

Table of Contents

Preface

Silicon Wafer Technology. Status and Overlook at the Millennium and a Decade Beyond A.P. Mozer	1
Self-Assembling Si/SiGe Nanostructures for Light Emitters K. Eberl, O.G. Schmidt, O. Kienzle and F. Ernst	13
The Origin and Efficiency of Dislocation Luminescence in Si and its Possible Application in Optoelectronics E.A. Steinman, V.V. Kveder, V.I. Vdovin and H.G. Grimmeiss	23
Acoustically Driven Optical Parameters in - Photonic Materials I. Ostrovskii and O.A. Korotchenkov	33
Growth-Defects and Process-Induced Defects in SiGe-Based Heterostructures A.N. Larsen	43
Status, Hopes and Limitations for the Si: Er-based 1.54 μm Emitter W. Jantsch, S. Lanzerstorfer, M. Stepikhova, H. Preier and L. Palmetshofer	53
Oxygen Precipitation Behaviour and Internal Gettering in Epitaxial and Polished Czochralski Silicon Wafers K. Sueoka, M. Akatsuka, M. Yonemura, S. Sadamitsu, E. Asayama, T. Ono, Y. Koike and H. Katahama	63
Grown-in Defects in High Temperature Annealed Si Wafers N. Tsuchiya, H. Matsushita, J. Sugamoto, A. Kawasaki and H. Kubota	73
Hydrogen Platelets in Crystalline Silicon - Precursors for the 'Smart Cut' S.T. Pantelides and F.A. Reboredo	83
Relaxation of Misfit Induced Strain in Si-Based Heterostructures S.H. Christiansen, H.P. Strunk, H. Wawra, M. Becker and M. Albrecht	93
Materials Quality and Materials Cost - Are they on a Collision Course? K.V. Ravi	103
Defect Engineering in the Development of Advanced Silicon Crystals and Wafers J. Vanhellemont	111
200 GHz Potential of Si-Based Devices U. König	121
Silicon Materials Engineering for the Next Millennium L.C. Kimerling	131
Electrical Characterization of As-Grown and Thermally Treated 8" Silicon Wafers A. Castaldini, D. Cavalcoli, A. Cavallini, S. Pizzini and E. Susi	143
Equilibrium Critical Thickness of Strained Buried SiGe Layers A. Fischer, G. Kissinger, H. Richter and P. Zaumseil	149
Improved Microwave Absorption Technique for Bulk and Surface Lifetime Analysis in Processed Si Wafers E. Gaubas, E. Simoen, C. Claeys and A. Poyai	155
Defect Control in Nitrogen Doped Czochralski Silicon Crystals A. Ikari, K. Nakai, Y. Tachikawa, H. Deai, Y. Hideki, Y. Ohta, N. Masahashi, S. Hayashi, T. Hoshino and W. Ohashi	161
Growth and Characteristics of Low Trap Density Ultrathin [4-7 nm] Gate Oxides for SiGe Quantum Well MOS Structures S. Kar and P. Zaumseil	167
Interaction of Crystal Defects with p-n Junctions in Multicrystalline Si Solar Cells O. Krüger, M. Kittler, C. Häbeler and W. Koch	173
Interaction between Point Defects and Dislocations in SiGe K. Lyutovich, F. Ernst, E. Kasper, M. Bauer and M. Oehme	179
Radiation Induced Defect Levels in Highly Doped n-Type $\text{Si}_{1-x}\text{Ge}_x$ Strained Layers E.V. Monakhov, A.Y. Kuznetsov, H.H. Radamson and B.G. Svensson	185
ESR Investigations of Modulation-Doped Si/SiGe Quantum Wells N. Sandersfeld, W. Jantsch, Z. Wilamowski and F. Schäffler	191

Shallower Thermal Donor and Nitrogen-Oxygen Complex in Nitrogen Doped Czochralski Silicon	
D.R. Yang, J. Zhang, L. Li and D.L. Que	197
X-Ray Diffraction Studies of the Influence of Substitutional Carbon on Si/Ge Interdiffusion in SiGe/Si Superlattices	
P. Zaumseil and H. Rücker	203
Radiation Defects Formation in Si<Ge>	
L.I. Khirunenko, Y.V. Pomozov, M.G. Sosnin, N.V. Abrosimov, M. Höhne and W. Schröder	209
Oxygen and Peculiarities of its Precipitation in Si<Ge>	
L.I. Khirunenko, Y.V. Pomozov, M.G. Sosnin, N.V. Abrosimov, M. Höhne and W. Schröder	215
The Peculiarities of a Non-Stationary Growth Kinetics in GSMBE and their Influence on Si/Si_{1-x}Ge_x Interfaces Abruptness	
L.K. Orlov, A.V. Potapov and S.V. Ivin	221
Vacancy-Gettering in Silicon: Cavities and Helium-Implantation	
F. Corni, R. Tonini, S. Frabboni, C. Nobili, G. Calzolari, S. Masetti, P. Tamarozzi, G. Pavia and G.F. Cerofolini	229
Gettering Centres for Metals and Oxygen Formed in MeV-Ion-Implanted and Annealed Silicon	
R. Kögler, A. Peeva, W. Anwand, P. Werner, A.B. Danilin and W. Skorupa	235
Iron Gettering on Cavities Produced by Helium Implantation	
F. Roqueta, A. Grob, J.J. Grob, C. Dubois, J. Fauré and L. Ventura	241
Gettering at Vacancy and Interstitial-Rich Regions in MeV Ion Implanted Silicon	
K.L. Beaman, J.M. Glasko, S.V. Kovesnikov and G.A. Rozgonyi	247
Laser-Stimulated Gettering Processes in Cd_xHg_{1-x}Te Solid Solutions	
V.A. Gnatyuk, O.S. Gorodnychenko, A.V. Lomovtsev, P.O. Mozol' and O.I. Vlasenko	253
Gettering Strength Assessment Based on Lifetime Measurements	
F.G. Kirscht, B. Orschel, V. Higgs and A. Buczkowski	259
Impurity Gettering Investigation in the Si-SiO₂ System	
D. Kropman, V. Poll, L. Tambek, T. Kärner, U. Abru and M. Strik	267
Computer Simulation of Gettering Induced Oxygen Redistribution in SOI Structures	
V.G. Litovchenko, A.A. Efremov and C. Claeys	273
Surface Gettering Background Impurities and Defects in GaAs Plates	
N. Schmidt, A.T. Gorelenok, V.V. Emtsev, A.A. Kamanin, A.V. Markov, M. Mezdrogina, D.S. Poloskin and L. Vlasenko	279
Gettering Processes for the Preparation of Silicon Solar Cell Material	
A.A. Efremov, N.I. Klyui, V.G. Litovchenko, V.G. Popov, A.B. Romanyuk and B.N. Romanyuk	285
Gettering of Unintentionally Contaminated Silicon Wafers by Phosphorous Ion Implantation and Annealing	
M. Yli-Koski, J. Mellin and V. Ovchinnikov	291
Oxygen and Carbon Clustering in Cz-Si during Electron Irradiation at Elevated Temperatures	
J.L. Lindström, T. Hallberg, J. Hermansson, L.I. Murin, V.P. Markevich, M. Kleverman and B.G. Svensson	297
Infrared Vibrational Bands Related to Thermal Donors in Germanium	
V.V. Litvinov, A.A. Klechko, V.P. Markevich, L.I. Murin and J.L. Lindström	303
New Infrared Vibrational Bands Related to Interstitial and Substitutional Oxygen in Silicon	
L.I. Murin, V.P. Markevich, T. Hallberg and J.L. Lindström	309
Experimental and Numerical Investigation of the Oxygen Precipitation in Mono- and Multicrystalline Solar Silicon	
H.J. Möller and L. Long	315
The Segregation Behaviour of Oxygen at Dislocations in Silicon	
S. Senkader, P.R. Wilshaw, D. Gambaro and R.J. Falster	321
About the Electrical Properties of Oxygen Phases Segregated by Annealing Cz Silicon in the 600-800°C Range	
E.B. Yakimov, O.V. Feklisova, M. Acciarri, A. Cavallini and S. Pizzini	327
Positron Trapping by Oxygen-Related Defects in Silicon and Anisotropy of 1D-ACAR Spectra	
N.Y. Arutyunov	333

The Spatial Distribution of SiO₂ Precipitates Grown in Silicon at Laser Induced Centres Y. Blums	339
Effect of External Stress Applied during Annealing on Hydrogen- and Oxygen-Implanted Silicon A. Misiuk, H.B. Surma, I.V. Antonova, V.P. Popov, J. Bak-Misiuk, M. Lopez, A. Romano-Rodríguez, A. Barcz and J. Jun	345
The Nature of Precursors for the Thermal Donor Formation in Silicon V.B. Neimash, O.O. Puzenko, O.M. Kabaldin, A. Kraitichinskii, M. Kras'ko, C. Claeys and E. Simoen	351
Photoluminescence of Erbium-Doped Silicon: Temperature Dependence C.A.J. Ammerlaan, D.T.X. Thao, T. Gregorkiewicz, B.A. Andreev and Z.F. Krasil'nik	359
Rare Earth Impurities and Impurity-Related Centers in Silicon V.V. Emtsev, D.S. Poloskin, E.I. Shek, N.A. Sobolev, J. Michel and L.C. Kimerling	365
Defect Engineering in Si: Ho Light-Emitting Structure Technology N.A. Sobolev, A.M. Emel'yanov, R.N. Kyutt and Y.A. Nikolaev	371
Comparative Analysis of Light Emitting Properties of Si: Er and Ge/Si_{1-x}Ge_x Epitaxial Structures Obtained by MBE Method L.K. Orlov, A.V. Potapov, N.L. Ivina, E.A. Steinman and V.I. Vdovin	377
Pre-Cavities Defect Distribution in He Implanted Silicon Studied by Slow Positron Beam R.S. Brusa, G.P. Karwasz, A. Zecca, F. Corni, R. Tonini and G. Ottaviani	385
Ion Beam Doping of 6H-SiC for High Concentration p-Type Layers D. Panknin, W. Skorupa, H. Wirth, M. Voelskow, A. Mücklich, W. Anwand, G. Brauer, A. Pérez-Rodríguez, I. Bakočević and J.M. Morante	391
In-Situ Photoexcitation-Induced Perturbations of Defect Complex Concentration and Distribution in Silicon Implanted with Light and Heavy Ions N. Yarykin, C.R. Cho, R.A. Zuhr and G.A. Rozgonyi	397
Interaction of Hydrogen with Radiation-Induced Defects in Cz-Si Crystals V.P. Markevich, L.I. Murin, J.L. Lindström and M. Suezawa	403
The Influence of Low-Energy Argon Implantation and Out-Diffusion Heat Treatments on Hydrogen Enhanced Thermal Donor Formation in P-Type Czochralski Silicon A.G. Ulyashin, A.N. Petlitskii, R. Job, W.R. Fahrner, A.K. Fedotov and A.I. Stognii	409
Temperature Dependence of the Recombination Activity at Contaminated Dislocations in Si: A Model Describing the Different EBIC Contrast Behaviour M. Kittler, V.V. Kveder and W. Schröter	417
Experimental and Theoretical Study on Interaction Processes for 60° Short Dislocation Segments with Precipitation Centers in Si-Crystals V.A. Makara, L.P. Steblenko and A.N. Kolomiets	423
Ultrasonic Influence on Dislocation Dynamics in Silicon I. Ostrovskii, L.P. Steblenko and A.B. Nadtochii	429
P-N- Junction Peripheral Current Analysis using Gated Diode Measurements A. Czerwinski, E. Simoen, A. Poyai and C. Claeys	437
Investigations of Extended Defects after Sulfur Diffusion in GaAs N. Engler, H.S. Leipner, R.F. Scholz, P. Werner, F. Syrowatka, J. Schreiber and U.M. Gösele	443
On the Reduction of the Critical Thickness in In_xGa_{1-x}As Quantum Well Layers Grown on Vicinal GaAs Substrates C. Frigeri, A. Brinciotti, D.M. Ritchie and G.P. Donzelli	449
Extraction of Vacancy Parameters from Outdiffusion of Zinc from Silicon P. Pichler	455
Cu Determination in Silicon Wafers: A Comparison between Electrical and Chemical Measurements V. Raineri, D. Cali, M. Camalleri, M. Di Dio and A. Puglisi	461
Single Defect Studies by Means of Random Telegraph Signals in Submicron Silicon MOSFETs E. Simoen, C. Claeys, N.B. Lukyanchikova, M.V. Petrichuk and N.P. Garbar	467
Variations of Silicon Melt Convection in a Crucible with Boron Addition K. Terashima and S. Nishimura	473
Electrical Impedance Spectroscopy (EIS) as a New Characterisation Tool for the Determination of Electrical Material Parameters in Semiconductors and Insulators P. Viscor, M. Jensen and J. Vedde	479

Electron Spin Resonance of the P_b Centers Associated with Oxygen Precipitates in Silicon Crystals	
H. Yamada-Kaneta and M. Koizuka	485
Structural and Electrical Quality of Silicon Bicrystals Fabricated by a Modified Direct Bonding Technique	
T.S. Argunova, M.Y. Gutkin, L.S. Kostina, T.V. Kudriavtseva, E.D. Kim and S.C. Kim	491
Formation of Spatial Inhomogeneities as a Result of Heat Treatment in Silicon Doped with Zinc	
E.V. Astrova, V.B. Voronkov, A.A. Lebedev, A.N. Lodygin and A.D. Remenyuk	497
Magnetoplastic Effect in Compound Semiconductors	
E.V. Darinskaya, E.A. Petrzhik, S.A. Erofeeva and V.P. Kisel	503
Reconstruction of GaAs/AlAs (311) and (100) Interfaces: Raman Study	
M.D. Efremov, V.A. Volodin, V.V. Bolotov, V.A. Sachkov, G.A. Lubas, V.V. Preobrazhenski and B.R. Semyagin	507
Simulation of Point Defect Diffusion in Semiconductors	
O. Velichko and A.K. Fedotov	513
Correlation between Intrinsic Stress Distribution and Crystallographic Defects Density Profile in Czochralski Silicon after CMOS Processing	
T. Piotrowski and W. Jung	519
Silicon Impurity-Related Effects on Structural Defects in III-V Nitrides	
N. Shmidt, V. Busov, V.V. Emtsev, R. Kyutt, W. Lundin, D.S. Poloskin, V.V. Ratnikov, A.V. Sakharov and A. Usikov	525
Reconstruction of Deep Level Defect Distribution from DLTS Measurements in Compensated Semiconductors	
O.A. Soltanovich, E.B. Yakimov and N. Yarykin	531
Identification of Process Induced Defects in Silicon Power Devices	
E.V. Astrova, V.A. Kozlov, A.A. Lebedev and V.B. Voronkov	539
Nondestructive Defect Characterization and Engineering in Contemporary Silicon Power Devices	
P. Hazdra and J. Vobecký	545
Rapid Low Temperature Diode Fabrication on P-Type Czochralski Silicon on the Base of Simple Hydrogen Enhanced Thermal Donor Formation Processes	
R. Job, J.A. Weima, G. Grabosch, D. Borchert, W.R. Fahrner, V. Raiko and A.G. Ulyashin	551
Oriented Silicon Films on Glass Substrates for Device Applications	
M.D. Efremov, V.A. Volodin, V.V. Bolotov, A.V. Vishnyakov, O.K. Shabanova, D.I. Bragin, L.I. Fedina and S.A. Kochubei	557
Radiation Induced Lattice Defects in InGaP/InGaAs P-HEMTs and their Effect on Device Performance	
H. Ohyama, E. Simoen, S. Kuroda, C. Claeys, Y. Takami, T. Hakata and H. Sunaga	563
Hydrogen Diffusion and Trapping in Microcrystalline Silicon	
D. Ballutaud, L. Lusson, A. Boutry-Forveille and A. Lusson	571
Substrate Material for sub-0.25μm Si Technology Comparison of Hydrogen Annealed Wafers and Challengers: Evidence for Dopant Enhanced Diffusion	
M.T. Bostelmann and B. Leroy	577
Atomic Structure of Chalcogen-Hydrogen Complexes in Silicon	
C.A.J. Ammerlaan and P.T. Huy	583
Electric Properties of Hydrogenated Polycrystalline CdS-CdSe Solid Solution Films	
A.K. Fedotov, S. Manego, A.V. Mazanik, M. Tarasik, Y. Trofimov, A.G. Ulyashin and A. Yanchenko	589
Hydrogen-Enhanced Transformation of Electrical and Structural Properties of Thin Subsurface Ion Implanted Silicon Layer in SiO₂-Si Systems	
E.I. Terukov, B.J. Ber, V.K. Kudojarova, V.J. Davydov, A. Nazarov, J.N. Vovk and S. Ashok	595