

Cambridge University Press

978-1-107-40577-6 - Materials Research Society Symposia Proceedings: Volume 35:

Energy Beam-Solid Interactions and Transient Thermal Processing/1984

Editors: D. K. Biegelsen, G. A. Rozgonyi and C. V. Shank

Frontmatter

[More information](#)

Energy Beam-Solid Interactions and Transient Thermal Processing/1984

Cambridge University Press

978-1-107-40577-6 - Materials Research Society Symposia Proceedings: Volume 35:
Energy Beam-Solid Interactions and Transient Thermal Processing/1984

Editors: D. K. Biegelsen, G. A. Rozgonyi and C. V. Shank

Frontmatter

[More information](#)

MATERIALS RESEARCH SOCIETY SYMPOSIA PROCEEDINGS

ISSN 0272 - 9172

- Volume 1—Laser and Electron-Beam Solid Interactions and Materials Processing,
J. F. Gibbons, L. D. Hess, T. W. Sigmon, 1981
- Volume 2—Defects in Semiconductors, J. Narayan, T. Y. Tan, 1981
- Volume 3—Nuclear and Electron Resonance Spectroscopies Applied to Materials
Science, E. N. Kaufmann, G. K. Shenoy, 1981
- Volume 4—Laser and Electron-Beam Interactions with Solids, B. R. Appleton,
G. K. Celler, 1982
- Volume 5—Grain Boundaries in Semiconductors, H. J. Leamy, G. E. Pike,
C. H. Seager, 1982
- Volume 6—Scientific Basis for Nuclear Waste Management, S. V. Topp, 1982
- Volume 7—Metastable Materials Formation by Ion Implantation, S. T. Picraux,
W. J. Choyke, 1982
- Volume 8—Rapidly Solidified Amorphous and Crystalline Alloys, B. H. Kear,
B. C. Giessen, M. Cohen, 1982
- Volume 9—Materials Processing in the Reduced Gravity Environment of Space,
G. E. Rindone, 1982
- Volume 10—Thin Films and Interfaces, P. S. Ho, K.-N. Tu, 1982
- Volume 11—Scientific Basis for Nuclear Waste Management V, W. Lutze, 1982
- Volume 12—In Situ Composites IV, F. D. Lemkey, H. E. Cline, M. McLean, 1982
- Volume 13—Laser Solid Interactions and Transient Thermal Processing of Materials,
J. Narayan, W. L. Brown, R. A. Lemons, 1983
- Volume 14—Defects in Semiconductors II, S. Mahajan, J. W. Corbett, 1983
- Volume 15—Scientific Basis for Nuclear Waste Management VI, D. G. Brookins, 1983
- Volume 16—Nuclear Radiation Detector Materials, E. E. Haller, H. W. Kraner, W. A.
Higinbotham, 1983
- Volume 17—Laser Diagnostics and Photochemical Processing for Semiconductor
Devices, R. M. Osgood, S. R. J. Brueck, H. R. Schlossberg, 1983
- Volume 18—Interfaces and Contacts, R. Ludeke, K. Rose, 1983
- Volume 19—Alloy Phase Diagrams, L. H. Bennett, T. B. Massalski, B. C. Giessen,
1983
- Volume 20—Intercalated Graphite, M. S. Dresselhaus, G. Dresselhaus, J. E. Fischer,
M. J. Moran, 1983
- Volume 21—Phase Transformations in Solids, T. Tsakalakos, 1984
- Volume 22—High Pressure in Science and Technology, C. Homan, R. K. MacCrone,
E. Whalley, 1984
- Volume 23—Energy Beam-Solid Interactions and Transient Thermal Processing,
J. C. C. Fan, N. M. Johnson, 1984
- Volume 24—Defect Properties and Processing of High-Technology Nonmetallic
Materials, J. H. Crawford, Jr., Y. Chen, W. A. Sibley, 1984

Cambridge University Press

978-1-107-40577-6 - Materials Research Society Symposia Proceedings: Volume 35:
Energy Beam-Solid Interactions and Transient Thermal Processing/1984

Editors: D. K. Biegelsen, G. A. Rozgonyi and C. V. Shank

Frontmatter

[More information](#)

MATERIALS RESEARCH SOCIETY SYMPOSIA PROCEEDINGS

- Volume 25—Thin Films and Interfaces II, J. E. E. Baglin, D. R. Campbell, W. K. Chu, 1984
- Volume 26—Scientific Basis for Nuclear Waste Management VII, G. L. McVay, 1984
- Volume 27—Ion Implantation and Ion Beam Processing of Materials, G. K. Hubler, O. W. Holland, C. R. Clayton, C. W. White, 1984
- Volume 28—Rapidly Solidified Metastable Materials, B. H. Kear, B. C. Giessen, 1984
- Volume 29—Laser-Controlled Chemical Processing of Surfaces, A. W. Johnson, D. J. Ehrlich, H. R. Schlossberg, 1984
- Volume 30—Plasma Processing and Synthesis of Materials, J. Szekely, D. Apelian, 1984
- Volume 31—Electron Microscopy of Materials, W. Krakow, D. Smith, L. W. Hobbs, 1984
- Volume 32—Better Ceramics Through Chemistry, C. J. Brinker, D. E. Clark, D. R. Ulrich, 1984
- Volume 33—Comparison of Thin Film Transistor and SOI Technologies, H. W. Lam, M. J. Thompson, 1984
- Volume 34—Physical Metallurgy of Cast Iron, H. Fredriksson, M. Hillerts, 1985
- Volume 35—Energy Beam-Solid Interactions and Transient Thermal Processing/1984, D. K. Biegelsen, G. Rozgonyi, C. Shank, 1985
- Volume 36—Impurity Diffusion and Gettering in Silicon, R. B. Fair, C. W. Pearce, J. Washburn, 1985
- Volume 37—Layered Structures, Epitaxy and Interfaces, J. M. Gibson, L. R. Dawson, 1985
- Volume 38—Plasma Synthesis and Etching of Electronic Materials, R. P. H. Chang, B. Abeles, 1985
- Volume 39—High-Temperature Ordered Intermetallic Alloys, C. C. Koch, C. T. Liu, N. S. Stoloff, 1985
- Volume 40—Electronic Packaging Materials Science, E. A. Giess, K.-N. Tu, D. R. Uhlmann, 1985
- Volume 41—Advanced Photon and Particle Techniques for the Characterization of Defects in Solids, J. B. Roberto, R. W. Carpenter, M. C. Wittels, 1985
- Volume 42—Very High Strength Cement-Based Materials, J. F. Young, 1985
- Volume 43—Coal Combustion and Conversion Wastes: Characterization, Utilization, and Disposal, G. J. McCarthy, R. J. Lauf, 1985
- Volume 44—Scientific Basis for Nuclear Waste Management VIII, C. M. Jantzen, J. A. Stone, R. C. Ewing, 1985

Cambridge University Press

978-1-107-40577-6 - Materials Research Society Symposia Proceedings: Volume 35:
Energy Beam-Solid Interactions and Transient Thermal Processing/1984

Editors: D. K. Biegelsen, G. A. Rozgonyi and C. V. Shank

Frontmatter

[More information](#)

Cambridge University Press

978-1-107-40577-6 - Materials Research Society Symposia Proceedings: Volume 35:

Energy Beam-Solid Interactions and Transient Thermal Processing/1984

Editors: D. K. Biegelsen, G. A. Rozgonyi and C. V. Shank

Frontmatter

[More information](#)

MATERIALS RESEARCH SOCIETY SYMPOSIA PROCEEDINGS VOLUME 35

Energy Beam-Solid Interactions and Transient Thermal Processing/1984

Symposium held November 26-30, 1984, Boston, Massachusetts,
U. S. A.

EDITORS:

D. K. Biegelsen

Xerox Palo Alto Research Center, Palo Alto, California, U. S. A.

G. A. Rozgonyi

Microelectronics Center of North Carolina, Research Triangle Park,
North Carolina, U. S. A.

C. V. Shank

AT&T Bell Laboratories, Holmdel, New Jersey, U. S. A.



MATERIALS RESEARCH SOCIETY

Pittsburgh, Pennsylvania

Cambridge University Press

978-1-107-40577-6 - Materials Research Society Symposia Proceedings: Volume 35:
Energy Beam-Solid Interactions and Transient Thermal Processing/1984

Editors: D. K. Biegelsen, G. A. Rozgonyi and C. V. Shank

Frontmatter

[More information](#)

CAMBRIDGE UNIVERSITY PRESS

Cambridge, New York, Melbourne, Madrid, Cape Town,
Singapore, São Paulo, Delhi, Mexico City

Cambridge University Press

32 Avenue of the Americas, New York NY 10013-2473, USA

Published in the United States of America by Cambridge University Press, New York

www.cambridge.org

Information on this title: www.cambridge.org/9781107405776

Materials Research Society

506 Keystone Drive, Warrendale, PA 15086

<http://www.mrs.org>

© Materials Research Society 1985

This publication is in copyright. Subject to statutory exception
and to the provisions of relevant collective licensing agreements,
no reproduction of any part may take place without the written
permission of Cambridge University Press.

This publication has been registered with Copyright Clearance Center, Inc.
For further information please contact the Copyright Clearance Center,
Salem, Massachusetts.

First published 1985

First paperback edition 2012

Single article reprints from this publication are available through
University Microfilms Inc., 300 North Zeeb Road, Ann Arbor, MI 48106

CODEN: MRSPDH

ISBN 978-0-931-83700-5 Hardback

ISBN 978-1-107-40577-6 Paperback

Cambridge University Press has no responsibility for the persistence or
accuracy of URLs for external or third-party internet websites referred to in
this publication, and does not guarantee that any content on such websites is,
or will remain, accurate or appropriate.

Cambridge University Press
978-1-107-40577-6 - Materials Research Society Symposia Proceedings: Volume 35:
Energy Beam-Solid Interactions and Transient Thermal Processing/1984
Editors: D. K. Biegelsen, G. A. Rozgonyi and C. V. Shank
Frontmatter
[More information](#)

Contents

PREFACE	xvii
ACKNOWLEDGMENTS	xix
PART I: INTRODUCTORY OVERVIEWS	
PICOSECOND PHOTON-SOLID INTERACTION H. Kurz and N. Bloembergen	3
FUNDAMENTAL ASPECTS OF HIGH SPEED CRYSTAL GROWTH FROM THE MELT A.G. Cullis	15
KINETICS AND MECHANISMS OF SOLID PHASE EPITAXY AND COMPETITIVE PROCESSES IN SILICON G.L. Olson	25
APPLICATIONS OF BEAM-SOLID INTERACTIONS IN SEMICONDUCTOR MATERIAL AND DEVICE PROCESSING John C.C. Fan	39
PART II: ULTRA FAST PROCESSES IN HIGHLY EXCITED MATERIALS	
THERMODYNAMIC AND KINETIC STUDIES OF PULSED-LASER ANNEALING FROM TRANSIENT CONDUCTIVITY MEASUREMENTS P.S. Peercy and Michael O. Thompson	53
ELECTRON-PHONON AND PHONON-PHONON INTERACTIONS UNDER LASER ANNEALING CONDITIONS Alvin Compaan	65
PICOSECOND PHOTOEMISSION STUDIES OF THE LASER-INDUCED PHASE TRANSITION IN SILICON A.M. Malvezzi, H. Kurz and N. Bloembergen	75
PHOTOELECTRON SPECTROSCOPY OF CONDUCTION-ELECTRON ENERGY DISTRIBUTIONS IN LASER-EXCITED SILICON J.P. Long, R.T. Williams, J.C. Rife and M.N. Kabler	81
TIME-RESOLVED, LASER-INDUCED PHASE TRANSFORMATION IN ALUMINUM S. Williamson, G. Mourou and J.C.M. Li	87
PULSE-DURATION-DEPENDENT-FREE-CARRIER-ABSORPTION IN SEMICONDUCTORS P. Mukherjee, M. Sheik-Bahaei and H.S. Kwok	97

Cambridge University Press

978-1-107-40577-6 - Materials Research Society Symposia Proceedings: Volume 35:

Energy Beam-Solid Interactions and Transient Thermal Processing/1984

Editors: D. K. Biegelsen, G. A. Rozgonyi and C. V. Shank

Frontmatter

[More information](#)

TIME-RESOLVED STUDIES OF RAPID SOLIDIFICATION IN HIGHLY UNDERCOOLED MOLTEN SILICON D.H. Lowndes, G.E. Jellison, Jr., R.F. Wood, S.J. Pennycook and R.W. Carpenter	101
SPATIALLY AND TEMPORALLY RESOLVED REFLECTIVITY PROFILES OF CRYSTALLINE SILICON IRRADIATED BY 48 PS PULSES OF ONE-MICRON LASER RADIATION Steven C. Moss, Ian W. Boyd, Thomas F. Boggess and Arthur L. Smirl	107
TIME-RESOLVED ELLIPSOMETRY AND REFLECTIVITY MEASUREMENTS OF THE OPTICAL PROPERTIES OF SILICON DURING PULSED EXCIMER LASER IRRADIATION G.E. Jellison, Jr. and D.H. Lowndes	113
TIME-RESOLVED X-RAY STUDIES DURING PULSED-LASER IRRADIATION OF Ge J.Z. Tischler, B.C. Larson and D.M. Mills	119
ANISOTROPIC SECOND HARMONIC GENERATION INDUCED IN SILICON AND GERMANIUM BY PICOSECOND AND NANOSECOND LASER PULSES John A. Litwin, Henry M. Van Driel and John E. Sipe	125
EVOLUTION OF SILICON IRRADIATED WITH FEMTOSECOND PULSES D. Hulin, C. Tanguy, M. Combescot, J. Bok, A. Migus and A. Antonetti	131
ULTRAFAST PHASE TRANSITION OF GaAs SURFACES IRRADIATED BY PICOSECOND LASER PULSES J.M. Liu, A.M. Malvezzi and N. Bloembergen	137
PART III: FUNDAMENTAL ASPECTS OF BULK RECRYSTALLIZATION	
IMPURITY INCORPORATION DURING Si ULTRAFAST SOLIDIFICATION TO THE CRYSTALLINE AND AMORPHOUS PHASE Salvatore Ugo Campisano	145
A TEST OF TWO SOLUTE-TRAPPING MODELS M.J. Aziz, J.Y. Tsao, M.O. Thompson, P.S. Peercy, C.W. White and W.H. Christie	153
MODELING OF UNDERCOOLING, NUCLEATION, AND MULTIPLE PHASE FRONT FORMATION IN PULSED-LASER-MELTED AMORPHOUS SILICON R.F. Wood, G.A. Geist, A.D. Solomon, D.H. Lowndes and G.E. Jellison, Jr.	159
EFFECTS OF ARSENIC DOPING ON THE SOLIDIFICATION DYNAMICS OF PULSED-LASER-MELTED SILICON Michael O. Thompson, P.S. Peercy and J.Y. Tsao	169

Cambridge University Press

978-1-107-40577-6 - Materials Research Society Symposia Proceedings: Volume 35:

Energy Beam-Solid Interactions and Transient Thermal Processing/1984

Editors: D. K. Biegelsen, G. A. Rozgonyi and C. V. Shank

Frontmatter

[More information](#)

LOW-ENERGY, PULSED-LASER IRRADIATION OF AMORPHOUS SILICON: MELTING AND RESOLIDIFICATION AT TWO FRONTS W. Sinke and F.W. Saris	175
RELATION BETWEEN TEMPERATURE AND SOLIDIFICATION VELOCITY IN RAPIDLY COOLED LIQUID SILICON M.O. Thompson, P.H. Bucksbaum and J. Bokor	181
OVERHEATING AND UNDERCOOLING IN SILICON DURING PULSED-LASER IRRADIATION B.C. Larson, J.Z. Tischler and D.M. Mills	187
LASER-BEAM-GLASS INTERACTION INDUCING GLASS-CRYSTALLINE TRANSFORMATIONS E. Haro, M. Balkanski, G.P. Espinosa and J.C. Phillips	193
LASER-INDUCED SURFACE RIPPLES: WHAT IS UNDERSTOOD AND WHAT IS NOT P.M. Fauchet and A.E. Siegman	199
LASER IRRADIATION OF Ge(100): AN ASSESSMENT OF SURFACE ORDER WITH He DIFFRACTION W.R. Lambert, P.L. Trevor, M.T. Schulberg, M.J. Cardillo and J.C. Tully	205
EFFECTS OF IMPURITIES ON THE COMPETITION BETWEEN SOLID PHASE EPITAXY AND RANDOM CRYSTALLIZATION IN ION-IMPLANTED SILICON G.L. Olson, J.A. Roth, Y. Rytz-Froidevaux and J. Narayan	211
RAMAN MEASUREMENTS ON GRAPHITE MODIFIED BY HIGH-POWER LASER IRRADIATION J. Steinbeck, G. Braunstein, M.S. Dresselhaus, B.S. Elman and T. Venkatesan	219
ELECTRON-BEAM ANNEALING OF PHOSPHORUS IMPLANTED CADMIUM TELLURIDE C.B. Yang, M.L. Peng, J.T. Lue and H.L. Hwang	225
ELECTRIC CONDUCTIVITY OF VITREOUS SILICA DURING PULSED-ELECTRON-BEAM IRRADIATION Stanley H. Stern and Ralph B. Fiorito	233
THRESHOLD ENERGIES FOR THE MELTING OF Si AND Al DURING PULSED-LASER IRRADIATION C.K. Ong, H.S. Tan and E.H. Sin	239
CALCULATIONS ON MULTI-PULSE, LASER-INDUCED DIFFUSION AND EVAPORATION LOSS OF ARSENIC AND BORON IN SILICON H.S. Tan and C.K. Ong	245
EXPLOSIVE CRYSTALLIZATION IN a-Ge FILMS IRRADIATED WITH MICROSECOND LASER PULSES R.K. Sharma and S.K. Bansal	251

Cambridge University Press

978-1-107-40577-6 - Materials Research Society Symposia Proceedings: Volume 35:

Energy Beam-Solid Interactions and Transient Thermal Processing/1984

Editors: D. K. Biegelsen, G. A. Rozgonyi and C. V. Shank

Frontmatter

[More information](#)

IMPLANTED IMPURITY INCORPORATION AND SEGREGATION PHENOMENA INDUCED BY PEBA IN SILICON G. Chaussemy, D. Barbier and A. Laugier	257
PART IV: RAPID THERMAL PROCESSING	
ELECTRONIC DEFECTS IN TRANSIENT, THERMALLY PROCESSED SEMICONDUCTORS N.M. Johnson	265
DYNAMIC ANNEALING PHENOMENA AND THE ORIGIN OF RTA-INDUCED "HAIRPIN" DISLOCATIONS W. Maszara, D.K. Sadana, G.A. Rozgonyi, T. Sands, J. Washburn and J.J. Wortman	277
A STUDY OF ELECTRICALLY ACTIVE DEFECTS INDUCED BY PULSED-ELECTRON-BEAM ANNEALING IN (100) N-TYPE VIRGIN SILICON M.S. Doghmane, D. Barbier and A. Laugier	287
A COMPARISON OF DEEP LEVELS GENERATED IN InP BY PROTON AND DEUTRON BOMBARDMENT A.J. Macrander and B. Schwartz	293
CHARACTERIZATION OF DEFECTS IN PROTON-IMPLANTED GaAs H.A. Jenkinson, G.N. Maracas, M. O'Tooni and R.G. Sarkis	299
STRAIN/DAMAGE IN CRYSTALLINE MATERIALS BOMBARDED BY MeV IONS: RECRYSTALLIZATION OF GaAs BY HIGH-DOSE IRRADIATION C.R. Wie, T. Vreeland, Jr., and T.A. Tombrello	305
ACTIVATION OF Si-N MODES IN SILICON BY PULSED-LASER ANNEALING H.J. Stein, P.S. Peercy and C.R. Hills	315
CHEMICAL REACTION PRODUCTS FROM INTERACTION OF HIGH-ENERGY BEAMS WITH COMPOSITES J.S. Perkins, S.S. Lin, P.W. Wong, D.J. Jaklitsch and A.F. Connolly	321
RAPID THERMAL ANNEALING IN Si T.E. Seidel, C.S. Pai, D.J. Lischner, D.M. Maher, R.V. Knoell, J.S. Williams, B.R. Penumalli and D.C. Jacobson	329
A SIMPLE MODEL FOR THE TRANSIENT, ENHANCED DIFFUSION OF ION-IMPLANTED PHOSPHOROUS IN SILICON F.F. Morehead and R.T. Hodgson	341

A COMPARISON OF MILLISECOND ANNEALING OF B IMPLANTS AND ISOTHERMAL ANNEALING FOR TIMES OF A FEW SECONDS R.A. McMahon, D.G. Hasko, H. Ahmed, W.M. Stobbs and D.J. Godfrey	347
RAPID THERMAL ANNEALING OF PRE-AMORPHIZED B AND BF ₂ -IMPLANTED SILICON I.D. Calder, H.M. Naguib, D. Houghton and F.R. Shepherd	353
LIGHT-INDUCED, SHORT-TIME ANNEALING OF SILICON-IMPLANTED LAYERS D. Wouters and H.E. Maes	359
HIGH-QUALITY BORON AND BF ₂ -IMPLANTED P ⁺ JUNCTIONS IN Si USING SOLID PHASE EPITAXY AND TRANSIENT ANNEALING P.K. Vasudev, A.E. Schmitz and G.L. Olson	367
FORMATION OF SHALLOW P ⁺ JUNCTIONS USING TWO-STEP ANNEALS C.I. Drowley, J. Adkisson, D. Peters and S-Y. Chiang	375
IMPURITY DIFFUSION DURING RTA R.B. Fair	381
SOLID-PHASE EPITAXIAL REGROWTH OF ION-PLANTED SILICON ON SAPPHIRE USING RAPID THERMAL ANNEALING A.M. Hodge, A.G. Cullis and N.G. Chew	393
IMPROVING THE QUALITY OF A HETEROEPITAXIAL CaF ₂ OVERLAYER BY RAPID POST ANNEALING Loren Pfeiffer, Julia M. Phillips, T.P. Smith III, W.M. Augustyniak and K.W. West	401
TRANSIENT ANNEALING OF NEUTRON-TRANSMUTATION-DOPED SILICON C.J. Pollard, K.G. Barraclough and M.S. Skolnick	407
PULSED-CO ₂ -LASER ANNEALING OF ION-IMPLANTED SILICON R.B. Jamas, J. Narayan, W.H. Christie, R.E. Eby, O.W. Holland and R.F. Wood	413
DOPANT INCORPORATION IN SILICON DURING NONEQUILIBRIUM SOLIDIFICATION: COMPARISON OF TWO PROCESSES E.P. Fogarassy, D.H. Lowndes, J. Narayan and C.W. White	419
PART V: COMPOUND SEMICONDUCTORS	
RAPID ANNEALING OF GaAs AND RELATED COMPOUNDS J.S. Williams and S.J. Pearton	427
EPITAXY AND DEFECTS IN LASER-IRRADIATED, SINGLE-CRYSTAL BISMUTH Aubrey L. Helms, Jr., Clifton W. Draper, Dale C. Jacobson, John M. Poate and Steven L. Bernasek	439

Cambridge University Press
978-1-107-40577-6 - Materials Research Society Symposia Proceedings: Volume 35:
Energy Beam-Solid Interactions and Transient Thermal Processing/1984
Editors: D. K. Biegelsen, G. A. Rozgonyi and C. V. Shank
Frontmatter
[More information](#)

BORON REDISTRIBUTION DURING TRANSIENT THERMAL METAL SILICIDE GROWTH ON Si C.J. Sofield, R.E. Harper and P.J. Rosser	445
OPTICAL FURNACE ANNEALING Neil J. Barrett, D.C. Bartle, A.G. Todd and J.D. Grange	451
RAPID THERMAL ANNEALING OF TiSi_2 FOR INTERCONNECTS P.J. Rosser and G.J. Tomkins	457
TRANSIENT PROCESSING OF TITANIUM SILICIDES IN A NON-ISOTHERMAL REACTOR C.S. Wei, J. Van Der Spiegel, J. Santiago and L.E. Seiberling	465
TITANIUM SILICIDATION BY HALOGEN LAMP ANNEALING T. Okamoto, M. Shimizu, K. Tsukamoto and T. Matsukawa	471
LUMINESCENCE OF Si-IMPLANTED InP AFTER RAPID THERMAL ANNEALING D. Kirillov and J.L. Merz	477
RAPID THERMAL-PULSED DIFFUSION OF Zn INTO GaAs S.K. Tiku, J.B. Delaney, N.S. Gabriel and H.T. Yuan	483
THE MICROSTRUCTURE OF TRANSIENTLY ANNEALED DONOR IMPLANTS IN GaAs M.A. Shahid, R. Bensalem and B.J. Sealy	489
THE APPLICATION OF LASER ANNEALING TO THE FABRICATION OF IMPATT DIODE STRUCTURES Anthony E. Adams and L.A. Hing	497
INCOHERENT LIGHT ANNEALING OF SELECTIVELY IMPLANTED GaAs FOR MESFET APPLICATIONS S.A. Kitching, M.H. Badawi, S.W. Bland and J. Mun	503
RAPID THERMAL ANNEALING OF Si-IMPLANTED GaAs FOR POWER FETs H. Kanber, R.J. Cipolli and J.M. Whelan	509
RAPID THERMAL ANNEALING OF DEPOSITED SiO_2 FILMS J. Wong, T-M. Lu, S.S. Cohen and S. Mehta	515
ANALYSIS OF HIGH-DOSE IMPLANTED SILICON BY HIGH-DEPTH RESOLUTION RBS AND SPECTROSCOPIC ELLIPSOMETRY AND TEM T. Lohner, G. Mezey, M. Fried, L. Ghita, C. Ghita, A. Mertens, H. Kerkow, E. Kotai, F. Paszti, F. Banyai, G.Y. Vizkelethy, E. Jaroli, J. Gyulai and M. Somogyi	523
CHANNELING EFFECT IN BORON AND BORON MOLECULAR ION-IMPLANTATION M. Delfino and B.M. Paine	529

Cambridge University Press

978-1-107-40577-6 - Materials Research Society Symposia Proceedings: Volume 35:
Energy Beam-Solid Interactions and Transient Thermal Processing/1984

Editors: D. K. Biegelsen, G. A. Rozgonyi and C. V. Shank

Frontmatter

[More information](#)

ION-PROJECTION LITHOGRAPHY FOR SUBMICRON MODIFICATION OF MATERIALS G. Stengl, H. Loschner, W. Maurer and P. Wolf	533
DISORDER PRODUCTION AT METAL-SILICON INTERFACES BY MeV/amu ION RADIATION R.L. Headrick and L.E. Seiberling	539
ION-INDUCED MIXING IN Ni-SiO ₂ BILAYERS T.C. Banwell, M-A. Nicolet, P.J. Grunthaner and T. Sands	545
PULSED ION-BEAM INDUCED REACTIONS OF Ni AND Co WITH AMORPHOUS AND SINGLE CRYSTAL SILICON J.O. Olowolafe and R. Fastow	553
PART VII: SILICON CRYSTAL GROWTH FROM THE MELT OVER INSULATORS	
SOLID-LIQUID INTERFACE INSTABILITY IN THE ENERGY-BEAM RECRYSTALLIZATION OF SILICON ON INSULATOR El-Hang Lee	563
CHARACTERIZATION, CONTROL, AND REDUCTION OF SUBBOUNDARIES IN SILICON ON INSULATORS M.W. Geis, C.K. Chen, Henry I. Smith, R.W. Mountain, and C.L. Doherty	575
IMPROVED CRYSTAL PERFECTION IN ZONE-RECRYSTALLIZED Si FILMS ON SiO ₂ Loren Pfeiffer, K.W. West, Scott Paine and D.C. Joy	583
HIGH-VOLTAGE ELECTRON MICROSCOPY INVESTIGATION OF SUBGRAIN BOUNDARIES IN RECRYSTALLIZED SILICON-ON-INSULATOR STRUCTURES H. Baumgart and F. Phillipp	593
SUBBOUNDARY SPACING AND APPEARANCE IN LASER ZONE-MELTING RECRYSTALLIZATION OF SILICON ON AMORPHOUS SUBSTRATE J.P. Joly, J.M. Hode and J.C. Castagna	599
SUBBOUNDARY FREE SUBMICRONIC DEVICES ON LASER- RECRYSTALLIZED SILICON ON INSULATOR A.J. Auberton-Herve, J.P. Joly, J.M. Hode and J.C. Castagna	607
RECENT ADVANCES IN Si AND Ge ZONE-MELTING RECRYSTALLIZATION C.K. Chen, M.W. Geis, H.K. Choi, B-Y. Tsaur and John C.C. Fan	613
Si-ON-INSULATOR FORMATION USING A LINE-SOURCE ELECTRON BEAM J.A. Knapp	619

Cambridge University Press

978-1-107-40577-6 - Materials Research Society Symposia Proceedings: Volume 35:

Energy Beam-Solid Interactions and Transient Thermal Processing/1984

Editors: D. K. Biegelsen, G. A. Rozgonyi and C. V. Shank

Frontmatter

[More information](#)

COMPUTER MODELING OF LATERAL EPITAXIAL GROWTH OVER OXIDE Lynn O. Wilson and G.K. Celler	623
THERMAL PROFILES IN SILICON-ON-INSULATOR (SOI) MATERIAL RECRYSTALLIZED WITH SCANNING LIGHT LINE SOURCES Katsuhiko Kubota, Charles E. Hunt and Jeffrey Frey	629
KINETICS OF RADIATIVE MELTING OF Si G.K. Celler, L.E. Trimble and Lynn O. Wilson	635
SOI TECHNOLOGIES: DEVICE APPLICATIONS AND FUTURE PROSPECTS B-Y. Tsaur	641
LASER RECRYSTALLIZATION AND 3D INTEGRATION J.P. Colinge	653
SINGLE CRYSTALLINE SOI SQUARE ISLANDS FABRICATED BY LASER RECRYSTALLIZATION USING A SURROUNDING ANTI- REFLECTION CAP AND SUCCESSIVE SELF-ALIGNED ISOLATION UTILIZING THE SAME CAP R. Mukai, N. Sasaki, T. Iwai, S. Kawamura and M. Nakano	663
TWO-STEP LASER RECRYSTALLIZATION OF SILICON STRIPES IN SiO ₂ GROOVES FOR CRYSTALLOGRAPHIC ORIENTATION CONTROL K. Egami, M. Kimura, T. Hamaguchi and N. Endo	669
PHOTODETECTOR ARRAYS IN LASER-RECRYSTALLIZED SILICON INTEGRATED WITH AN OPTICAL WAVEGUIDE R.W. Wu, H.A. Timlin, H.E. Jackson and J.T. Boyd	675
X-RAY STUDIES OF STRAIN IN LASER-CRYSTALLIZED SOI FILMS Michael Rivier, F. Reidinger, G. Goetz, J. McKittrick and A. Cserhati	681
ADHESION EFFECTS ON THE RECRYSTALLIZATION OF SILICON FILMS C.E. Bleil and J.R. Troxell	687
PART VIII: SILICON SOLID-PHASE CRYSTAL GROWTH ON INSULATORS	
SOLID PHASE EPITAXY OF UHV-DEPOSITED AMORPHOUS Si OVER RECESSED SiO ₂ LAYER M. Tabe and Y. Kunii	695
FORMATION OF Si-ON-INSULATOR STRUCTURE UNDER SOLID PHASE GROWTH M. Miyao, M. Moniwa, T. Warabisako, H. Sunami and T. Tokuyama	705
SOLID PHASE PROCESSES FOR SEMICONDUCTOR-ON-INSULATOR C.V. Thompson	711

Cambridge University Press
978-1-107-40577-6 - Materials Research Society Symposia Proceedings: Volume 35:
Energy Beam-Solid Interactions and Transient Thermal Processing/1984
Editors: D. K. Biegelsen, G. A. Rozgonyi and C. V. Shank
Frontmatter
[More information](#)

GRAIN GROWTH PROCESSES DURING TRANSIENT ANNEALING OF As-IMPLANTED, POLYCRYSTALLINE-SILICON FILMS S.J. Krause, S.R. Wilson, W.M. Paulson and R.B. Gregory	721
MODIFYING CRYSTALLOGRAPHIC ORIENTATIONS OF POLY- CRYSTALLINE Si FILMS USING ION CHANNELING K. T-Y. Kung, R.B. Iverson and R. Reif	727
AUTHOR INDEX	733
SUBJECT INDEX	737

Cambridge University Press

978-1-107-40577-6 - Materials Research Society Symposia Proceedings: Volume 35:
Energy Beam-Solid Interactions and Transient Thermal Processing/1984

Editors: D. K. Biegelsen, G. A. Rozgonyi and C. V. Shank

Frontmatter

[More information](#)

Cambridge University Press

978-1-107-40577-6 - Materials Research Society Symposia Proceedings: Volume 35:

Energy Beam-Solid Interactions and Transient Thermal Processing/1984

Editors: D. K. Biegelsen, G. A. Rozgonyi and C. V. Shank

Frontmatter

[More information](#)

Preface

This volume contains papers presented at the symposium on "Energy Beam Solid Interactions and Transient Thermal Processing." held in Massachusetts, November 26-30, 1984. The symposium was the seventh in a series of Materials Research Society symposia devoted to those topical areas evolving from the subject of "laser annealing." The conference opened with a plenary session highlighting representative areas of the symposium. A special concluding talk was presented by Walter Brown (AT&T Bell Labs), summarizing the meeting and pointing to areas requiring further study. Symposium sessions were coordinated with those in other symposia (e.g. impurity diffusion) to enhance the coupling in areas of common interest.

The material covered in this symposium has three distinct foci. First is the field of sub-microsecond (to femtosecond) interactions of energy beams with solids and the resultant material changes on similar time scales. Issues of energy transfer, internal equilibration, solid phase regrowth of amorphized layers, ultrarapid quenching of amorphous semiconductors dominate this topic. A second focus is the maturing area of rapid thermal processing (10^{-3} to 10^2 seconds). The materials science issues of defect and impurity kinetics, and silicide and alloy development underlie a strong technological thrust. The third focus is the area of semiconductor growth over insulators by lateral epitaxy. Studies concerning low angle grain boundaries, the characteristic microscopic defects in zone melting recrystallization of thin films, and increasing emphasis on solid phase lateral epitaxy are showing strong progress towards technologically suitable preparation techniques.

Symposium Co-Chairmen

D.K. Biegelsen G.A. Rozgonyi C.V. Shank

January 1985

Cambridge University Press

978-1-107-40577-6 - Materials Research Society Symposia Proceedings: Volume 35:
Energy Beam-Solid Interactions and Transient Thermal Processing/1984

Editors: D. K. Biegelsen, G. A. Rozgonyi and C. V. Shank

Frontmatter

[More information](#)

Acknowledgments

We wish to thank all the contributors and participants who made the symposium so successful. We particularly would like to acknowledge the invited speakers, who provided excellent summaries of specific areas and set the tone of the meeting. They are:

W.L. Brown	G. Mourou
S.U. Campisano	J. Narayan
J. -P. Colinge	G.L. Olson
A. Compaan	P.S. Peercy
A.G. Cullis	T.E. Seidel
R.B. Fair	M. Tabe
J.C.C. Fan	C.V. Thompson
H. Kurz	B. -Y. Tsaur
E. -H. Lee	J.S. Williams
N.M. Johnson	R.F. Wood

We are deeply indepted to the session chairs, who directed the sessions, guided the discussions, and gave invaluable help in having the papers refereed. They are:

B.R. Appleton	D.H. Lowndes
H. Baumgart	L. Pfeiffer
N. Bloembergen	R.F. Pinizzotto
W.L. Brown	J.M. Poate
G.K. Celler	D.K. Sadana
R.T. Hodgson	T.O. Sedgwick
B.C. Larson	H.I. Smith
R.A. Lemons	M.O. Thompson

It is our great pleasure to acknowledge, with gratitude, the financial support provided by the Army Research Office, Electronics Division (Dr. J. Hurt and Dr. R. W. Griffith); the Office of Naval Research (Dr. L. R. Cooper); the Air Force Office of Scientific Research (Dr. K. J. Malloy); and the Xerox Corporation.

Finally, we are grateful to F. Soto (Xerox) and A. Walker (AT&T) for excellent secretarial support.