

Fri., May 27

WORKSHOP SCIENTIFIC PROGRAM

Friday, May 27

13:15 - 13:30 **[Introductory]**

- J. Murota (Research Institute of Electrical Communication, Tohoku University)

Session I : Invited Talks (1)

13:30 - 14:00 **Infrared Photodetectors with Ge/Si Structures** ... 1
Invited - E. Kasper and M. Oehme (Institut für Halbleitertechnik, Universität Stuttgart)

14:00 - 14:30 **Engineered Substrates and their Future Role in Microelectronics** ... 5
Invited - E.A. Fitzgerald (Dept. of Materials Science and Engineering, MIT)

14:30 - 15:00 **Ge/Si nanostructures: Control of dot size, position by selective epitaxy and influence of point defects** ... 7
Invited - V. Le Thanh, T.K. Nguyen-Duc, Lam H. Nguyen, F. Arnaud d'Avitaya, and J. Derrien (Centre de Recherche en Matière Condensée et Nanosciences (CRMC-N CNRS), Laboratoire associé à l'Université de la Méditerranée (Aix-Marseille II) et l'Université Paul Cézanne (Aix-Marseille III))

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

Session II : Invited Talks (2)

15:15 - 15:45 **Atomic Layer Processing for Doping of SiGe** ... 11
Invited - B. Tillack, Y. Yamamoto, D. Bolze, B. Heinemann, H. Rücker, D. Knoll, J. Murota*, and W. Mehr (IHP, *Research Institute of Electrical Communication, Tohoku University)

15:45 - 16:15 **Characteristics and Integration of Selectively grown Strain-Relaxed SiGe buffer layers** ... 15
Invited - M. Caymax, R. Delhougne, R. Loo, G. Eneman, P. Verheyen (Imec, Belgium)

Session III : Short Presentation (1)

16:15 - 16:20 **Excimer Laser Assisted Processing of Silicon-Germanium-Carbon Films** ... 17
Short - S. Chiussi, E. Lopez, F. Gontad, J. Serra, P. Gonzalez, B. Leon (Dpto. Física Aplicada, Universidade de Vigo)

16:20 - 16:25 **Electron Interaction Effects in Strained p-SiGe/Ge Heterostructures** ... 19
Short - ¹B. Rössner, ^{1,2}H. von Känel, ²D. Chrastina, ²G. Isella, ¹B. Batlogg (¹Laboratory of solid state physics, ETH Zürich, ²INFM and L-NESS Dipartimento di Fisica del Politecnico di Milano)

16:25 - 16:30 **FTIR observation of hydrogen desorption from SiH₄ adsorbed SiGe(001) surfaces** ... 21
Short - F. Hirose¹, Y. Kimura², M. Shinohara³ and M. Niwano² (¹Faculty of Engineering, Yamagata University, ²Research Institute of Institute of Electrical Communication, Tohoku University, ³Department of Electrical and Electronic Engineering, Nagasaki University)

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16:30 - 16:35 Short	Strain Relaxation of SiGe Thin Films Grown on Ion-Implanted Si Substrates - K. Nakagawa ¹ , J. Yamanaka ¹ , K. Sawano ² , K. Suzuki ¹ , Y. Ozawa ² , T. Hattori ² and Y. Shiraki ² (¹ Center for Crystal Science and Technology, University of Yamanashi, ² Advanced Research Laboratories, Musashi Institute of Technology)	... 23
16:35 - 16:40 Short	Twin Formation in (110) SiGe-On-Insulator Structures during Ge Condensation Process - N. Sugiyama ¹ , N. Hirashita ¹ , Y. Moriyama ¹ , S. Nakaharai ¹ , T. Tezuka ¹ , K. Usuda ¹ and S. Takagi ^{2, 3} (MIRAI -ASET ¹ , MIRAI-AIST ² , University of Tokyo ³)	... 25
16:40 - 16:45 Short	Application of Ultraclean Hot-Wall LPCVD Epi System to SSOI - Y. Kunii, Y. Hashiba, A. Moriya, Y. Inokuchi, and H. Kurokawa (Hitachi Kokusai Electric Inc.)	... 27
16:45 - 16:50 Short	Suppression of atomic exchange between Ge and Si on GeH₄/Si(001) using an atomically flat surface - Y. Narita, T. Murata and M. Suemitsu (Center for Interdisciplinary Research, Tohoku University)	... 29
16:50 - 16:55 Short	Carbon Predeposition and Ge-Dot Formation on Si(001)-2x1 Surface by GSMBE using Monomethylsilane and Germane - Y. Narita ¹ , T. Murata ¹ , A. Kato ¹ , T. Endoh ² and M. Suemitsu ¹ (¹ Center for Interdisciplinary Research, Tohoku University, ² Research Institute of Electrical Communication, Tohoku University)	... 31
16:55 - 17:00 Short	Surface structures in the initial growth of epitaxial Si_{1-x-y}Ge_xC_y layers in SiGe and C alternate deposition - S. Takeuchi ¹ , O. Nakatsuka ² , Y. Wakazono ¹ , A. Sakai ¹ , M. Ogawa ³ , Y. Yasuda ^{1,†} , and S. Zaima ¹ (¹ Department of Crystalline Materials Science, Graduate School of Engineering, Nagoya University, ² EcoTopia Science Institute, Nagoya University, ³ Center for Cooperative Research in Advanced Science and Technology, Nagoya University, [†] Present affiliation: Research Institute of KUT, Kochi University of Technology)	... 33
17:00 - 17:05 Short	Control of Solid-Phase Reaction and Electrical Properties of Ni silicide/Si Contacts by Ge and C Incorporation - O. Nakatsuka ¹ , K. Okubo ² , A. Sakai ² , J. Murota ⁴ , Y. Yasuda ^{2,†} , M. Ogawa ³ , and S. Zaima ² (¹ EcoTopia Science Institute, Nagoya University, ² Department of Crystalline Materials Science, Graduate School of Engineering, Nagoya University, ³ Center for Cooperative Research in Advanced Science and Technology, Nagoya University, ⁴ Research Institute of Electrical Communication, Tohoku University, [†] Present affiliation: Research Institute of KUT, Kochi University of Technology)	... 35
17:05 - 17:10 Short	Low-Temperature Lateral Crystallization of Ni-Mediated a-Si on SiO₂ Structures by High Electric Field - T. Sadoh, H. Kanno, A. Kenjo, and M. Miyao (Dept. of Electronics, Kyushu University)	... 37
17:10 - 17:20	Break [Poster Setting]	
17:20 - 18:20	Session IV : Poster Session (1) (5F Hallway) (see the page " iX ")	
19:00 - 21:00	Banquet (SENDAI EXCEL HOTEL TOKYU 1F [Tanabata])	

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Saturday, May 28

Session V : Invited Talks (3)

- 10:00 - 10:30 **Control of Charged States of Silicon-Based Quantum Dots and Its Application to Floating Gate MOS Memories** ... 39
Invited
- S. Miyazaki (Graduate School of Advanced Sciences of Matter, Hiroshima University)
- 10:30 - 11:00 **Strained-Si/SiGe/Ge-On-Insulator CMOS and Substrate Technologies** ... 41
Invited
- S. Takagi (MIRAI-AIST and The University of Tokyo)

Session VI : Short Presentation (2)

- 11:00 - 11:05 **Epitaxial Growth of Germanium on (100) Germanium: Kinetics and Layer Quality** ... 45
Short
- ¹R. Bonzom, ¹F.E. Leys, ¹R. Loo, ¹M. Caymax, ¹W. Vandervorst and ²K. Dessein
(¹Imec, Belgium, ²Umicore Electro-Optic Materials NV, Belgium)
- 11:05 - 11:10 **Fabrication of Multiply-Stacked Structures Consisting of Si-QDs with Ultrathin SiO₂ and Its Application of Light Emitting Diodes** ... 47
Short
- K. Makihara, J. Xu, *H. Deki, Y. Kawaguchi, H. Murakami, S. Higashi and S. Miyazaki
(Graduate School of Advanced Sciences of Matter., Hiroshima University, *Hiroshima Kokusai Gakuinn University)
- 11:10 - 11:15 **Strain field distribution in strained-Si / SiGe virtual substrates and its influence on roughness formation** ... 49
Short
- K. Sawano¹, N. Usami², K. Nakagawa³, and Y. Shiraki¹ (¹Research Center for Silicon Nano-Science, Advanced Research Laboratories, Musashi Institute of Technology, ²Institute for Material Research, Tohoku University, ³Center for Crystal Science and Technology, University of Yamanashi)
- 11:15 - 11:20 **Improvement of High Speed Characteristics of SiGe HBT/BiCMOS by Promoting Emitter Diffusion** ... 51
Short
- M. Miura¹, H. Shimamoto³, R. Hayami¹, A. Kodama³, T. Tominari², T. Hashimoto², and K. Washio¹ (¹Central Research Laboratory, Hitachi Ltd., ²Micro Device Division, Hitachi Ltd., ³Renesas Northern Japan Semiconductor. Inc.)
- 11:20 - 11:25 **Floating zone growth of Si-rich SiGe bulk crystal using pre-synthesized SiGe feed rod with uniform composition** ... 53
Short
- N. Usami, M. Kitamura, K. Obara, Y. Nose, T. Shishido and K. Nakajima (Institute for Materials Research, Tohoku University)
- 11:25 - 11:30 **Growth of SiGe with compositional distribution for solar cell applications** ... 55
Short
- N. Usami, W. Pan, K. Fujiwara, K. Ohdaira, M. Tayanagi and K. Nakajima (Institute for Materials Research, Tohoku University)
- 11:30 - 11:35 **Line-Shape Patterning Effect on Strain in Si/Si_{1-x}Ge_x/Si(100) Heterostructures** ... 57
Short
- J. Uhm, M. Sakuraba and J. Murota (Laboratory for Nanoelectronics and Spintronics, Research Institute of Electrical Communication, Tohoku University)

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11:35 - 11:40 Short	Si Epitaxial Growth Using Si₂H₆ on PH₃ Reacted Si_{1-x}Ge_x(100) by Ultraclean Low Pressure CVD - Y. Chiba, M. Sakuraba and J. Murota (Laboratory for Nanoelectronics and Spintronics, Research Institute of Electrical Communication, Tohoku University)	... 59
11:40 - 11:45 Short	Strain Relaxation by Heat Treatment in Epitaxial Ge Films on Si(100) using ECR Plasma CVD - K. Sugawara, M. Sakuraba and J. Murota (Laboratory for Nanoelectronics and Spintronics, Research Institute of Electrical Communication, Tohoku University)	... 61
11:45 - 11:50 Short	Carbon Doping Effect on Strained Si_{1-x}Ge_x Epitaxial Growth on Si(100) - H. Nitta, J. Tanabe, M. Sakuraba and J. Murota (Laboratory for Nanoelectronics and Spintronics, Research Institute of Electrical Communication, Tohoku University)	... 63
11:50 - 12:00	Closing Session	
12:00 - 13:00	Session VII : Poster Session (2) (5F Hallway) (see the page " X ")	

Monday, June 13

Special Session : Invited Talks (4)

11:00 - 12:00 Invited	MOSFETs in Strained Heterostructures on Insulator - J.L. Hoyt, I. Åberg, C. Ní Chléirigh, and O.O. Olubuyide (Microsystems Technology Laboratories, Department of Electrical Engineering and Computer Science, MIT)	... 65
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Poster

Poster Session (1) (5F Hallway)

17:15 - 18:15 Friday, May 27

- P-01 **Excimer Laser Assisted Processing of Silicon-Germanium-Carbon Films** ... 17
- S. Chiussi, E. Lopez, F. Gontad, J. Serra, P. Gonzalez, B. Leon (Dpto. Fisica Aplicada, Universidade de Vigo)
- P-02 **Electron Interaction Effects in Strained p-SiGe/Ge Heterostructures** ... 19
- ¹B. Rössner, ^{1,2}H. von Känel, ²D. Chrastina, ²G. Isella, ¹B. Batlogg (¹Laboratory of solid state physics, ETH Zürich, ²INFM and L-NESS Dipartimento di Fisica del Politecnico di Milano)
- P-03 **FTIR observation of hydrogen desorption from SiH₄ adsorbed SiGe(001) surfaces** ... 21
- F. Hirose¹, Y. Kimura², M. Shinohara³ and M. Niwano² (¹Faculty of Engineering, Yamagata University, ²Research Institute of Institute of Electrical Communication, Tohoku University, ³Department of Electrical and Electronic Engineering, Nagasaki University)
- P-04 **Strain Relaxation of SiGe Thin Films Grown on Ion-Implanted Si Substrates** ... 23
- K. Nakagawa¹, J. Yamanaka¹, K. Sawano², K. Suzuki¹, Y. Ozawa², T. Hattori² and Y. Shiraki² (¹Center for Crystal Science and Technology, University of Yamanashi, ²Advanced Research Laboratories, Musashi Institute of Technology)
- P-05 **Twin Formation in (110) SiGe-On-Insulator Structures during Ge Condensation Process** ... 25
- N. Sugiyama¹, N. Hirashita¹, Y. Moriyama¹, S. Nakaharai¹, T. Tezuka¹, K. Usuda¹ and S. Takagi^{2, 3} (MIRAI -ASET¹, MIRAI-AIST², University of Tokyo³)
- P-06 **Application of Ultraclean Hot-Wall LPCVD Epi System to SSOI** ... 27
- Y. Kunii, Y. Hashiba, A. Moriya, Y. Inokuchi, and H. Kurokawa (Hitachi Kokusai Electric Inc.)
- P-07 **Suppression of atomic exchange between Ge and Si on GeH₄/Si(001) using an atomically flat surface** ... 29
- Y. Narita, T. Murata and M. Suemitsu (Center for Interdisciplinary Research, Tohoku University)
- P-08 **Carbon Predeposition and Ge-Dot Formation on Si(001)-2x1 Surface by GSMBE using Monomethylsilane and Germane** ... 31
- Y. Narita¹, T. Murata¹, A. Kato¹, T. Endoh² and M. Suemitsu¹ (¹Center for Interdisciplinary Research, Tohoku University, ²Research Institute of Electrical Communication, Tohoku University)
- P-09 **Surface structures in the initial growth of epitaxial Si_{1-x-y}Ge_xC_y layers in SiGe and C alternate deposition** ... 33
- S. Takeuchi¹, O. Nakatsuka², Y. Wakazono¹, A. Sakai¹, M. Ogawa³, Y. Yasuda^{1,†}, and S. Zaima¹ (¹Department of Crystalline Materials Science, Graduate School of Engineering, Nagoya University, ²EcoTopia Science Institute, Nagoya University, ³Center for Cooperative Research in Advanced Science and Technology, Nagoya University, [†]Present affiliation: Research Institute of KUT, Kochi University of Technology)

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- P-10 **Control of Solid-Phase Reaction and Electrical Properties of Ni silicide/Si Contacts by Ge and C Incorporation** ... 35
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- P-11 **Low-Temperature Lateral Crystallization of Ni-Mediated a-Si on SiO₂ Structures by High Electric Field** ... 37
- T. Sadoh, H. Kanno, A. Kenjo, and M. Miyao (Dept. of Electronics, Kyushu University)

Poster Session (2) (5F Hallway)

12:00 - 13:00 Saturday, May 28

- P-12 **Epitaxial Growth of Germanium on (100) Germanium: Kinetics and Layer Quality** ... 45
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- P-14 **Strain field distribution in strained-Si / SiGe virtual substrates and its influence on roughness formation** ... 49
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- P-16 **Floating zone growth of Si-rich SiGe bulk crystal using pre-synthesized SiGe feed rod with uniform composition** ... 53
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- P-18 **Line-Shape Patterning Effect on Strain in Si/Si_{1-x}Ge_x/Si(100) Heterostructures** ... 57
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- P-19 **Si Epitaxial Growth Using Si₂H₆ on PH₃ Reacted Si_{1-x}Ge_x(100) by Ultraclean Low Pressure CVD** ... 59
- Y. Chiba, M. Sakuraba and J. Murota (Laboratory for Nanoelectronics and Spintronics, Research Institute of Electrical Communication, Tohoku University)
- P-20 **Strain Relaxation by Heat Treatment in Epitaxial Ge Films on Si(100) using ECR Plasma CVD** ... 61
- K. Sugawara, M. Sakuraba and J. Murota (Laboratory for Nanoelectronics and Spintronics, Research Institute of Electrical Communication, Tohoku University)
- P-21 **Carbon Doping Effect on Strained Si_{1-x}Ge_x Epitaxial Growth on Si(100)** ... 63
- H. Nitta, J. Tanabe, M. Sakuraba and J. Murota (Laboratory for Nanoelectronics and Spintronics, Research Institute of Electrical Communication, Tohoku University)