

Table of Contents

Committees

Preface

1. Crystalline Silicon for Solar Cells: Single Crystals, Multi-Crystalline Si, Ribbons, Si Thin Films on Substrates

Casting Single Crystal Silicon: Novel Defect Profiles from BP Solar's Mono²™ Wafers N. Stoddard, B. Wu, I. Witting, M.C. Wagener, Y. Park, G.A. Rozgonyi and R. Clark	1
Carrier Recombination Activities and Structural Properties of Small-Angle Boundaries in Multicrystalline Silicon J. Chen, T. Sekiguchi, S. Ito and D.R. Yang	9
Impact of Iron and Molybdenum in Mono and Multicrystalline Float-Zone Silicon Solar Cells G. Coletti, L.J. Geerligs, P. Manshanden, C. Swanson, S. Riepe, W. Warta, J. Arumughan and R. Kopecek	15
Divacancy Induced Improvement for Stabilization of Silicon Conductivity versus Temperature G.N. Kamaev, M.D. Efremov, V.A. Stuchinsky, B.I. Mihailov and S.G. Kurkin	21
Mechanism of Shunting of Nanocrystalline Silicon Solar Cells Deposited on Rough Ag/ZnO Substrates H. Li, R. Franken, R.L. Stolk, J.K. Rath and R.E.I. Schropp	27
Advances in Structural Characterization of Thin Film Nanocrystalline Silicon for Photovoltaic Applications A. Le Donne, S. Binetti, G. Isella, B. Pichaud, M. Texier, M. Acciarri and S. Pizzini	33

2. Silicon-Based Materials and Advanced Semiconductor Materials (Strained Si, SOI, SiGe, SiC, Ge)

Origination and Properties of Dislocations in Thin Film Nitrides H.P. Strunk	39
Metal In-Diffusion during Fe and Co-Germanidation of Germanium E. Simoen, K. Opsomer, C. Claeys, K. Maex, C. Detavernier, R.L. Van Meirhaeghe and P. Clauws	47
Investigation of 4H-SiC Layers Implanted by Al Ions E.V. Kolesnikova, E.V. Kalinina, A.A. Sitnikova, M.V. Zamoryanskaya and T.P. Popova	53
Interstitial Carbon-Related Defects in Si_{1-x}Ge_x Alloys L.I. Khirunenko, Y.V. Pomozev, M.G. Sosnin, A.V. Duvanskii, V.J.B. Torres, J. Coutinho, R. Jones, P.R. Briddon, N.V. Abrosimov and H. Riemann	59
Effect of Various Treatments on Light Emission Properties of Si-Rich-SiO_x Structures M. Baran, N. Korsunskaya, L. Khomenkova, T. Stara, V. Khomenkov, Y. Goldstein, E. Savir and J. Jedrzejewski	65
Size Dependent Photoluminescence of Si Nano-Crystals Embedded in Amorphous Silicon A.L.Q. Vasques, T.V. Torchynska, G. Polupan, Y. Matsumoto-Kuwabara, L. Khomenkova and L.V. Shcherbyna	71
Very First Relaxation Steps in Low Temperature Buffer Layers SiGe/Si Heterostructures Studied by X-Ray Topography N. Burle, B. Pichaud, V.I. Vdovin and M.M. Rzaev	77
Passivation of Si and SiGe/Si Structures with 1-Octadecene Monolayers I.V. Antonova, M.B. Gulyaev, R.A. Soots, V.A. Seleznev and V.Y. Prinz	83
Configuration of DV Complexes In Ge: Positron Probing of Ion Cores N.Y. Arutyunov, V.V. Emtsev, E. Sayed and R. Krause-Rehberg	89
Influence of the Highly-Doped Drain Implantation and the Window Size on Defect Creation in p⁺/n Si_{1-x}Ge_x Source/Drain Junctions M. Kamruzzaman Chowdhury, B. Vissouvanadin, M. Bargallo Gonzalez, N. Bhouri, P. Verheyen, H. Hikavy, O. Richard, J. Geypen, H. Bender, R. Loo, C. Claeys, E. Simoen, V. Machkaoutsan, P. Tomasini, S.G. Thomas, J.P. Lu, J.W. Weijtmans and R. Wise	95

Comparison of Defects Created by Plasma-Based Ion Implantation and Conventional Implantation of Hydrogen in Germanium	
M. David, F. Pailloux, M. Drouet, M.F. Beaufort, J.F. Barbot, E. Simoen and C. Claeys	101
Co-Germanide Schottky Contacts on Ge	
L. Lajaunie, M. David, K. Opsomer, E. Simoen, C. Claeys and J.F. Barbot	107
Internal Dissolution of Buried Oxide in SOI Wafers	
O. Kononchuk, F. Boedt and F. Allibert	113
Degradation and their Recovery Behavior of Irradiated GaAlAs LEDs	
H. Ohyama, K. Takakura, T. Nagano, M. Hanada, S. Kuboyama, E. Simoen and C. Claeys	119
Vacancy Clusters in Germanium	
A.R. Peaker, V.P. Markevich, J. Slotte, K. Kuitunen, F. Tuomisto, A. Satta, E. Simoen, I. Capan, B. Pivac and R. Jačimović	125
Formation of Hydrogen-Related Shallow Donors in $\text{Ge}_{1-x}\text{Si}_x$ Crystals Implanted with Protons	
Y.M. Pokotilo, A.N. Petukh, V.V. Litvinov, V.P. Markevich, N.V. Abrosimov and A.R. Peaker	131
Crystallization of InSb Phase Near the Bonding Interface of Silicon-on-Insulator Structure	
I.E. Tyschenko, A.G. Cherkov, M. Voelskow and V.P. Popov	137
SiGe Heterostructures-on-Insulator Produced by Ge^+-Ion Implantation and Subsequent Hydrogen Transfer	
I.E. Tyschenko, A.G. Cherkov, M. Voelskow and V.P. Popov	143

3. Impurities (Oxygen, Carbon, Nitrogen, Fluorine, Metals) in Si

Microwave and Infra Red Light Absorption Studies of Carrier Lifetime in Silicon and Germanium	
E. Gaubas and J. Vanhellemont	149
Impact of NiSi_2 Precipitates Electronic Structure on the Minority Carrier Lifetime in n-and p-Type Silicon	
M.V. Trushin, O.F. Vyvenko and M. Seibt	155
Oxygen Dimers and Related Defects in Plastically Deformed Silicon	
N. Yarykin	161
Enhanced Oxygen Precipitation during the Czochralski Crystal Growth	
L. Válek, J. Šik and D. Lysáček	167
Influence of the Dislocation Travel Distance on the DLTS Spectra of Dislocations in Cz-Si	
V.V. Kveder, V.I. Orlov, M. Khorosheva and M. Seibt	175
Detection of Nickel in Silicon by Recombination Lifetime Measurements	
H. Savin, M. Yli-Koski, A. Haarahiltunen, H. Talvitie and J. Sinkkonen	183
Effect of Diffusion of I Group Metal (Ag) on Characteristics of Metal/Porous Silicon Sensors	
T.D. Dzhafarov, S. Aydin and D. Oren	189
SEM Investigation of Surface Defects Arising at the Formation of a Buried Nitrogen-Containing Layer in Silicon	
A.V. Frantskevich, A.M. Saad, A.K. Fedotov, E.I. Rau, A.V. Mazanik and N.V. Frantskevich	195
Radiation Defects and Thermal Donors Introduced in Silicon by Hydrogen and Helium Implantation and Subsequent Annealing	
P. Hazdra and V.V. Komarnitskyy	201
Infrared Absorption from Low Carbon Concentration, Low Dose, Annealed CZ Silicon	
N. Inoue, Y. Goto and T. Sugiyama	207
Peculiarities of Dislocation Related D1/D2 Bands Behavior under Copper Contamination in Silicon	
A.N. Tereshchenko and E.A. Steinman	213
Multiplicity of Nitrogen Species in Silicon: The Impact on Vacancy Trapping	
V.V. Voronkov and R.J. Falster	219

4. Modeling/Simulation of Defects in Si/Semiconductors

The Electrical and Optical Properties of Point and Extended Defects in Silicon Arising from Oxygen Precipitation	
R. Jones	225

Fundamental Interactions of Fe in Silicon: First-Principles Theory S.K. Estreicher, M. Sanati and N.G. Szwacki	233
First Principles Calculations of the Formation Energy of the Neutral Vacancy in Germanium P. Śpiewak, K.J. Kurzydłowski, K. Sueoka, I. Romandic and J. Vanhellemont	241
First-Principles Simulations of Frenkel Pair Formation and Annealing in Irradiated β-SiC L. Pizzagalli and G. Lucas	247
Primary Defects in n-Type Irradiated Germanium: A First-Principles Investigation A. Carvalho, R. Jones, C. Janke, S. Öberg and P.R. Briddon	253
A Theoretical Study of Copper Contaminated Dislocations in Silicon N. Fujita, R. Jones, S. Öberg, P.R. Briddon and A.T. Blumenau	259
Theoretical Aspects on the Formation of the Tri-Interstitial Nitrogen Defect in Silicon N. Fujita, R. Jones, T.A.G. Eberlein, S. Öberg and P.R. Briddon	265
Effect of Hydrostatic Pressure on Self-Interstitial Diffusion in Si, Ge, Si<Ge> Crystals: Quantum-Chemical Simulations V.E. Gusakov, V.I. Belko and N.N. Dorozhkin	271
Modeling of the Diffusion and Activation of Arsenic in Silicon Including Clustering and Precipitation A. Martinez-Limia, P. Pichler, C. Steen, S. Paul and W. Lerch	277
Integrated Approach for Modeling of Heat Transfer and Microdefect Formation during CZ Silicon Single Crystal Growth A.I. Prostomolotov and N.A. Verezub	283
 5. Defect Engineering in Microelectronics and Photovoltaics	
Dislocations in Silicon as a Tool to Be Used in Optics, Electronics and Biology M. Kittler, M. Reiche, T. Arguirov, T. Mchedlidze, W. Seifert, O.F. Vyvenko, T. Wilhelm and X. Yu	289
Two Paths of Oxide Precipitate Nucleation in Silicon G. Kissinger, J. Dabrowski, A. Sattler, T. Müller and W. von Ammon	293
Engineering of Dislocation-Loops for Light Emission from Silicon Diodes T. Mchedlidze, T. Arguirov, M. Kittler, T. Hoang, J. Holleman, P. LeMinh and J. Schmitz	303
A Comparative Analysis of Structural Defect Formation in Si⁺ Implanted and then Plasma Hydrogenated and in H⁺ Implanted Crystalline Silicon H. Nordmark, A.G. Ulyashin, J.C. Walmsley and R. Holmestad	309
The Temperature Evolution of the Hydrogen Plasma Induced Structural Defects in Crystalline Silicon H. Nordmark, A.G. Ulyashin, J.C. Walmsley, A. Holt and R. Holmestad	315
Electrical Uniformity of Direct Silicon Bonded Wafer Interfaces M.C. Wagener, R.H. Zhang, W. Zhao, M. Seacrist, M. Ries and G.A. Rozgonyi	321
Structure of Magnetically Ordered Si:Mn J. Bak-Misiuk, E. Dynowska, P. Romanowski, A. Shalimov, A. Misiuk, S. Kret, P. Dłużewski, J. Domagala, W. Caliebe, J. Dabrowski and M. Pruszczyk	327
Influence of Low-Temperature Argon Ion-Beam Treatment on the Photovoltage Spectra of Standard Cz Si Wafers A.M. Saad, O.V. Zinchuk, N.A. Drozdov, A.K. Fedotov and A.V. Mazanik	333
Defect Engineering for SIMOX Processing R. Kögler, A. Mücklich, W. Anwand, F. Eichhorn and W. Skorupa	339
Hydrogen Interaction with Point Defects in the Si-SiO₂ Structures and its Influence on the Interface Properties D. Kropman, E. Mellikov, T. Kärner, Ü. Ugaste, T. Laas, I. Heinmaa, U. Abru and A. Medvid	345
IR Studies on the Interaction between Thermal and Radiation Defects in Silicon C.A. Londos, G.D. Antonaras, M.S. Potsidi, E.N. Sgourou, I.V. Antonova and A. Misiuk	351
Diffusion and Activation of Ultra Shallow Boron Implants in Silicon in Proximity of Voids O. Marcelot, A. Claverie, D. Alquier, F. Cayrel, W. Lerch, S. Paul, L. Rubin, V. Raineri, F. Giannazzo and H. Jaouen	357
Radiation-Induced Defect Reactions in Cz-Si Crystals Contaminated with Cu V.P. Markevich, A.R. Peaker, I.F. Medvedeva, V.E. Gusakov, L.I. Murin and B.G. Svensson	363

The Role of High Temperature Treatments in Stress Release and Defect Reduction I. Mica, M.L. Polignano, E. Bonera, G.P. Carnevale and P. Magni	369
Properties of Si:Cr Annealed under Enhanced Stress Conditions A. Misiuk, A. Barcz, L. Chow, B. Surma, J. Bak-Misiuk and M. Prujnszczyk	375
Radiation Enhanced Diffusion of Implanted Palladium in Silicon J. Vobecký	381
Evolution of Thermal Donors in Silicon Enhanced by Self-Interstitials V.V. Voronkov, G.I. Voronkova, A.V. Batunina, R.J. Falster, V.N. Golovina, A.S. Guliaeva, N.B. Tiurina and M.G. Milvidski	387
Enhanced Formation of Thermal Donors in Germanium Doped Czochralski Silicon Pretreated by Rapid Thermal Annealing X. Zhu, D.R. Yang, M. Li, C. Cui, L. Wang, X.Y. Ma and D.L. Que	393

6. Gettering and Passivation Techniques

Study of Gettering Mechanisms in Silicon: Competitive Gettering between Phosphorus Diffusion Gettering and Other Gettering Sites M.B. Shabani, T. Yamashita and E. Morita	399
Effect of Grown-In Defects on the Structure of Oxygen Precipitates in Cz-Si Crystals with Different Diameter V.G. Litovchenko, I.P. Lisovskyy, C. Claeys, V.P. Kladko, S.O. Zlobin, M.V. Muravska, O.O. Efremov and M.V. Slobodjan	405
Horizontal Versus Vertical Annealing of Silicon Wafers at High Temperatures G. Kissinger, A. Fischer, G. Ritter, V.D. Akhmetov and M. Kittler	413
Impact of Extended Defects on the Electrical Properties of Solar Grade Multicrystalline Silicon for Solar Cell Application S. Binetti, M. Acciarri and J. Libal	419
Investigation of the Hydrogen Transport Processes in Crystalline Silicon of n-Type Conductivity A.M. Saad, Ö. Velichko, Y.P. Shaman, A. Barcz, A. Misiuk and A.K. Fedotov	425
Evaluation of Surface Passivation Layers for Bulk Lifetime Estimation of High Resistivity Silicon for Radiation Detectors J.M. Rafi, L. Cardona-Safont, M. Zabala, C. Boulord, F. Campabadal, G. Pellegrini, M. Lozano, E. Simoen and C. Claeys	431

7. Defect and Impurity Characterization (Physical and Electrical)

HREM Study of the Strain Field Induced by the Entrance of a Matrix Dislocation within the Coherent Twin GB in Ge. J. Thibault-Pénisson and M.J. Hÿtch	437
Nanoscale Imaging of $\text{CaCu}_3\text{Ti}_4\text{O}_{12}$ Dielectric Properties: The Role of Surface Defects V. Raineri, P. Fiorenza, R. Lo Nigro and D.C. Sinclair	443
Observation of Leakage Sites in High-k Gate Dielectrics in MOSFET Devices by Electron-Beam-Induced Current Technique T. Sekiguchi, J. Chen, M. Takase, N. Fukata, N. Umezawa, K. Ohmori, T. Chikyo, R. Hasunuma, K. Yamabe, S. Inumiya and Y. Nara	449
Vacancies in Growth-Rate-Varied CZ Silicon Crystal Observed by Low-Temperature Ultrasonic Measurements H. Yamada-Kaneta, T. Goto, Y. Nemoto, K. Sato, M. Hikin, Y. Saito and S. Nakamura	455
Photoinduced Variation of Capacitance Characteristics of MDS Structures with Three-Layer SiN_x Dielectrics S.A. Arzhannikova, M.D. Efremov, V.A. Volodin, G.N. Kamaev, D.V. Marin, V.S. Shevchuk, S.A. Kochubei, A.A. Popov and Y.A. Minakov	461
Silicon Epitaxial Layers for CCD and CMOS Imager Sensors : Limits and Challenges of the In-Line and Off-Line Metal Detection Techniques G. Borionetti, S. Cox, P. Godio, I. Gohar, J. Pitney and M. Seacrist	467
New Opportunities to Study Defects by Soft X-Ray Absorption Fine Structure F. Boscherini, D. De Salvador, G. Bisognin and G. Ciatto	473

Femtosecond and Nanosecond Laser Pulse Crystallization of Thin a-Si:H Films on Non-Refractory Glass Substrates V.A. Volodin, M.D. Efremov, G.A. Kachurin, S.A. Kochubei, A.G. Cherkov, M. Deutschmann and N. Baersch	479
DLTS and PR Studies of Partially Relaxed InGaAs/GaAs Heterostructures Grown by MOVPE Ł. Gelczuk, G. Jóźwiak, M. Motyka and M. Dąbrowska-Szata	485
Electrical Activation and Carrier Compensation in Si and Mg Implanted GaN by Scanning Capacitance Microscopy F. Giannazzo, F. Iucolano, F. Roccaforte, L. Romano, M.G. Grimaldi and V. Raineri	491
Deep Level Transient Spectroscopy of Ultra Shallow Junctions in Si Formed by Implantation N. Mitromara, J.H. Evans-Freeman and R. Duffy	497
Regular Dislocation Networks in Si. Part II: Luminescence T. Mchedlidze, T. Wilhelm, X. Yu, T. Arguirov, G. Jia, M. Reiche and M. Kittler	503
Mapping of Device Yield Relevant Electrical Si-Wafer Parameters K. Niemietz, K. Dornich, T. Hahn, A. Helbig, S. Hellwig, K.H. Stegmann and J.R. Niklas	511
Clustering of Gold on 6H-SiC and Local Nanoscale Electrical Properties F. Ruffino, F. Giannazzo, F. Roccaforte, V. Raineri and M.G. Grimaldi	517
On the Failure of Intelligent Power Devices Induced by Extreme Electro-Thermal Fatigue. A Microstructural Analysis B. Khong, M. Legros, P. Dupuy, C. Levade and G. Vanderschaeve	523
EBIC Investigations of Deformation Induced Defects in Si E.B. Yakimov	529
 8. Si-Based Nanostructures (Nanocrystals, Nanowires, Nanodevices)	
Growth and Properties of Silicon Nanowires for Low-Dimensional Devices P. Werner	535
Modification of Silicon Nanocrystals Embedded in an Oxide by High Energy Ion Implantation I.V. Antonova, M.B. Gulyaev, V.A. Skuratov, D.V. Marin, E.V. Zaikina, Z.S. Yanovitskaya, J. Jedrzejewski and I. Balberg	541
Hydrogenated Nanocrystalline Silicon Thin Films Studied by Scanning Force Microscopy. D. Cavalcoli, M. Rossi, A. Tomasi, A. Cavallini, D. Chrastina and G. Isella	547
Phonon Confinement and Impurity Doping in Silicon Nanowires Synthesized by Laser Ablation N. Fukata, T. Oshima, N. Okada, S. Matsushita, T. Tsurui, J. Chen, T. Sekiguchi and K. Murakami	553
Properties of Nanostructure Formed on SiO₂/Si Interface by Laser Radiation A. Medvid, I. Dmitruk, P. Onufrijevs and I. Pundyk	559
 9. Silicon-Based Heterostructures and Optoelectronics	
Erbium Doped Materials for a Si-Based Microphotonics F. Priolo, G. Franzò, F. Iacona, A. Irrera, R. Lo Savio, M. Miritello and E. Pecora	563
Regular Dislocation Networks in Silicon. Part I: Structure T. Wilhelm, T. Mchedlidze, X. Yu, T. Arguirov, M. Kittler and M. Reiche	571
Mono- and Polycrystalline Silicon for Terahertz Intracenter Lasers S.G. Pavlov, H.W. Hübers, N.V. Abrosimov and H. Riemann	579
Dislocation Photoluminescence in Silicon and Germanium S. Shevchenko and A.N. Tereshchenko	583
Silicon Doped with Lithium and Magnesium from the Melt for Terahertz Laser Application N.V. Abrosimov, N. Nötzel, H. Riemann, K. Irmischer, S.G. Pavlov, H.W. Hübers, U. Böttger, P.M. Haas, N. Drichko and M. Dressel	589
Investigation of the Temperature Degradation and Re-Activation of the Luminescent Centres in Rare Earth Implanted SiO₂ Layers S. Prucnal, L. Rebohle and W. Skorupa	595
Light-Emitting Structures with Near-Band Edge Luminescence for Si Optoelectronics N.A. Sobolev	601

The Unusual Temperature Shift of Dislocation Related D1/D2 PL Bands in Donor Doped Silicon	
E.A. Steinman, A.N. Tereshchenko and N.V. Abrosimov	607
Terahertz Emission from Phosphor Centers in SiGe and SiGe/Si Semiconductors	
S.G. Pavlov, H.W. Hübers, N.V. Abrosimov, H. Riemann, H.H. Radamson, N.A. Bekin, A.N. Yablonsky, R.K. Zhukavin, Y.N. Drozdov and V.N. Shastin	613
X-Ray Characterization of the Lattice Perfection of Heteroepitaxial SIS Structures	
P. Zaumseil, G. Weidner and T. Schroeder	619
Electroluminescence from ZnO/n⁺-Si Heterojunction	
X.Y. Ma, P.L. Chen, D.S. Li and D.R. Yang	625
Characterization of SiO₂/Si Interface by Cathodoluminescent Method	
M.V. Zamoryanskaya and V.I. Sokolov	629