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Symposium held April 17-21, 1995, San Francisco, California, U.S.A.

S. Ashok, J. Chevallier, I. Akasaki, N. M. Johnson and B. L. Soporì

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Frontmatter
[More information](#)

CONTENTS

Preface xix

Acknowledgments xxi

Materials Research Society Symposium Proceedings xxii

PART I: PLENARY REVIEW

*Order and Disorder in Semiconductors 3
Hans J. Queisser

PART II: GROWN-IN DEFECTS IN BULK CRYSTALS

Surfaces and Crystal Defects of Silicon 17
P. Wagner, M. Brohl, D. Gräf, and U. Lambert

The Formation of Defects Degrading Gate Oxide
Integrity During CZ-Si Crystal Growth 23
*Y. Tsumori, K. Nakai, T. Iwasaki, H. Haga, K. Kojima,
and T. Nakashizu*

Analysis of Dislocation Networks and Electronic Properties
of Dendritic Web Silicon 29
*S.L. Morelhão, D.L. Meier, G.T. Neugebauer, B.B. Bathey,
and S. Mahajan*

On the Recombination Activity of Oxygen Precipitation
Related Lattice Defects in Silicon 35
*J. Vanhellemont, A. Kaniava, M. Libezny, E. Simoen, G. Kissinger,
E. Gaubas, C. Claeys, and P. Clauws*

Characterization of Growth Defects in CdZnTe Single Crystals
by Synchrotron White Beam X-ray Topography 41
*H. Chung, B. Raghothamachar, J. Wu, M. Dudley, D.J. Larson, Jr.,
and D.C. Gillies*

Large Persistent Photochromic Effect Due to DX Centers in
AlSb Doped with Selenium 47
P. Becla, A.G. Witt, J. Lagowski, and W. Walukiewicz

Control of Oxygen Content in Heavily Sb-Doped CZ Si Crystal
by Adjusting Ambient Pressure 53
*Koji Izunome, Xinming Huang, Shinji Togawa, Kazutaka Terashima,
and Shigeyuki Kimura*

Photodiffractive Characterization of Growth-Defects in GaAs 59
K. Jarasiunas, M. Sudzius, A. Kaniava, and J. Vaitkus

*Invited Paper

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 978-1-558-99281-8 - Defect and Impurity Engineered Semiconductors and Devices:
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 Frontmatter
[More information](#)

Influence of Electric Field and Temperature on Magnetic Field Induced Prolonged Changes of Electric Parameters of Silicon Systems	65
<i>Vladimir M. Maslovsky</i>	
Electrical and Structural Properties of MeV Si⁺ Ion Implantation in Silicon	71
<i>Aditya Agarwal, S. Koveshnikov, K. Christensen, and G.A. Rozgonyi</i>	
Investigation of Resistivity Distributions in CdTe Crystals by Time Dependent Charge Measurements (TDCM)	77
<i>C. Eiche, W. Joerger, M. Fiederle, R. Schwarz, M. Salk, D.G. Ebling, and K.W. Benz</i>	
Scanning Tunneling Microscopy Studies of GaAs_{1-x}P_x Single Crystals	83
<i>X. Liu, E.R. Weber, D.F. Ogletree, M. Salmeron, and T. Slupinski</i>	
Study of Oxygen Diffusion and Clustering in Silicon Using an Empirical Interatomic Potential	89
<i>Z. Jiang and R.A. Brown</i>	
Computation of the Onset of Point Defect Aggregation in Crystalline Silicon Using an Empirical Interatomic Potential	95
<i>T. Sinno and R.A. Brown</i>	
Numerical Simulation of Point Defect Distributions in a Growing Czochralski Silicon Crystal in Response to an Abrupt Change in the Growth Conditions	101
<i>W. Wijaranakula, Q.S. Zhang, K. Takano, and H. Yamagishi</i>	
Deviation from Stoichiometry and Lattice Properties of Semiconducting SnTe Phase	107
<i>E.I. Rogacheva, G.V. Gorne, and O.N. Nashchekina</i>	

PART III: GROWN-IN DEFECTS IN THIN FILMS

Low Energy Ion Implantation of As During Si-MBE	115
<i>E.J.H. Collart, D.J. Gravesteijn, E.G.C. Lathouwers, and W.J. Kersten</i>	
Nucleation and Growth of Defects in SOI Materials	121
<i>G.C.M. Silvestre, R.A. Moore, and B.J. Kennedy</i>	
Extraction of Elastic Parameters of Heavily Boron-Doped Silicon Layer by Elimination of Misfit Dislocations	129
<i>Ho-Jun Lee, Chul-Hi Han, and Choong-Ki Kim</i>	
Efficient Nonradiative Recombination Centers in MBE-Grown Si and SiGe/Si Heterostructures	135
<i>W.M. Chen, I.A. Buyanova, A. Henry, W.-X. Ni, G.V. Hansson, and B. Monemar</i>	

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 978-1-558-99281-8 - Defect and Impurity Engineered Semiconductors and Devices:
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 S. Ashok, J. Chevallier, I. Akasaki, N. M. Johnson and B. L. Soporì
 Frontmatter
[More information](#)

Defect-Engineered Graded $\text{Ge}_x\text{Si}_{1-x}$ Buffers on Si (001) with Extreme Low Threading Dislocation Density	141
<i>G. Kissinger, T. Morgenstern, G. Morgenstern, H.B. Erzgräber, and H. Richter</i>	
DLTS Study on Annealed Low-Temperature GaAs Layers with An n-l(LT)-n Structure Grown by MBE	147
<i>Tsai-Cheng Lin, Hiromasa T. Kalbe, and Tsugunori Okumura</i>	
Deep Impurities in AlGaAs Grown by MOCVD Using Different Hydrogen and Nitrogen as Carrier Gases	153
<i>J.C. Chen, Z.C. Huang, Bing Yang, H.K. Chen, and K.J. Lee</i>	
Atomic Structure of Deep Level Defects in Dimethylaluminum Methoxide-Doped GaAs	159
<i>Y. Park and M. Skowronski</i>	
Intentional Defect Incorporation in Metalorganic Vapor Phase Epitaxy Indium Gallium Arsenide by Oxygen Doping	165
<i>J.W. Huang and T.F. Kuech</i>	
The Ultrafast Carrier Dynamics in Semiconductors: The Role of Defects	171
<i>P.M. Fauchet, G.W. Wicks, Y. Kostoulas, A.I. Lobad, and K.B. Ucer</i>	
Dependence of Sheet Hole Concentrations on Growth Kinetics of a Carbon Doped Electron Beam Heated Graphite Source in GaAs and $\text{Al}_{0.3}\text{Ga}_{0.7}\text{As}$ Films Grown by Solid Source MBE	177
<i>D.L. Sato, F.J. Szalkowski, and H.P. Lee</i>	
Point Defect Supersaturation During Zinc Diffusion into InP	183
<i>D. Wittorf, W. Jäger, A. Rucki, K. Urban, H.-G. Hettwer, N.A. Stolwijk, and H. Mehrer</i>	
Low Deep Impurity $\text{In}_x\text{Ga}_{1-x}\text{P}$ Grown by Metalorganic Chemical Vapor Deposition	189
<i>Z.C. Huang, Bing Yang, H.K. Chen, and J.C. Chen</i>	
Very Low Deep Level $\text{Al}_x\text{Ga}_{1-x}\text{As}$ ($x=0.22$) Layer Grown by Metalorganic Chemical Vapor Deposition	195
<i>Z.C. Huang, Bing Yang, H.K. Chen, and J.C. Chen</i>	
Low-Temperature, Solid-Phase Epitaxial Growth of Amorphized, Non-Stoichiometric GaAs	201
<i>K.B. Belay, D.L. Llewellyn, and M.C. Ridgway</i>	
Magnetic Circular Dichroism of Low-Temperature-Grown $\text{Al}_x\text{Ga}_{1-x}\text{As}$	207
<i>A. Prasad, X. Liu, P. Stallinga, E.R. Weber, A.K. Verma, and J.S. Smith</i>	
Spectroscopic Ellipsometric Characterization of Low Temperature GaAs	213
<i>X. Gao, P.G. Snyder, P.W. Yu, Y.Q. Zhang, and Z.F. Peng</i>	

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 Frontmatter
[More information](#)

Optical Absorptions and EL2-Like Defects in Low Temperature Grown Molecular-Beam-Epitaxial GaAs	219
<i>S.K. So, M.H. Chan, and K.T. Chan</i>	
Investigation of Free Exciton Properties in GaAs Epitaxial Layer	225
<i>Wu Fengmei, Shi Yi, Martin Parenteau, Anouar Jorio, Zheng Youdou, and Cosmo Carlone</i>	
Uniformity of Arsenic Dimer and Tetramer Fluxes from a Valved Arsenic Cracking Source in MBE	231
<i>George A. Patterson, James S.C. Chang, and Forrest G. Kellert</i>	
*Dopant-Defect Interactions in II-VI Semiconductors Studied by PAC	237
<i>Thomas Wichert</i>	
Growth and Characterization of the Binary Defect Alloy Cu_{2-x}Se and the Relation to II-VI/I-III-VI Heterojunction Formation	249
<i>Art J. Nelson, K. Sinha, and John Moreland</i>	
Nonstoichiometric Defects in Semiconductor SnTe Thin Films	255
<i>O.N. Nashchekina, E.I. Rogacheva, L.P. Shpakovskaya, V.I. Pinegin, and A.I. Fedorenko</i>	

PART IV: GETTERING AND RELATED PHENOMENA

*Transition-Metal Impurity Luminescence in GaAs and its Application to Material Characterization	263
<i>T. Nishino</i>	
Transient Diffusion and Gettering of Au and Cu to Cavities in Si	273
<i>J. Wong-Leung, J.S. Williams, and E. Nygren</i>	
Minority Carrier Diffusion Length Improvement in Czochralski Silicon by Aluminum Gettering	279
<i>Subhash M. Joshi, Ulrich M. Gösele, and Teh Y. Tan</i>	
Impurity Gettering in MBE Grown Silicon	285
<i>A. Nylandsted Larsen, P. Kringhøj, J. Lundsgaard Hansen, and S.Yu. Shiryayev</i>	
Lateral Diffusion and Capture of Iron in P-Type Silicon	291
<i>Kevin L. Beaman, Aditya Agarwal, Sergei V. Kovesnikov, and George A. Rozgonyi</i>	
Phosphorus and Aluminum Gettering of Gold in Silicon: Simulation and Optimization Considerations	297
<i>R. Gafiteanu, U. Gösele, and T.Y. Tan</i>	

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S. Ashok, J. Chevallier, I. Akasaki, N. M. Johnson and B. L. Soporì
Frontmatter
[More information](#)

A Study of Gettering Efficiency and Stability in Czoehrsalski Silicon	303
<i>Scott A. McHugo, E.R. Weber, M. Mizuno, and F.G. Kirscht</i>	
Gettering of Interstitial Iron in P/P+ Epitaxial Silicon Wafers	309
<i>W. Wijaranakula, X. Gao, K. Curtis, and H. Haddad</i>	
Characterization of the Damage on the Back Side of Silicon Wafers	315
<i>S.E. Lindo, K.M. Matney, and M.S. Goorsky</i>	
Mechanism of Iron Gettering by Polycrystalline Silicon Film in P-Type Czoehrsalski (CZ) Silicon	321
<i>Kamal K. Mishra</i>	
External Gettering Comparison and Structural Characterization of Single and Polycrystalline Silicon	327
<i>Henry Hieslmair, Scott McHugo, and Eicke Weber</i>	
Effect of P-Doping Level-POCl₃ Diffused or Spin-On Deposited-On the Gettering Efficiency of Polycrystalline Silicon After RTA or CTA	333
<i>M. Loghmarti, K. Mahfoud, J.C. Muller, D. Sayah, and P. Siffert</i>	

PART V: HYDROGEN INTERACTION WITH SEMICONDUCTORS

*Spectroscopy of Transition-Metal-Hydrogen Complexes in Silicon	341
<i>Michael Stavola, S.J. Uffring, M.J. Evans, P.M. Williams, and G.D. Watkins</i>	
Coupling of Electronic and Structural Properties of Hydrogen in Crystalline Silicon	353
<i>Wolfgang Csaaszar and Arthur L. Endrös</i>	
Low-Temperature Diffusivity of Hydrogen in Different Silicon Substrates	359
<i>Xiaojun Deng and Bhushan L. Soporì</i>	
ECR Hydrogen Plasma Treatment of Si: Defect Activation Under Thermal Anneal	365
<i>C.W. Nam and S. Ashok</i>	
Hydrogen and Lithium Passivation of Gold in Silicon: A Comparative Study	371
<i>E.Ö. Sveinbjörnsson, S. Kristjánsson, O. Engström, and H.P. Gislason</i>	

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Frontmatter

[More information](#)

Electron Spin Resonance Evidence for a Localized EP (E'δ-Like) Defect Structure	377
<i>John F. Conley, Jr. and P.M. Lenahan</i>	
*Hydrogen-Induced Metastability of Polycrystalline Silicon	381
<i>N.H. Nickel</i>	
Analysis of Hydrogen Passivation Mechanisms in Poly-Si TFT's by Employing R.F. Plasma	393
<i>K.Y. Choi, Y.S. Kim, H.S. Choi, B.S. Bae, and M.K. Han</i>	
Hydrogenation of Multicrystalline Si-Materials for Solar Cells: Discrimination Between Effects in the Intra-Grain and Grain Boundary Regions	399
<i>J. Poortmans, M. Rosmeulen, A. Kaniava, J. Vanhellemont, H. Elgamel, and J. Nijs</i>	
Enhanced Hydrogenation Due to Ultrasound Treatment in Polycrystalline Silicon: New Approach to Thin Film Defect Engineering	405
<i>S. Ostapenko, W. Henley, S. Karimpanakel, L. Jastrzebski, and J. Lagowski</i>	
Hydrogen Passivation of Defects in Electron Irradiated Polycrystalline Silicon Solar Cells	411
<i>R.R. Bilyalov and B.M. Abdurakhmanov</i>	
Interaction of Atomic Hydrogen with Chalcogens in GaAs	417
<i>J. Vetterhöffer and J. Weber</i>	
Hydrogen Passivation of Shallow Dopants in Indium Doped Bulk CdTe	423
<i>Suma Gurumurthy, A.K. Sreedhar, H.L. Bhat, B. Sundershesu, R.K. Bagai, and Vikram Kumar</i>	
Plasma-Induced Electron Traps in n-InP	429
<i>Yoshifumi Sakamoto, Takashi Sugino, Koichiro Matsuda, and Junji Shirafuji</i>	
Hydrogen Diffusion in n-GaAs:Si Under Hydrostatic Pressure	435
<i>B. Machayekhi, J. Chevallier, B. Theys, J.M. Besson, G. Weill, and G. Syfosse</i>	
Native Defects in Low Temperature GaAs and the Effect of Hydrogenation	441
<i>R.E. Pritchard, S.A. McQuaid, R.C. Newman, J. Mäkinen, H.J. von Bardeleben, and M. Missous</i>	

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S. Ashok, J. Chevallier, I. Akasaki, N. M. Johnson and B. L. Soporì
Frontmatter
[More information](#)

Hydrogen-Related Electron Traps in GaAs and Their Relation to Crystal Stoichiometry	447
<i>Tatsuyuki Shinagawa and Tsugunori Okumura</i>	
Hydrogen Passivation of Shallow Dopants in InP Studied by Photoluminescence Spectroscopy	453
<i>Sathya Balasubramanian and Vikram Kumar</i>	
Hydrogen-Induced Passivation of Deep Traps in n-GaAs:Si Grown on LT-GaAs	459
<i>E.C. Paloura, A. Ginoudi, B. Theys, J. Chevallier, C.B. Lioutas, J. Kalomiros, M. Lagadas, and Z. Hatzopoulos</i>	

PART VI: DEFECT ISSUES IN WIDE GAP SEMICONDUCTORS

*Theory of Defects in Wide-Band-Gap Semiconductors	467
<i>Chris G. Van de Walle and Jörg Neugebauer</i>	
The Role of Impurities in Hydride Vapor Phase Epitaxially Grown Gallium Nitride	479
<i>R.J. Molnar, K.B. Nichols, B. Maki, E.R. Brown, and I. Melngailis</i>	
High Resistivity InAlN by Nitrogen or Oxygen Implantation	485
<i>J.C. Zolper, S.J. Pearton, C.R. Abernathy, and C.B. Vartuli</i>	
Deep Level Defects in GaN Characterized by Capacitance Transient Spectroscopies	491
<i>W. Götz, N.M. Johnson, R.A. Street, H. Amano, and I. Akasaki</i>	
Hydrogen Diffusion and Passivation in InGaAlN Alloys	497
<i>S.J. Pearton, C.R. Abernathy, J.D. MacKenzie, C.B. Vartuli, R.G. Wilson, J.M. Zavada, and R.J. Shul</i>	
Atomic Hydrogen in GaN	503
<i>Jörg Neugebauer and Chris G. Van de Walle</i>	
Photoluminescence Studies of GaN and AlGaIn Layers Under Hydrostatic Pressure	509
<i>C. Wetzel, W. Walukiewicz, E.E. Haller, H. Amano, and I. Akasaki</i>	
Photoconductivity as a Function of Temperature in MOCVD Grown Gallium Nitride Films	515
<i>C.H. Qiu, W. Melton, and J.I. Pankove</i>	
Time Resolved Photoluminescence Spectroscopy on GaN Epitaxial Layers	521
<i>B.K. Meyer, D. Volm, C. Wetzel, L. Eckey, J.-Ch. Holst, P. Maxim, R. Heitz, A. Hoffmann, I. Broser, E.N. Mokhov, P.G. Baranov, C. Qiu, and J.I. Pankove</i>	

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S. Ashok, J. Chevallier, I. Akasaki, N. M. Johnson and B. L. Soporì
Frontmatter
[More information](#)

Defect Studies in n-Type GaN Grown by Molecular Beam Epitaxy	527
<i>W. Götz, D.B. Oberman, and J.S. Harris, Jr.</i>	
The Effects of Sintering on the Microstructure and the Luminescent Characteristics of Polycrystalline ZnS	533
<i>R. Matthew Adams, Peter Mascher, and Adrian H. Kitai</i>	
Study of Deep Levels by Admittance Spectroscopy in High Resistivity P-Type 6H-SiC Single Crystals	539
<i>A.O. Evwaraye, S.R. Smith, and W.C. Mitchel</i>	

PART VII: DEFECT CHARACTERIZATION

*Local Vibrational Mode (LVM) Spectroscopy of Semiconductors	547
<i>Eugene E. Haller</i>	
*Silicon Delta Doping in GaAs: An Ongoing Enigma	567
<i>R.C. Newman, M.J. Ashwin, J. Wagner, M.R. Fahy, L. Hart, S.N. Holmes, and C. Roberts</i>	
Applications of Scanning Defect Mapping System for Semiconductor Characterization	579
<i>Kevin F. Carr, N. Carlson, P. Weitzman, B.L. Soporì, C. Marshall, and L. Allen</i>	
Characterization of Fast Diffusing Charged Defects in Semiconductors	585
<i>T. Heiser, A. Zamouche, and A. Mesli</i>	
Noncontact Photoconductivity Amplitude Technique to Characterize Polishing- and Slicing-Induced Residual Damage in Si Wafers	591
<i>Y. Ogita, M. Nakano, and H. Masumura</i>	
Non-Destructive Method for Simultaneous Mapping of Diffusion Length and Surface Recombination Velocity	597
<i>Hans-Christoph Ostendorf and Arthur L. Endrös</i>	
Investigation of Recombination Parameters in Ion Implanted Layer-Substrate Si Structures	603
<i>E. Gaubas, K. Jarasiunas, A. Kaniava, and J. Vaitkus</i>	
Peculiarities of Determination of Recombination Parameters at Moderate and High Excitation Levels in Silicon Wafers	609
<i>E. Gaubas and A. Kaniava</i>	

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Frontmatter
[More information](#)

Application of Elastic Mid-IR-Laser-Light Scattering for Non-Destructive Inspection in Microelectronics	615
<i>Victor P. Kalinushkin, Vladimir A. Yuryev, Oleg V. Astafiev, Alexander N. Buzynin, and Nikolay I. Bletsan</i>	

**PART VIII: ION IMPLANTATION AND
PROCESS-INDUCED DEFECTS**

Activation of Implanted Phosphorus Ions into Silicon by Followed Hydrogen Ion Implantations	623
<i>Y. Hasebe, H. Ohshima, T. Hattori, A. Usami, and Y. Tokuda</i>	
Photoluminescence of Extended Defects in Silicon-on- Insulator Formed by Implantation of Oxygen	629
<i>Y.H. Qian, J.H. Evans, L.F. Giles, A. Nejmi, and P.L.F. Hemment</i>	
Type II Dislocation Loops and Their Effect on Strain in Ion Implanted Silicon as Studied by High Resolution X-ray Diffraction	635
<i>R.H. Thompson, Jr., V. Krishnamoorthy, J. Liu, and K.S. Jones</i>	
Contactless Evaluation of the Surface Recombination Property of Silicon with an Ion-Implanted Layer	641
<i>Akira Usami, Takanori Makino, Hideaki Yoshida, and Etsuro Morita</i>	
Ultrasound Defect Engineering of Transition Metals Via Metal-Acceptor Pairs in Silicon	647
<i>Ronald E. Bell II, Serguei Ostapenko, and Jacek Lagowski</i>	
Inversion of Conductivity in p-Si After Ion Treatment	653
<i>Alexander N. Buzynin, Albert E. Luk'yanov, Vyacheslav V. Osiko, and Vladimir V. Voronkov</i>	
Surface-Oriented Oxygen Mass Transport During Implantation	659
<i>A.B. Danilin, L.A. Charnyi, A.W. Nemirovski, and V.V. Saraikin</i>	
Observation of Vacancy-Oxygen Complexes in Silicon Implanted with Substoichiometric Doses of Oxygen Ions	665
<i>A.I. Belogorokhov, L.A. Charnyi, A.B. Danilin, and A.W. Nemirovski</i>	
X-ray Topography of Strain Fields Induced by 100 MeV Ti⁷⁺ Ion Irradiated Si(100)	671
<i>B.B. Sharma, S.R. Gupta, R.K. Sharma, V. Kumar, U. Tiwari, P. Sen, and G.K. Mehta</i>	
Relation Between Structure and Carrier Lifetime in As-Implanted GaAs	677
<i>Z. Lillental-Weber, W. Swider, H. Kaglich, A. Claverie, H.H. Wang, and J.F. Whitaker</i>	

Cambridge University Press
978-1-558-99281-8 - Defect and Impurity Engineered Semiconductors and Devices:
Symposium held April 17-21, 1995, San Francisco, California, U.S.A.
S. Ashok, J. Chevallier, I. Akasaki, N. M. Johnson and B. L. Soporì
Frontmatter
[More information](#)

**The Influence of Non-Stoichiometry on the Electrical
Activation of n-Type Dopants in InP 683**
M.C. Ridgway, C.M. Johnson, and P. Kringhøj

**Ellipsometric Monitoring of Defects Induced
by Electron Cyclotron Resonance Etching of GaAs 689**
*P.G. Snyder, N.J. Ianno, B. Wigert, S. Pittal, B. Johs, and
J.A. Woollam*

**Electron-Beam-Induced Transformation of Defects
in Proton-Implanted CdS Single Crystals 695**
V.B. Mityukhlyayev

PART IX: DEFECTS IN DEVICES

***Defects and Future Silicon Technology 703**
J. Palm and L.C. Kimerling

***Probing Metal Defects in CCD Image Sensors 713**
William C. McColgin, J.P. Lavine, and C.V. Stancampiano

**Crystallographic Defect Related Degradation in
High Density Memory Devices 725**
S.S. Kim and W. Wijaranakula

**Improvement of PIN Photodiodes on the SOI Layer
by Rapid Thermal Annealing 731**
*Yoshimaro Fujii, Akira Usami, Katsuhiro Fujiyoshi,
Hideaki Yoshida, and Masaya Ichimura*

**Characterization of MOS Devices Fabricated on
Carbon Implanted Silicon Substrates 737**
*Ibrahim Ban, Mehmet C. Öztürk, Kim Christensen, and
Dennis M. Maher*

**The Role of the Si-SiO₂ (CVD) Interface in Degradation
Effects for High-Speed Bipolar Transistors 743**
*J.-Q. Lü, S. Schöttl, E. Stefanov, F. Koch,
R. Mahnkopf, and H. Klose*

**Influence of Dislocations on the I-V Characteristics
of Silicon Solar Cells 749**
Robert Murphy, Bhushan L. Soporì, and Doug Rose

**Effects of Light on the Resonant Tunneling in
Silicon Quantum Dot Diode 757**
Chen Ding and Raphael Tsu

*Invited Paper

Cambridge University Press
 978-1-558-99281-8 - Defect and Impurity Engineered Semiconductors and Devices:
 Symposium held April 17-21, 1995, San Francisco, California, U.S.A.
 S. Ashok, J. Chevallier, I. Akasaki, N. M. Johnson and B. L. Soporì
 Frontmatter
[More information](#)

A Model for the Frequency Dependence of Charge Pumping Current in Polycrystalline Silicon Thin Film Transistor	761
<i>Ga-Won Lee, Jung-Yeal Lee, Deuk-Sung Choi, Sung-Hoi Hur, Choong-Ki Kim, and Chul-Hi Han</i>	
Analysis and Control of the Performance-Limiting Defects in HEM-Grown Silicon for Solar Cells	767
<i>Chandra P. Khattak, Frederick Schmid, Michael Cudzinovic, Martha Symko, and Bhushan L. Soporì</i>	
Resolving Degradation Mechanism in Carbon and Beryllium Doped HBT's Using Pulsed Mode Current Stress	777
<i>Y.C. Chou, G.P. Li, C.S. Wu, Peter Chu, C.K. Pao, and T.C. Cisco</i>	
Degradation of InGaAs High Electron Mobility Transistors: The Role of Channel Composition and Thickness	783
<i>Marjohn Meshkinpour, Mark S. Goorsky, Dwight C. Streit, Thomas R. Block, and Mike Wojtowicz</i>	
Improved Performance of MESFET Devices with L.T. GaAs Buffer Layers	789
<i>M. Lagadas, Z. Hatzopoulos, F. Karadima, G. Konstantinidis, N. Kornilios, C. Papavasiliou, and A. Christou</i>	
Defects and Impurities in Mercuric Iodide Processing	795
<i>J.M. Van Scyoc, R.B. James, T.E. Schlesinger, and T.S. Gilbert</i>	
Room Temperature Infrared Electroluminescence from Thin-Film Polycrystalline Chalcopyrite Cu(In,Ga)Se₂-Based Diodes	803
<i>Miguel A. Contreras, John Webb, Andrew Tennant, and Rommel Noufi</i>	

**PART X: INTERFACES, QUANTUM WELLS
AND SUPERLATTICES**

*Electronic Properties of Ideal and Interface-Modified Metal-Semiconductor Contacts	811
<i>Winfried Mönch</i>	
Effect of RF Power on the Characteristic Parameters of W/n-GaAs Schottky Contacts Fabricated by RF Sputtering	823
<i>A. Singh, G. Aroca, and L. Velásquez</i>	
High Temperature I-V and C-V Characteristics of a Al/n-GaAs/In Schottky Barrier Type Device	829
<i>A. Singh and N. Marciano</i>	

*Invited Paper

Cambridge University Press
 978-1-558-99281-8 - Defect and Impurity Engineered Semiconductors and Devices:
 Symposium held April 17-21, 1995, San Francisco, California, U.S.A.
 S. Ashok, J. Chevallier, I. Akasaki, N. M. Johnson and B. L. Sopori
 Frontmatter
[More information](#)

Temperature Dependence of Metal-Semiconductor Contacts on 6H-SiC	835
<i>S.R. Smith, A.O. Ewwaraye, and W.C. Mitchel</i>	
Surface Morphology Investigation of Au and Pt Electroless Contact on ZnCdTe Crystal by Atomic Force Microscopy	841
<i>Zhiyu Hu, Zhihua Hu, K.T. Chen, M.A. George, A. Burger, and W.E. Collins</i>	
Metastable Defect at Si-SiO₂ Interfaces	851
<i>Z. Jing, G. Lucovsky, and J.L. Whitten</i>	
Comparative Study of Experimental Techniques for Boron Profiling at Poly-Si/SiO₂ Interface	857
<i>M. Furtsch, J. Bevk, J. Bude, S.W. Downey, K.S. Krisch, N. Moriya, P.J. Silverman, and H.S. Luftman</i>	
Atomic Structure of the Interfaces Between Silicon Directly Bonded Wafers	863
<i>M. Benamara, A. Rocher, A. Laporte, G. Sarrabayrouse, L. Lescouzères, A. PeyreLavigne, M. Fnaiech, and A. Claverie</i>	
Direct Wafer Bonding of Preamorphized Silicon Wafers	869
<i>A. Laporte, G. Sarrabayrouse, M. Benamara, A. Claverie, A. Rocher, L. Lescouzères, and A. PeyreLavigne</i>	
Effect of Fermi Level Pinning at the Surface During OMVPE Growth	875
<i>R.M. Cohen, C.Y. Chen, W.M. Li, D.S. Simons, and P.H. Chi</i>	
Radiative Recombination Processes in Boron Modulation-Doped SiGe Quantum Wells	881
<i>I.A. Buyanova, W.M. Chen, A. Henry, W.X. Ni, G.V. Hansson, and B. Monemar</i>	
Introduction of Radiative Isoelectronic Complexes During Molecular Beam Epitaxial Growth of Si and Si_{1-x}Ge_x/Si Superlattices	887
<i>Karen L. Moore, Oliver King, Dennis G. Hall, Joze Bevk, and Matthias Furtsch</i>	
A Systematic Study of the Structural and Luminescence Properties of P-Type Porous Silicon	893
<i>H. Yoon and M.S. Goorsky</i>	
Space Charge Layers at the Porous Silicon Surface	899
<i>S.Z. Weisz, J. Avalos, M. Gomez, A. Many, Y. Goldstein, and E. Savir</i>	
Reversible and Irreversible Light-Induced Change of Photoluminescence in Porous Silicon	905
<i>Suk-Ho Choi and Byoung-Hun Mun</i>	

Cambridge University Press

978-1-558-99281-8 - Defect and Impurity Engineered Semiconductors and Devices:

Symposium held April 17-21, 1995, San Francisco, California, U.S.A.

S. Ashok, J. Chevallier, I. Akasaki, N. M. Johnson and B. L. Sopori

Frontmatter

[More information](#)**PART XI: DEFECT PROPERTIES, REACTION,
ACTIVATION AND PASSIVATION**

*Chemistry of Point Defect in Silicon and its Applications in Semiconductor Technology	913
<i>S. Pizzini, S. Binetti, and M. Acciarri</i>	
*Bistability of Defects in Semiconductors	929
<i>Masashi Mizuta</i>	
Interaction Between EL5 and EL6 in Bulk GaAs	935
<i>Hirofumi Shiraki, Yutaka Tokuda, and Koichi Sassa</i>	
The Kinetics of Capture and Emission of Discrete DX Related Centers in Silicon Doped AlGaAs Using Time Analyzed Transient Spectroscopy	941
<i>Sandeep Agarwal and Y.N. Mohapatra</i>	
DX-Like Centers in IV-VI	947
<i>Dmitriy R. Khokhlov</i>	
Low Temperature Anneal of the Divacancy in P-Type Silicon	953
<i>M.-A. Trauwaert, J. Vanhellemont, H.E. Maes, A.-M. Van Bavel, G. Langouche, A. Stesmans, and P. Clauws</i>	
Are the Models of the Triply Charged Gallium Vacancy and Doubly Charged Gallium Interstitial Alive or Dead?	959
<i>R.M. Cohen, C.Y. Chen, W.M. Li, D.S. Simons, and P.H. Chi</i>	
Some Peculiarities During Creation and Destruction of the Native Defects with the Negative Correlation Energy in Semiconductors	965
<i>Semyon D. Savransky</i>	
Classical and Rapid Thermal Process Effects on Oxygen and Carbon Precipitation in Silicon	971
<i>K. Mahfoud, M. Lohmarti, J.C. Muller, and P. Siffert</i>	
Studies of Defects in ZnO by Positron Annihilation	977
<i>Werner Puff, Sebastian Brunner, Peter Mascher, and Adam G. Balogh</i>	
Defect Reaction and Electrical Properties of Iron in n-Type Silicon	983
<i>Hajime Kitagawa and Shuji Tanaka</i>	
Modification of Recombination Activity of Dislocations in Si and SiGe by Contamination and Hydrogenation	989
<i>M. Kittler, W. Seifert, and V. Higgs</i>	

*Invited Paper

Cambridge University Press
978-1-558-99281-8 - Defect and Impurity Engineered Semiconductors and Devices:
Symposium held April 17-21, 1995, San Francisco, California, U.S.A.
S. Ashok, J. Chevallier, I. Akasaki, N. M. Johnson and B. L. Sopori
Frontmatter
[More information](#)

Recombination at Oxidation Induced Stacking Faults in Silicon	995
<i>J.A. Davidson, J.H. Evans, M. Vandini, and A.R. Peaker</i>	
Surface Passivation and the Ultrafast Optical Response of Low-Temperature-Grown GaAs	1001
<i>H.H. Wang, J.F. Whitaker, K. Al-Hemyari, and S.L. Williamson</i>	
Passivation Studies on AlGaAs Surfaces Suitable for High Power Laser Development	1007
<i>C. Edirisinghe, H.E. Ruda, I. Koutzarov, Q. Liu, L. Jedral, M.G. Boudreau, M. Boumerzoug, J. Brown, P. Mascher, A. Moore, and R. Henderson</i>	
Passivation of InGaAs/GaAs Vertical-Cavity Surface-Emitting Lasers by Amorphous GaAs Deposition	1013
<i>Hyo-Hoon Park, Byueng-Su Yoo, Min Soo Park, Jaejin Lee, Hae Gwon Lee, El-Hang Lee, Jae-Heon Shin, and Yong Hee Lee</i>	
Sulfidization in Alcoholic Solutions: A New Surface Passivation Method for GaAs	1019
<i>Vasily N. Bessolov, Andrew F. Ivankov, Elena V. Konenkova, and Mikhail V. Lebedev</i>	
Effects of Additive Elements on Electrical Properties of Tantalum Oxide Films	1025
<i>Hisayoshi Fujikawa and Yasunori Taga</i>	
Phase Separation of Si_{1-x}Ge_x Alloys	1031
<i>Eunja Kim and Young Hee Lee</i>	
Incorporation of Hydrogen in SiO₂ and Si₃N₄ Thin Films Deposited by ECR-CVD	1037
<i>J. Brown, M. Boudreau, M. Boumerzoug, P. Mascher, T.E. Jackman, S.Y. Tong, and H. Haugen</i>	
Author Index	1043
Subject Index	1049

Cambridge University Press

978-1-558-99281-8 - Defect and Impurity Engineered Semiconductors and Devices:

Symposium held April 17-21, 1995, San Francisco, California, U.S.A.

S. Ashok, J. Chevallier, I. Akasaki, N. M. Johnson and B. L. Sopori

Frontmatter

[More information](#)

PREFACE

This volume results from a symposium held at the 1995 MRS Spring Meeting, April 17–21, in San Francisco. The symposium, bearing the title of this volume, followed upon a highly successful earlier symposium entitled “Defect Engineering in Semiconductor Growth, Processing and Device Technology,” held at the 1992 MRS Spring Meeting. The intent of the present symposium was to go beyond defect control and explore deliberate introduction and manipulation of defects and impurities in order to engineer some desired properties in semiconductor materials and devices. The response from the academic and industrial research communities was overwhelming, with over 280 abstracts submitted from around the world. The theme of defect engineering has clearly come of age.

The organization of this proceedings volume closely follows the topics around which the sessions were built. After a broad plenary introduction by Professor Hans Queisser on “Order and Disorder in Semiconductors,” the papers are grouped around ten distinct topics covering materials, processing and devices. The papers on grown-in defects in bulk crystals deal with overviews of intrinsic and impurity-related defects, their influence on electrical, optical and mechanical properties, as well as the use of impurities to arrest certain types of defects during growth and defects to control growth. In the case of epitaxial films, additional issues concerning stoichiometry and defects caused by plasmas and electron/ion irradiation are included. In view of the emerging interest in widegap semiconductors like GaN and SiC for blue light emitting devices and high-temperature electronics, a special session was devoted to this important topic.

Defect reaction processes pertaining to impurity gettering, precipitation and hydrogen passivation are specific examples of defect engineering that improve the electronic quality of the material. A large part of the symposium was devoted to these issues. A number of invited and contributed papers also dealt with characterization techniques needed to study and to identify these defects in materials and device structures.

The scope of defect and impurity engineering is far-ranging as exemplified by superlattice disordering phenomena, interface passivation and application of ion implantation, plasma treatment and rapid thermal processing for creating/activating/suppressing trap levels. All of these topics are addressed in this volume.

The symposium extended over the entire five days of the MRS meeting, with ten oral and two evening poster sessions. There were in all 17 invited talks, 75 contributed oral presentations and 130 posters. All the papers were peer-reviewed at the conference and revised as necessary. We are most grateful to the referees who often had to forego their evenings in San Francisco in order to perform this vital task in a timely manner. The quality of conference proceedings critically depends on this voluntary endeavor, in addition to the care exercised by the authors. Within the limitations of the publication deadline, every effort was made to minimize errors, but the reader is urged to bear with the inevitable shortcomings in the spirit of the symposium title!

S. Ashok
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978-1-558-99281-8 - Defect and Impurity Engineered Semiconductors and Devices:

Symposium held April 17-21, 1995, San Francisco, California, U.S.A.

S. Ashok, J. Chevallier, I. Akasaki, N. M. Johnson and B. L. Soporì

Frontmatter

[More information](#)

Cambridge University Press

978-1-558-99281-8 - Defect and Impurity Engineered Semiconductors and Devices:

Symposium held April 17-21, 1995, San Francisco, California, U.S.A.

S. Ashok, J. Chevallier, I. Akasaki, N. M. Johnson and B. L. Soporì

Frontmatter

[More information](#)

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Symposium held April 17-21, 1995, San Francisco, California, U.S.A.

S. Ashok, J. Chevallier, I. Akasaki, N. M. Johnson and B. L. Sopori

Frontmatter

[More information](#)

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S. Ashok, J. Chevallier, I. Akasaki, N. M. Johnson and B. L. Soporì

Frontmatter

[More information](#)

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