School of Eng., Nagoya Univ., Japan
- 09:20-09:24 P-06: **“In-line Characterization of Heterojunction Bipolar Transistor Base
Layers by High-Resolution X-Ray Diffraction”**, . . . 31
N. D. Nguyen¹, R. Loo¹, A. Hikavy¹, B. Van Daele¹, P. Ryan², M. Wormington², J.
Hopkins²,
¹IMEC, Belgium, ²Bede plc, UK
- 09:24-09:28 P-07: **“High Rate Growth of Crystalline Ge Films at Low Temperatures
by Controlling 60MHz Inductively-Coupled Plasma of H₂- diluted GeH₄”**, . . . 33
S. Miyazaki, T. Sakata, K. Makihara, M. Ikeda,
Graduate School of Advanced Sciences of Matter, Hiroshima Univ., Japan
- 09:28-09:32 P-08: **“Charge Injection Characteristics of NiSi-Dots/Silicon-Quantum-
Dots Stacked Floating Gate in MOS Capacitors”**, . . . 35
M. Ikeda, R. Matsumoto, K. Shimanoe, T. Okada, K. Makihara, S. Higashi and S.
Miyazaki,
Graduate School of Advanced Sciences of Matter, Hiroshima Univ., Japan
- 09:32-09:36 P-09: **“Formation of PtSi Nanodot Induced by Remote Hydrogen Plasma”**, . . . 37
K. Shimanoe, K. Makihara, A. Ohta, M. Ikeda, S. Higashi and S. Miyazaki,
Graduate School of Advanced Sciences of Matter, Hiroshima Univ., Japan

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- 09:36-09:40 P-10: “**Infrared Study of Tris(dimethylamino)silane (TDMAS) Adsorption and Ozone Irradiation on Si(100) for Atomic Layer Deposition of SiO₂**”, . . . 39
Fumihiko Hirose¹, Yuta Kinoshita¹, Hironobu Miya², Kazuhiro Hirahara³, Yasuo Kimura⁴
and Michio Niwano⁴,
¹Graduate School of Sci. and Eng., Yamagata University, ²Hitachi Kokusai Electric Inc.,
³Shin-Etsu Chemical Co., Ltd., ⁴Res. Inst. Elec. Comm., Tohoku University, Japan
- 09:40-09:44 P-11: “**Infrared Study of Tetrakis(ethylmethylamino)hafnium (TEMAH) Adsorption and Ozone Irradiation for Atomic Layer Deposition of HfO₂**”, . . . 41
Hironobu Miya¹, Fumihiko Hirose², Yuta Kinoshita², Kazuhiro Hirahara³, Yasuo Kimura⁴
and Michio Niwano⁴,
¹Hitachi Kokusai Electric Inc., ²Graduate School of Sci. and Eng., Yamagata University,
³Shin-Etsu Chemical Co., Ltd., ⁴Res. Inst. Elec. Comm., Tohoku University, Japan
- 09:44-09:48 P-12: “**The Use of Porous Si to Control Strain Status in SiGe**”, . . . 43
Noritaka Usami, Kentaro Kutsukake, and Kazuo Nakajima¹, Sevak Amtablian, Alain
Fave, and Mustapha Lemiti², Junji Yamanaka, and Kiyokazu Nakagawa³,
¹Institute for Materials Research, Tohoku Univ., Japan, ²Institut des Nanotechnologies de
Lyon, France, ³Center for Crystal Science and Technology, Univ. Yamanashi, Japan
- 09:48-09:52 P-13: “**High-Concentration Phosphorus-Doping by LPCVD for High-Speed SiGe HBTs**”, . . . 45
Katsuya Oda¹, Makoto Miura¹, Hiromi Shimamoto², and Katsuyoshi Washio¹,
¹Central Research Laboratory, Hitachi, Ltd., ²Renesas Northern Japan Semiconductor,
Inc., Japan
- 09:52-09:56 P-14: “**Deposition of Silicon Nitride Films on Polyethylene-Terephthalate (PET) Using Pulsed-Plasma CVD under Near Atmospheric Pressure**”, . . . 47
M. Matsumoto¹, Y. Inayoshi¹, S. Murashige¹, M. Suemitsu¹, E. Miyamoto², T. Yara², S.
Nakajima², T. Uehara², and Y. Toyoshima³,
¹Center for Interdisciplinary Research, Tohoku Univ., ²Sekisui Chemicals Co. Ltd,
³Energy Technology Research Institute, AIST, Japan
- 09:56-10:00 P-15: “**Mechanism on the Shape Evolution of Ge Islands on Si (100) Substrate after Thin Si Capping**”, . . . 49
Arnold Alguno, Seiichi Goto, and Maki Suemitsu,
Center for Interdisciplinary Research, Tohoku Univ., Japan
- 10:00-10:04 P-16: “**Metastable Chemisorption State of Oxygen on Si(110)-16x2 Surface Observed by SR-PES**”, . . . 51
Yoshihisa Yamamoto¹, Hideaki Togashi¹, Atsushi Kato¹, Satoshi Hasegawa¹, Takuya
Nakano¹, Seiichi Goto¹, Yuden Teraoka², Akitaka Yoshigoe², and Maki Suemitsu¹,
¹Center for Interdisciplinary Research, Tohoku Univ., ²Synchrotron Radiation Research
Center, Japan Atomic Energy Agency, Japan
- 10:04-10:08 P-17: “**Characterization of B Incorporation in B Atomic Layer Doping at Si/Ge(100) Heterointerface**”, . . . 53
Takashi Yokogawa^{1,2}, Kiyohisa Ishibashi^{1,2}, Masao Sakuraba¹, Junichi Murota¹, Yasuhiro
Inokuchi², Yasuo Kunii², and Harushige Kurokawa²,
¹Laboratory for Nanoelectronics and Spintronics, Res. Inst. Electr. Comm., Tohoku Univ.,
²Hitachi Kokusai Electric Inc., Japan

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- 10:08-10:12 P-18: “**Heat-Treatment Effect on Structure of Atomic-Order Nitrided $\text{Si}_{0.5}\text{Ge}_{0.5}$ (100) Using Low Pressure CVD**”, . . . 55
Nao Akiyama¹, Masao Sakuraba¹, Bernd Tillack², and Junichi Murota¹,
¹Laboratory for Nanoelectronics and Spintronics, Res. Inst. Electr. Comm., Tohoku Univ.,
Japan, ² IHP, Germany
- 10:12-10:16 P-19: “**Effect of Low-Temperature SiH_4 Exposure on Heavily Atomic-Layer Doping of B in Si Epitaxial Growth on Si(100) by Ultraclean Low-Pressure CVD**”, . . . 57
Hiroki Tanno¹, Masao Sakuraba¹, Bernd Tillack², and Junichi Murota¹,
¹Laboratory for Nanoelectronics and Spintronics, Res. Inst. Electr. Comm., Tohoku Univ.,
Japan, ² IHP, Germany
- 10:16-10:20 P-20: “**Characterization of Temperature-Dependent Hole Resonant Tunneling Properties with High Ge Fraction ($x>0.4$) Si/Strained $\text{Si}_{1-x}\text{Ge}_x$ /Si(100) Heterostructure**”, . . . 59
Takahiro Seo, Masao Sakuraba, and Junichi Murota,
Laboratory for Nanoelectronics and Spintronics, Res. Inst. Electr. Comm., Tohoku Univ.,
Japan

Session V: Poster Presentation 10:30-12:00 (5F Hallway)

(Boards for posters are available during Workshop.)

12:00-13:30 **Lunch**

Session VI: Invited Session (4) 13:30-15:30 (4F Conference Room)

- 13:30-14:00 I-10: “**Structure and Growth of Tensile Strained Ge by Lattice Mismatch Engineering**”, . . . 61
Y. Bai, M.L. Lee and Eugene A. Fitzgerald,
MIT, USA
- 14:00-14:30 I-11: “**Substrate Parasitic Coupling in SOI Devices: Engineering Solutions**”, . . . 63
V. Kilchytska, D. Lederer, D. Flandre and Jean-Pierre Raskin,
Univ. Catholique de Louvain, Belgium
- 14:30-15:00 I-12: “**Si(Ge):Mn based materials for Spintronic Applications**”, . . . 65
Vinh Le Thanh¹, L. Michez¹, S. Olive-Mendez¹, J. Derrien¹, A. Barski², M. Jamet²,
¹Centre de Recherche en Matière Condensée et Nanosciences (CRM-CNRS), Univ.
Aix Marseille, ²Laboratoire Silicium Nanoélectronique Photonique et Structures,
DRFMC/SP2M, CEA-Grenoble, France
- 15:00-15:30 I-13: “**MBE Growth of SiGe with High Ge Content for Optical Applications**”, . . . 67
Michael. Oehme, J. Werner, O. Kirfel and E. Kasper,
Institut für Halbleitertechnik, Univ. Stuttgart, Germany

15:30-15:45 **Break**

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Session VII: Invited Session (5) 15:45-17:45 (4F Conference Room)

- 15:45-16:15 I-14: “**Reduced Self-Heating by Strained Silicon Substrate Engineering**”, . . . 69
Anthony O'Neill,
Newcastle University, UK
- 16:15-16:45 I-15: “**Group-IV Semiconductor Heterostructures for Strained Nanoscale Transistors**”, . . . 71
Yee-Chia Yeo,
Department of Electrical and Computer Engineering, National Univ. Singapore,
Singapore
- 16:45-17:15 I-16: “**Electron Charging and Discharging Characteristics of Si-Based Quantum Dots and Their Application of Floating Gate MOS Memories**”, . . . 73
Seiichi Miyazaki,
Hiroshima Univ., Japan
- 17:15-17:45 I-17: “**Growth and Characterization of Tensile-Strained Ge Layers on Strain Relaxed $\text{Ge}_{1-x}\text{Sn}_x$ Buffer Layers**”, . . . 75
Osamu Nakatsuka¹, S. Takeuchi¹, A. Sakai², M. Ogawa³, and S. Zaima¹
¹Graduate School of Eng., Nagoya Univ., ²Graduate School of Eng. Sci., Osaka Univ.,
³EcoTopia Sci. Inst., Nagoya Univ., Japan
- 17:45-17:50 **Closing Remarks**