

International 21st Century COE Symposium on Atomistic Fabrication Technology

October 19-20, 2006
Icho-Kaikan, Osaka University, Japan

Thursday, October 19, 2006

9:30 AM	Opening Remarks	K. Endo	<i>Osaka University</i>
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Session 1: Thin Film Deposition and Materials Science

Chairperson H. Watanabe (Osaka Univ.)

9:45 AM	1.1 <i>Invited</i> - Role of Hydrogen in Polycrystalline Silicon Thin-films	N.H. Nickel	<i>Hahn-Meitner-Institut Berlin</i>
10:15 AM	1.2 <i>Invited</i> - Epitaxial Growth and Characterization of 4H-SiC	T. Kimoto	<i>Kyoto University</i>
10:45 AM	1.3 Tribological Properties of Segment-structured DLC Films Prepared on Continuous DLC Coatings	Y. Adachi ¹ , Y. Aoki ¹ , Y. Ohson ¹ , H. Murakami ¹ and N. Ohtake ²	¹ <i>Tokyo Institute of Technology,</i> ² <i>Nagoya University</i>
11:05 AM	1.4 High-rate Deposition of Microcrystalline Silicon Film at Low Temperatures by Atmospheric Pressure Plasma Chemical Vapor Deposition	H. Kakiuchi, H. Ohmi, Y. Kuwahara, R. Inuzuka and K. Yasutake	<i>Osaka University</i>
11:25 AM	1.5 Development of Atmospheric Pressure Plasma Enhanced Chemical Transport toward Eco-friendly Manufacturing	H. Ohmi, Y. Hamaoka, Y. Ogiyama, H. Kakiuchi and K. Yasutake	<i>Osaka University</i>
11:45 AM	Lunch		

Session 2: Ultraprecision Machining (1)

Chairperson Y. Sano (Osaka Univ.)

1:00 PM	2.1 <i>Invited</i> - Manipulating Mechanics and Chemistry in Precision Optics Finishing	S.D. Jacobs	<i>University of Rochester</i>
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1:30 PM	2.2 Precision Grinding of Micro Array Lens Molding Die with 4-axes Controlled Micro Wheel	Y. Yamamoto, H. Suzuki, T. Onishi, T. Okino and T. Moriwaki	<i>Kobe University</i>
1:50 PM	2.3 Development of Numerically Controlled Local Wet Etching	K. Yamamura	<i>Osaka University</i>
2:10 PM	2.4 Fabrication Technology of Total Reflection Mirrors to Realize Hard-x-ray Sub-30-nm Focusing	H. Yumoto ¹ , H. Mimura ¹ , S. Matsuyama ¹ , S. Handa ¹ , A. Shibatani ¹ , K. Katagishi ¹ , Y. Sano ¹ , K. Yamamura ¹ , Y. Mori ¹ , K. Tamasaku ³ , M. Yabashi ² , Y. Nishino ³ , T. Ishikawa ³ and K. Yamauchi ¹	¹ <i>Osaka University</i> , ² <i>JASRI</i> , ³ <i>RIKEN</i>
2:30 PM	2.5 Development of Scanning X-ray Fluorescences Microscope with Spatial Resolution Better Than 30nm Using K-B Mirror Optics	S. Matsuyama ¹ , H. Mimura ¹ , H. Yumoto ¹ , Y. Sano ¹ , K. Yamamura ¹ , K. Endo ¹ , Y. Mori ¹ , M. Yabashi ² , Y. Nishino ³ , K. Tamasaku ³ , T. Ishikawa ^{2,3} and K. Yamauchi ¹	¹ <i>Osaka University</i> , ² <i>JASRI</i> , ³ <i>RIKEN</i>
2:50 PM	Break		

Session 3: Ultraprecision Machining (2)

Chairperson K. Yamamura (Osaka Univ.)

3:15 PM	3.1 <i>Invited-</i> Nanoprecision Mechanical Fabrication Technologies Applying ELID	H. Ohmori ¹ , K. Katahira ¹ , Y. Uehara ¹ , W. Lin ¹ , Y. Watanabe ¹ , T. Naruse ¹ , M. Asami ² and N. Mitsuishi ²	¹ <i>RIKEN</i> , ² <i>The Nexsys</i>
3:45 PM	3.2 Development of Numerically Controlled Sacrificed Oxidation Using Atmospheric Pressure Plasma	Y. Sano, T. Masuda, H. Mimura and K. Yamauchi	<i>Osaka University</i>
4:05 PM	3.3 Fabrication of Flat Silicon Surfaces Using Eco-friendly Electrochemical Etching Process on Cathode	Y. Ichii and H. Goto	<i>Osaka University</i>

4:25 PM	3.4	Development of CAlyst-Referred Etching	H. Hara ¹ , Y. Sano ¹ , K. Arima ¹ , K. Yagi ¹ , J. Murata ¹ , A. Kubota ² , H. Mimura ¹ and K. Yamauchi ¹	¹ Osaka University, ² Kumamoto University
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4:45 PM- 6:30 PM

Poster Session

6:30 PM

Banquet (Minerva, Ichō-Kaikan)

Friday, October 20, 2006

Session 4: Computational Engineering Design

Chairperson H. Goto (Osaka Univ.)

9:30 AM	4.1	<i>Invited-</i> Ab-initio Simulations of the Mechanics, Electrical Transport and Chemical Reactivity of Metal Nanowires	J.A. Torres	<i>Atomistix S/A c/o Niels Bohr Institute</i>
10:00 AM	4.2	<i>Invited-</i> First-principles Molecular Dynamics Simulations of Chemical Reactions at Surfaces and Interfaces	Y. Morikawa ¹⁻³ , I. Hamada ^{1,2} , S. Yanagisawa ^{1,2} , K.H. Lee ^{1,2} , M. Hiramatsu ^{1,2} , A. Nagoya ^{1,2} , T. Takeuchi ^{1,2} , M. Otani ^{4,2} , O. Sugino ^{4,2} , Y. Okamoto ^{5,2} and T. Ikeshoji ^{3,2}	¹ Osaka University, ² JST(CREST), ³ AIST, ⁴ The University of Tokyo, ⁵ NEC
10:30 AM	4.3	Theoretical Study on Sodium Migration on C ₆₀ Cage in Finite Electric Fields	S. Tsukamoto ^{1,2} and T. Nakayama ^{1,2,3}	¹ ICORP, ² NIMS, ³ University of Tsukuba
10:50 AM	4.4	Towards Realizing Carbon-based Components for Nanoscale Electronic Devices	M.Y. David ¹ , T.A. Roman ¹ , M.M. Rahman ¹ , T. Kishi ¹ , W.A. Diño ^{1,2} , H. Nakanishi ¹ and H. Kasai ¹	¹ Osaka University, ² De La Salle University-Manila
11:10 AM	4.5	First-principles Analysis of the Difference of Reflectance Spectra between the (001) and the (111) Hydrogenated Silicon Surface	K. Inagaki, N. Okada, T. Noda, K. Endo and K. Hirose	<i>Osaka University</i>

11:30 AM	4.6	Electronic Structures of Peanut-shaped Fullerene Tubes	H. Nakayama, T. Ono, H. Goto and K. Hirose	<i>Osaka University</i>
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11:50 AM	Lunch			
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Session 5: Methods and Tools for Nano- and Micro-scale Functional Analysis

Chairperson K. Arima (Osaka Univ.)

1:00 PM	5.1	<i>Invited-</i> Macroscopic Quantum Tunneling of Charged Solitons in Helical Polyacetylene Nanofibers	Y.W. Park ¹ , H.J. Lee ¹ , S.H. Jhang ¹ , A.J. Choi ¹ , J.S. Yoo ¹ , H.S. Kim ¹ , A.N. Aleshin ^{1,2} , M.J. Goh ³ , K. Akagi ³ , R.B. Kaner ⁴ , J. Brooks ⁵ , A.B. Kaiser ⁶	¹ <i>Seoul National University,</i> ² <i>Russian Academy of Sciences,</i> ³ <i>Kyoto University,</i> ⁴ <i>University of California at Los Angeles,</i> ⁵ <i>Florida State University,</i> ⁶ <i>Victoria University of Wellington</i>
1:30 PM	5.2	<i>Invited-</i> At-wavelength Wavefront Metrology with 0.1 nm Accuracy for Extreme Ultraviolet Optical Systems	K. Sugisaki ¹ , M. Okada ¹ , Z. Yucong ¹ , K. Otaki ¹ , Z. Liu ¹ , J. Kawakami ¹ , J. Saito ¹ , K. Murakami ¹ , C. Ouchi ¹ , S. Kato ¹ , M. Hasegawa ¹ , T. Hasegawa ¹ , H. Yokota ¹ , M. Niibe ² and M. Takeda ³	¹ <i>EUVA,</i> ² <i>Univ. Hyogo,</i> ³ <i>Univ. Electro. - Commun.</i>
2:00 PM	5.3	Measurement of the Carrier Dynamics on the Si Surface by the Use of the Time-resolved Two-photon Photoelectron Spectroscopy	S. Tanaka and K. Tanimura	<i>Osaka University</i>
2:20 PM	5.4	Development of Noble Methods for Nanoscale Functional Analysis	Y. Kuwahara ^{1,4,5} , M. Akai-Kasaya ^{1,3} , T. Uemura ^{1,2} , A. Saito ^{1,4,5} and M. Aono ^{2,4}	¹ <i>Osaka University,</i> ² <i>NIMS,</i> ³ <i>JST(PRESTO),</i> ⁴ <i>JST(ICORP),</i> ⁵ <i>RIKEN</i>

2:40 PM	5.5	Ro-vibronic Structure in the Q-branch in the Spectra of Hydrogen Fulcher- α Band Emission in the Atmospheric Pressure Plasma CVD Process Driven at 150 MHz	Y. Oshikane ¹ , H. Kakiuchi ¹ , K. Yamamura ¹ , C.M. Western ² , K. Yasutake ¹ and K. Endo ¹	¹ <i>Osaka University,</i> ² <i>University of Bristol</i>
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3:00 PM	Break		
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Session 6: Advanced Solid State and Nanoelectronic Devices

Chairperson H. Watanabe (Osaka Univ.)

3:30 PM	6.1	<i>Invited-</i> Advanced CMOS Device Technologies for 45nm Node and Below	A. Veloso, T. Hoffmann, A. Lauwers, H. Yu, S. Severi, E. Augendre, S. Kubicek, P. Verheyen, N. Collaert, P. Absil, M. Jurczak and S. Biesemans	<i>IMEC</i>
4:00 PM	6.2	<i>Invited-</i> New Electron Devices Fabricated Using Bio Nano Process	Y. Uraoka ¹ , A. Miura ¹ , T. Fuyuki ¹ and I. Yamashita ^{1,2}	¹ <i>NAIST,</i> ² <i>Matsushita Electric Industrial</i>
4:30 PM	6.3	Ultrarapid Thermal Annealing Induced by Plasma Jet Irradiation and Its Application to Thin Film Transistor Fabrication	S. Higashi, H. Kaku, T. Okada, H. Murakami and S. Miyazaki	<i>Hiroshima University</i>
4:50 PM	6.4	Structural Change of the Thermal Oxide Layer on Si Substrates by Diffusion of Atomic Oxygen	T. Shimura, E. Mishima, K. Kawamura, H. Watanabe and K. Yasutake	<i>Osaka University</i>
5:10 PM	6.5	Atomic-scale Characterization of Semiconductor Surfaces after Wet Cleaning	K. Arima and M. Morita	<i>Osaka University</i>
5:30 PM	Closing Remarks		K. Yasutake	<i>Osaka University</i>

- Poster Session -

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| P1 Preparation of a-C:H Films on CNT Surfaces and Its Application to Polymer Matrix CNT Composites | T. Yasuhara ¹ , Y. Hayashi ¹ , H. Aihara ¹ , H. Murakami ¹ and N. Ohtake ² | ¹ <i>Tokyo Institute of Technology,</i>
² <i>Nagoya University</i> |
| P2 Determination of Elastic-inelastic Constitutive Relationships for Sputtered Gold-Tin Film by Uniaxial Tensile Testing | H. Fujita, H. Takemoto, T. Namazu and S. Inoue | <i>University of Hyogo</i> |
| P3 Fabrication of Polycrystalline Silicon Thin Films on Glass Substrates Using Ge Nano-islands as Nuclei | K. Minami, C. Yoshimoto, H. Ohmi, T. Shimura, H. Kakiuchi, H. Watanabe and K. Yasutake | <i>Osaka University</i> |
| P4 Atmospheric In-situ Arsenic-doped Si Selective Epitaxial Growth for High Concentration, High Growth Rate, and High Activation | T. Ikuta, Y. Miyanami, S. Fujita, H. Iwamoto and S. Kadomura | <i>Sony</i> |
| P5 Characterization of Epitaxial Si Films Grown at Low Temperatures by Atmospheric Pressure Plasma Chemical Vapor Deposition | N. Tawara, H. Ohmi, Y. Terai, T. Shimura, H. Kakiuchi, H. Watanabe, Y. Fujiwara and K. Yasutake | <i>Osaka University</i> |
| P6 Deposition Characteristics of Polycrystalline Silicon Carbide Films Prepared at High-rates by Atmospheric Pressure Plasma CVD | R. Nakamura, H. Kakiuchi, H. Ohmi, M. Aketa, K. Yasutake, K. Yoshii and Y. Mori | <i>Osaka University</i> |
| P7 Fabrication of Si _{1-x} Ge _x and SiC Films by Atmospheric Pressure Plasma Enhanced Chemical Transport | K. Kishimoto, D. Kamada, H. Ohmi, H. Kakiuchi and K. Yasutake | <i>Osaka University</i> |
| P8 Atmospheric Pressure Hydrogen Plasma Treatment of 4H-SiC(0001) Surfaces Using Porous Carbon Electrode | M. Harada, H. Ohmi, H. Kakiuchi, H. Watanabe and K. Yasutake | <i>Osaka University</i> |
| P9 High Rate Oxidation of Si Surfaces by Using Atmospheric Pressure Plasma | M. Harada, H. Kakiuchi, H. Ohmi, H. Watanabe and K. Yasutake | <i>Osaka University</i> |

P10	Shape Transition during Epitaxial Growth of GaAs Nanocrystals on Si(100)	H. Usui ¹ , H. Yasuda ¹ and H. Mori ²	¹ Kobe University, ² Osaka University
P11	Fundamental Study on Catalyst-Assisted Chemical Polishing of 4H-SiC	A. Kubota ¹ , K. Yagi ² , J. Murata ² , H. Hara ² , H. Yasui ¹ and K. Yamauchi ²	¹ Kumamoto University, ² Osaka University
P12	Development of High-resolution Computer-controlled Figuring System and Application to X-ray Reflective Optics	H. Mimura ¹ , H. Yumoto ¹ , S. Matsuyama ¹ , Y. Sano ¹ , K. Yamamura ¹ , Y. Mori ¹ , K. Tamasaku ³ , M. Yabashi ² , Y. Nishino ³ , T. Ishikawa ³ and K. Yamauchi ¹	¹ Osaka University, ² JASRI, ³ RIKEN
P13	Fabrication of Damascene Cu Wiring Using Solid Acid Catalyst	K. Yagi, J. Murata, H. Hara, Y. Sano, K. Yamauchi and H. Goto	Osaka University
P14	Removal Properties of Low-thermal-expansion Materials with Rotating-sphere Elastic Emission Machining	M. Kanaoka ¹ , H. Takino ¹ , K. Nomura ¹ , Y. Mori ² , H. Mimura ² and K. Yamauchi ²	¹ EUVA, ² Osaka University
P15	First-principles Theoretical Study of Adsorption of Hydrogen on TiO ₂ (110)	M. Hiramatsu ^{1,2} and Y. Morikawa ¹⁻³	¹ Osaka University, ² JST(CREST), ³ AIST
P16	First-principles Theoretical Study of Thiols Adsorbed on Au(111)	A. Nagoya ^{1,2} , I. Hamada ^{1,2} and Y. Morikawa ¹⁻³	¹ Osaka University, ² JST(CREST), ³ AIST
P17	First-principles Theoretical Study on the Atomic and Electronic Structures of Al/Alq ₃ Interfaces	K. Takeuchi ^{1,2} , S. Yanagisawa ^{1,2} , and Y. Morikawa ¹⁻³	¹ Osaka University, ² JST(CREST), ³ AIST
P18	Atomic-level Understanding of Reactive Ion Etching(RIE) Processes on Iron Oxide Surfaces Using CO Gasses -First principles study-	R. Muhida ¹ , M. David ¹ , T. Roman ¹ , S. Matsumoto ¹ , S. Kunikata ¹ , W.A. Diño ¹ , H. Akinaga ² , F. Takano ² , H. Shima ² , H.Nakanishi ¹ and H. Kasai ¹	¹ Osaka University, ² AIST

P19	Theoretical Study on Electron Conduction through Nanostructures	T. Ono and K. Hirose	<i>Osaka University</i>
P20	Study on Electron Conduction Properties of Nano-scale Structures by Using First-principles Calculations	Y. Egami ^{1,2} , T. Ono ¹ , H. Goto ¹ and K. Hirose ¹	¹ <i>Osaka University</i> , ² <i>JSPS</i>
P21	Order- <i>N</i> First-principles Calculations of the Electronic Properties of Semi-infinite Crystalline Hetero Interfaces	T. Sasaki, T. Ono, H. Goto and K. Hirose	<i>Osaka University</i>
P22	<i>Ab initio</i> Calculation of the Electronic Polarization of AlN Nanotubes	J. Otsuka, T. Ono and K. Hirose	<i>Osaka University</i>
P23	First-principles Study on Electronic Structure of Si/SiO ₂ Interface -Effect of Interface Defects on Local Charge Density-	K. Kutsuki, T. Ono and K. Hirose	<i>Osaka University</i>
P24	First-principles Study of Electronic Structure of Deformed Carbon Nanotube	K. Iwami, K. Hirose and T. Ono	<i>Osaka University</i>
P25	First-principles Study on Electron Conduction Property of 2D Jellium Nanowires	S. Aiba, Y. Egami, K. Hirose and T. Ono	<i>Osaka University</i>
P26	Surface Gradient Integrated Profiler for X-ray and EUV Optics	Y. Higashi ¹ , Y. Takaie ² , K. Endo ² , Y. Mori ² , K. Yamauchi ² , T. Kume ¹ , K. Enami ¹ , K. Yamamura ² , Y. Sano ² and K. Ueno ¹	¹ <i>KEK</i> , ² <i>Osaka University</i>
P27	Chemical State Analysis of Iron Oxide (FeO, Fe ₃ O ₄ and Fe ₂ O ₃) by Auger Spectra Measured with High Energy Resolution	K. Tsutsumi and Y. Nagasawa	<i>JEOL</i>
P28	Development of a Measuring Instrument for Nanoparticle on the Si Wafer Using a Light Scattering Method	H. An ¹ , T. Nagata ¹ , K. Sugimoto ¹ , K. Endo ² and Y. Mori ²	¹ <i>Osaka Electro-Communication University</i> , ² <i>Osaka University</i>

P29	Development of High-precision Differential Reflectance Spectrometer and Its Application to Analysis of Initial Stage of Silicon Native Oxidation	K. Inagaki, N. Okada, T. Noda, K. Hirose and K. Endo	<i>Osaka University</i>
P30	Observation of Nano-structure by SNOM with Small Sphere Probe	Y. Oshikane, T. Kataoka, M. Okuda, S. Hara, H. Inoue and M. Nakano	<i>Osaka University</i>
P31	Absolute Surface Profiling of Large Diameter Mirror by Point Diffraction Interferometer	S. Okagaki and T. Nakamura, T. Matsuura, Y. Oshikane, T. Kataoka, H. Inoue and M. Nakano	<i>Osaka University</i>
P32	Detection of Nano-particles and Nano-steps by White Light Scattering	K. Miyaji, H. Inoue, T. Kataoka, M. Nakano and Y. Oshikane	<i>Osaka University</i>
P33	Scanning Tunneling Microscopy Study of 4H-SiC(0001) Surfaces after Wet-chemical Preparations	R. Okamoto ¹ , K. Arima ¹ , H. Hara ¹ , Y. Sano ¹ , T. Ishida ¹ , K. Yagi ¹ , A. Kubota ² , K. Endo ¹ and K. Yamauchi ¹	¹ <i>Osaka University</i> , ² <i>Kumamoto University</i>
P34	Absolute Straightness Measurements of Plane Silicon Mirrors with Wedge by Near-infrared Ray Interferometry	N. Ajari, J. Uchikoshi, A. Tsuda, A. Funamoto, K. Arima and M. Morita	<i>Osaka University</i>
P35	Development of Surface Hall Potentiometry for Characterizing Semiconductor Materials	Y. Hidaka, K. Hiwa, M. Morita and K. Arima	<i>Osaka University</i>
P36	Tunneling-current-induced and Plasmon-enhanced Fluorescence from Copper Phthalocyanine Thin Films	T. Uemura ^{1,2} , T. Nakano ¹ , M. Akai-Kasaya ^{1,3} , A. Saito ^{1,4,5} , M. Aono ^{2,4} and Y. Kuwahara ^{1,4,5}	¹ <i>Osaka University</i> , ² <i>NIMS</i> , ³ <i>JST(PRESTO)</i> , ⁴ <i>JST(ICORP)</i> , ⁵ <i>RIKEN</i>
P37	Development of High Performance EUV Light Source by Laser Produced Plasma -Target Design and Evaluation of EUV Conversion Efficiency-	T. Yoshikawa, Y. Otani, M. Nakano, T. Kataoka, H. Inoue and Y. Oshikane	<i>Osaka University</i>

P38	Degradation of Magnetic Tunnel Junctions with Thin AlO _x Barrier	T. Mihara ¹ , Y. Kamakura ¹ , M. Morifuji ¹ , S. Ueno ² and K. Taniguchi ¹	¹ Osaka University, ² Renesas Technology
P39	Investigation of Pd ₂ Si Formation for Fully-Silicided Gate	T. Hosoi, K. Sano, K. Hosawa and K. Shibahara	Hiroshima University
P40	Nano Hot Embossing Method with Curved Stage onto Light Guide	A. Funamoto ^{1,2} , S. Lee ¹ , Y. Kawabata ¹ , M. Ohira ¹ , D. Uchida ¹ , S. Aoyama ¹ and M. Morita ²	¹ OMRON, ² Osaka University
P41	Metal-gap-semiconductor Device for Biosensors	T. Hirokane, H. Hashimoto, D. Kanzaki, S. Urabe and M. Morita	Osaka University
P42	Current-voltage Characteristics of Gap Electrodes with Extended λDNA Molecules	K. Hashimoto, T. Hanada, Y. Ochi, T. Hirokane, S. Kawakami, S. Uchiyama, K. Fukui, K. Arima, J. Uchikoshi and M. Morita	Osaka University
P43	Photodetective Characteristics of Metal-oxide-semiconductor Tunneling Structure for Optoelectronics	H. Hashimoto, R. Yamada, K. Arima, J. Uchikoshi and M. Morita	Osaka University
P44	Interface Reactions at TiN/HfSiON Gate Stacks Depending on the Electrode Structure and Deposition Method	S. Yoshida ¹ , Y. Watanabe ¹ , Y. Kita ¹ , T. Shimura ¹ , H. Watanabe ¹ , K. Yasutake ¹ , Y. Akasaka ² , Y. Nara ² and K. Yamada ³	¹ Osaka University, ² Selete, ³ Waseda University
P45	PVD-based In-situ Fabrication Method for Improving the Electrical Properties of Metal/High- <i>k</i> Gate Stacks	S. Horie ¹ , T. Minami ² , N. Kitano ² , M. Kosuda ² , H. Watanabe ¹ and K. Yasutake ¹	¹ Osaka University, ² Canon ANELVA

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| P46 | Systematic Study on Effective Work Functions for Poly-Si and Fully Silicided NiSi Electrodes on Hf-based Gate Dielectrics | K. Manabe ¹ , T. Hase ¹ , T. Tatsumi ¹ , H. Watanabe ² and K. Yasutake ² | ¹ <i>NEC</i> ,
² <i>Osaka University</i> |
| P47 | The Origin of Long-range Contrast in Hf-silicate Film Observed by Scanning Capacitance Microscopy | Y. Naitou ^{1,3} , A. Ando ¹ , H. Ogiso ¹ , S. Kamiyama ² , Y. Nara ² , H. Watanabe ³ and K. Yasutake ³ | ¹ <i>AIST</i> ,
² <i>Selete</i> ,
³ <i>Osaka University</i> |
| P48 | Oxidation Rate Diminishment of SiGe Epitaxial Films on Silicon-on-insulator Wafers | S. Horiuchi, M. Shimizu, T. Shimura, H. Watanabe and K. Yasutake | <i>Osaka University</i> |