

---

**MATERIALS  
RESEARCH  
SOCIETY  
SYMPOSIA PROCEEDINGS**

---

**VOLUME 56**

**Layered Structures  
and Epitaxy**

**EDITORS**

**J. M. Gibson  
G. C. Osbourn  
R. M. Tromp**



# Layered Structures and Epitaxy

Symposium held December 2-4, 1985, Boston, Massachusetts, U.S.A.

EDITORS:

**J. M. Gibson**

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

**G. C. Osbourn**

Sandia National Laboratories, Albuquerque, New Mexico, U.S.A.

**R. M. Tromp**

T. J. Watson Research Center, International Business Machines, Yorktown Heights, New York, U.S.A.



MATERIALS RESEARCH SOCIETY

Pittsburgh, Pennsylvania

This work relates to Department of Navy Grant N00014-86-G-0028 issued by the Office of Naval Research. The United States Government has a royalty-free license throughout the world in all copyrightable material contained herein.

This work was supported in part by the Air Force Office of Scientific Research, Air Force Systems Command, USAF, under Grant Number AFOSR-85-0355.

Copyright 1986 by Materials Research Society.  
All rights reserved.

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

Published by:

Materials Research Society  
9800 McKnight Road, Suite 327  
Pittsburgh, Pennsylvania 15237  
telephone (412) 367-3003

Library of Congress Cataloging in Publication Data

Main entry under title:

Layered structures and epitaxy.

(Materials Research Society symposia proceedings, ISSN 0272-9172 ; v. 56)

"Contains written accounts of almost all papers presented during the Symposium on Layered Structures and Epitaxy, held during the Meeting of the Materials Research Society in Boston, December, 1-6, 1985"—Pref.

Bibliography: p.

Includes indexes.

1. Epitaxy—Congresses. 2. Layer structure (Solids)—Congresses. 3. Surface chemistry—Congresses. 4. Superlattices as materials—Congresses.

I. Gibson, J. M. (John Murray), 1954- II. Osbourn, G. C. III. Tromp, R. M. IV. Symposium on Layered Structures and Epitaxy (1985 : Boston, Mass.) V. Materials Research Society. Meeting (1985 : Boston, Mass.) VI. Series.

QD921.L348 1986 530.4'1 86-16272

ISBN 0-931837-21-9

Manufactured in the United States of America

Manufactured by Publishers Choice Book Mfg. Co.  
Mars, Pennsylvania 16046

## **Layered Structures and Epitaxy**

---

---

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. Tsakalacos, 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

---

---

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
- Volume 45—Ion Beam Processes in Advanced Electronic Materials and Device Technology, F. H. Eisen, T. W. Sigmon, B. R. Appleton, 1985
- Volume 46—Microscopic Identification of Electronic Defects in Semiconductors, N. M. Johnson, S. G. Bishop, G. D. Watkins, 1985

---

---

MATERIALS RESEARCH SOCIETY SYMPOSIA PROCEEDINGS

---

- Volume 47—Thin Films: The Relationship of Structure to Properties, C. R. Aita, K. S. SreeHarsha, 1985
- Volume 48—Applied Material Characterization, W. Katz, P. Williams, 1985
- Volume 49—Materials Issues in Applications of Amorphous Silicon Technology, D. Adler, A. Madan, M. J. Thompson, 1985
- Volume 50—Scientific Basis for Nuclear Waste Management IX, L. O. Werme, 1985
- Volume 51—Beam-Solid Interactions and Phase Transformations, H. Kurz, G. L. Olson, J. M. Poate, 1986
- Volume 52—Rapid Thermal Processing, T. O. Sedgwick, T. E. Siedel, B. Y. Tsaur, 1986
- Volume 53—Semiconductor-on-Insulator and Thin Film Transistor Technology, A. Chiang, M. W. Geis, L. Pfeiffer, 1986
- Volume 54—Interfaces and Phenomena, R. H. Nemanich, P. S. Ho, S. S. Lau, 1986
- Volume 55—Biomedical Materials, M. F. Nichols, J. M. Williams, W. Zingg, 1986
- Volume 56—Layered Structures and Epitaxy, M. Gibson, G. C. Osbourn, R. M. Tromp, 1986
- Volume 57—Phase Transitions in Condensed Systems—Experiments and Theory, G. S. Cargill III, F. Spaepen, K. N. Tu, 1986
- Volume 58—Rapidly Solidified Alloys and Their Mechanical and Magnetic Properties, B. C. Giessen, D. E. Polk, A. I. Taub, 1986
- Volume 59—Oxygen, Carbon, Hydrogen, and Nitrogen in Crystalline Silicon, J. W. Corbett, J. C. Mikkelsen, Jr., S. J. Pearton, S. J. Pennycook, 1986
- Volume 60—Defect Properties and Processing of High-Technology Nonmetallic Materials, Y. Chen, W. D. Kingery, R. J. Stokes, 1986
- Volume 61—Defects in Glasses, Frank L. Galeener, David L. Griscom, Marvin J. Weber, 1986
- Volume 62—Materials Problem Solving with the Transmission Electron Microscope, L. W. Hobbs, K. H. Westmacott, D. B. Williams, 1986
- Volume 63—Computer-Based Microscopic Description of the Structure and Properties of Materials, J. Broughton, W. Krakow, S. T. Pantelides, 1986
- Volume 64—Cement-Based Composites: Strain Rate Effects on Fracture, S. Mindess, S. P. Shah, 1986
- Volume 65—Fly Ash and Coal Conversion By-Products: Characterization, Utilization and Disposal III, G. J. McCarthy , D. M. Roy, 1986
- Volume 66—Frontiers in Materials Education, G. L. Liedl, L. W. Hobbs, 1986

## Preface

This book contains written accounts of almost all papers presented during the Symposium on Layered Structures and Epitaxy, held during the Meeting of the Materials Research Society in Boston, December, 1-6, 1985. The Symposium covered new developments in epitaxial growth, superlattices, quantum wells and (amorphous) layered systems. The organizers thank all authors for their invaluable contributions which made this symposium a successful enterprise.

We also thank the Office of Naval Research (L.R. Cooper), the Air Force Office of Scientific Research (K. Malloy), and High Voltage Engineering Europa B.V. for their generous financial support. Without their help we could not have done it.

J.M. Gibson  
G.C. Osbourn  
R.M. Tromp

## Contents

PREFACE	xv
PART I: EPITAXIAL GROWTH OF SEMICONDUCTORS	
INTERFACIAL DEFECTS AND EPITAXY R.C. Pond	3
MOLECULAR DYNAMICS STUDIES OF THE COHERENCY OF MONOLAYER FILMS Marcia H. Grabow and George H. Gilmer	13
NEW SUPERLATTICE ARCHITECTURE IN III-V COMPOUND SEMICONDUCTORS VIA CONTROL OF EPITAXY ON AN ATOMIC SCALE P.M. Petroff	19
DEFECTS IN MBE SILICON R.M. Chrenko, L.J. Schowalter, E.L. Hall, and N. Lewis	27
THE INFLUENCE OF RECONSTRUCTION ON THE INITIAL STAGES OF SILICON MOLECULAR BEAM EPITAXY H.-J. Gossmann and L.C. Feldman	33
SURFACE STUDIES OF SILICON WITH A HIGH RESOLUTION TRANSMISSION ELECTRON MICROSCOPE J.M. Gibson, M.L. McDonald, F.C. Unterwald, H.-J. Gossmann, J.C. Bean, and R.T. Tung	39
HIGH CONTROLLABILITY OF CARRIER CONCENTRATION OF $p^-$ -LPE InP BY Mn DOPING T. Tanahashi, M. Kondo, T. Takanohashi, Y. Kotaki, S. Isozumi, and K. Nakajima	43
EPITAXY OF ARSENIC-PRESSURE-CONTROLLED MBE-GROWN GaAs LAYERS Y.H. Wang, W.C. Liu, C.Y. Chang, M.S. Jean, and S.A. Liao	49
PHOTOLUMINESCENCE AND ELECTRICAL PROPERTIES OF EPITAXIAL GaAs GROWN BY CLOSE SPACE VAPOR TRANSPORT J. Mimila-Arroyo, J.C. Bourgoin, R. Legros, and A. Huber	55
HEAVILY Si-DOPED AlAs FILMS GROWN BY MOLECULAR BEAM EPITAXY K. Kobayashi, N. Kamata, and T. Suzuki	61
SOLID PHASE EPITAXIAL GROWTH OF Ge ON GaAs C.J. Palmstrøm, G.J. Galvin, S.A. Schwarz, B.C. DeCooman, and J.W. Mayer	67

DEFECTS IN GaAs GROWN ON Ge SUBSTRATES C.B. Carter, B.C. DeCooman, N.H. Cho, R.M. Fletcher, D.K. Wagner, and J. Ballantyne	73
ANTIPHASE DOMAIN FREE EPITAXIAL GROWTH OF GaAs ON (100)Ge Y. Shinoda and Y. Ohmachi	79
NUCLEATION KINETICS OF CdTe/CdTe (111) HOMOEPITAXY BY LASER MBE J.T. Cheung	85
EPITAXY OF CdTe ON (100) GaAs L.A. Kolodziejski, R.L. Gunshor, N. Otsuka, and C. Choi	91
TWO DEFECT-RELATED PHOTOLUMINESCENCE SPECTRA AND CROSS-SECTION TEM OF MBE GROWN CdTe ON (100) InSb Z.C. Feng, A. Mascarenhas, W.J. Choyke, R.F.C. Farrow, J. Greggi, Jr., and F.A. Shirland	97
GROWTH AND CHARACTERIZATION OF $Hg_{1-x}Cd_xTe$ ON CdTe SUBSTRATES, PREPARED BY ORGANOMETALLIC EPITAXY I.B. Bhat and S.K. Ghandhi	103
LATTICE MATCHING IN HgCdTe-CdZnTe HETEROJUNCTIONS T. Maekawa, T. Saito, M. Yoshikawa, and H. Takigawa	109
X-RAY MONITORING OF InGaAsP LAYERS GROWN BY VAPOR PHASE EPITAXY A.T. Macrander and K. Streege	115
X-RAY DIFFRACTION ANALYSIS OF EPITAXIAL STRUCTURES Bruce M. Paine	121
PART II: EPITAXIAL SILICIDES AND METALS	
INITIAL STAGES OF EPITAXY OF METALS ON Si(111)-7 x 7 STUDIED BY UHV ELECTRON MICROSCOPY K. Takayanagi	129
METALLIC EPITAXY OF TRANSITION METALS ON SEMICONDUCTORS G.A. Prinz	139
DIFFRACTION STUDIES OF METAL-SEMICONDUCTOR INTERFACES D. Cherns, C.J. Kiely, and D.J. Eaglesham	145
GROWTH AND CHARACTERIZATION OF EPITAXIAL Si/CoSi <sub>2</sub> AND Si/CoSi <sub>2</sub> /Si HETEROSTRUCTURES B.D. Hunt, N. Lewis, E.L. Hall, L.G. Turner, L.J. Schowalter, Masako Okamoto, and Shin Hashimoto	151

STRAIN MEASUREMENT IN EPITAXIAL $\text{NiSi}_2/\text{Si}(111)$ BY MeV ION CHANNELING	
Masako Okamoto, Shin Hashimoto, B.D. Hunt, L.J. Schowalter, and W.M. Gibson	157
ELECTRON BEAM INDUCED CURRENT STUDIES OF NICKEL SILICIDE/SILICON SCHOTTKY BARRIER HEIGHTS	
J.M. Gibson, D.C. Joy, R.T. Tung, J.L. Ellison, C. Pimentel, and A.F.J. Levi	163
EPIТАХІАЛЬНОЕ РОСТВОРЕННЯ НІКЕЛІСІДОВИХ СЛОВІНЬ НА СІЛІЦІЙ ПРИ ЕЛЕКТРОННОМУ ПАРЕНІ	
T. Inada, S. Tohyama, Y. Funaki, and K. Itoh	171
STUDY OF Nb/Si MULTILAYERS	
C. Li, X. Cai, Z. Ye, H. Zhang, W. Zhang, G. Xiong, K. Wu, S. Wang, and D. Yin	177
ELECTRONIC AND CRYSTALLOGRAPHIC STRUCTURE OF IRON FILMS EPITAXIALLY GROWN ON Cu SINGLE CRYSTALS	
P.A. Montano, Y.C. Lee, J. Marcano, and H. Min	183
THE STRUCTURE AND COMPOSITION OF INTERPHASE BOUNDARIES IN Ni/Ag-(001) THIN FILMS DOPED WITH Au	
S.A. Dregia, C.L. Bauer, and P. Wynblatt	189
STRAIN IN MAGNETIC EuS/SrS SUPERLATTICES INVESTIGATED BY He ION CHANNELING	
S. Mantl, Ch. Buchal, B. Stritzker, and B. Saftic	195
ELECTRICAL RESISTIVITY OF Au-Cr SUPERLATTICES	
M.B. Brodsky, C.H. Sowers, and L.R. Sill	201
X-RAY AND TRANSPORT STUDIES OF RUTHENIUM-IRIDIUM BICRYSTAL SUPERLATTICES	
Roy Clarke, F. Lamelas, C. Uher, J.E. Cunningham, and C.P. Flynn	205
STRUCTURAL AND MAGNETIC PROPERTIES OF SINGLE CRYSTAL RARE EARTH Gd-Y SUPERLATTICES	
J. Kwo, D.B. McWhan, M. Hong, E.M. Gyorgy, and F.J. DiSalvo	211
PART III: STRAINED LAYER EPITAXY	
CONDUCTION BAND ENERGY LEVELS IN SUPERLATTICES WITH COMPLEX UNIT CELLS	
G.C. Osbourn	219

QUANTUM CONFINEMENT EFFECTS IN ZnSe/ZnMnSe STRAINED-LAYER SUPERLATTICES R.B. Rylsma, R. Frohne, J. Kossut, W.M. Becker, L.A. Kolodziejski, and R.L. Gunshor	223
OPTICAL IMAGING OF DISLOCATIONS IN STRAINED-LAYER SUPERLATTICES AND LATTICE-MISMATCHED EPILAYERS P.L. Gourley, R.M. Biefeld, and L.R. Dawson	229
HIGH RESOLUTION ELECTRON MICROSCOPE STUDY OF CdTe - Cd <sub>0.6</sub> Mn <sub>0.4</sub> Te SUPERLATTICES C. Choi, N. Otsuka, L.A. Kolodziejski, and R.L. Gunshor	235
PRESSURE-DEPENDENT MAGNETO-OPTIC MEASUREMENTS IN STRAINED-LAYER SUPERLATTICES AT LOW TEMPERATURES E.D. Jones, J.F. Schirber, I.J. Fritz, P.L. Gourley, R.M. Biefeld, L.R. Dawson, and T.J. Drummond	241
STRAIN AND REORDERING IN CaF <sub>2</sub> /Si(111) EPITAXY Shin Hashimoto, L.J. Schowalter, R.W. Fathauer, and W.M. Gibson	247
MBE GROWTH OF NON-LATTICE MATCHED (Ba,Ca)F <sub>2</sub> , (Pb,Sn)Se/(Ba,Ca)F <sub>2</sub> AND CdTe/(Ba,Ca)F <sub>2</sub> ON Si SUBSTRATES H. Zogg, P. Maier, and P. Norton	253
EPITAXIAL GROWTH OF ZIRCONIA AND YTTRIA STABILIZED ZIRCONIA FILMS ON SAPPHIRE SUBSTRATES BY REACTIVE SPUTTERING F. Konushi, T. Doi, H. Matsunaga, Y. Kakihara, M. Koba, K. Awane, and I. Nakamura	259
PART IV: QUANTUM WELLS	
SEMICONDUCTOR QUANTUM-WELL HETEROSTRUCTURES L.L. Chang	267
THEORETICAL METHODS FOR CALCULATING ELECTRONIC PROPERTIES OF SEMICONDUCTOR SUPERLATTICES Joel N. Schulman	279
PHOTOCONDUCTIVITY, PHOTOREFLECTANCE, AND PHOTOLUMINESCENCE OF GaAs-AlAs MULTIPLE QUANTUM WELLS H. Neff, K.J. Bachmann, and W.D. Laidig	289
DIRECT OBSERVATION OF INTERFACE TRAPS IN OMVPE-GROWTH SELECTIVELY DOPED AlGaAs/GaAs HETEROSTRUCTURE USING MODIFIED DLTS M. Takikawa, T. Oohori, K. Kasai, J. Komono, and A. Shibatomi	295

STABILITY OF Si-DOPED AlGaAs/GaAs MODFET STRUCTURES DURING CONVENTIONAL FURNACE AND RAPID OPTICAL ANNEALING J.K. Abrokwah, M. Hibbs-Brenner, R.R. Daniels, and P. Joslyn	301
NOVEL MEASUREMENT OF THE BAND DISCONTINUITIES IN (Al <sub>x</sub> Ga <sub>1-x</sub> )As HETEROJUNCTIONS B.A. Wilson, P. Dawson, C.W. Tu, and R.C. Miller	307
STRUCTURAL CHARACTERIZATION OF HgTe/CdTe SUPERLATTICES B.M. Paine, T. Vreeland, Jr., and J.T. Cheung	313
DEPTH-DEPENDENT MIXING OF AN AlAs-GaAs SUPERLATTICE BY ION IMPLANTATION S.A. Schwarz, T. Venkatesan, R. Bhat, M. Koza, H.W. Yoon, Y. Arakawa, and P. Mei	321
INTERMIXING OF ION-IMPLANTED AlGaAs/GaAs SUPERLATTICES J. Ralston, G.W. Wicks, L.F. Eastman, L. Rathbun, B.C. DeCooman, and C.B. Carter	327
THE DEFECT STRUCTURE OF ION-IMPLANTED Al <sub>x</sub> Ga <sub>1-x</sub> As/GaAs SUPERLATTICES B.C. DeCooman, C.B. Carter, J. Ralston, G.W. Wicks, and L.F. Eastman	333
EFFECTS OF Se IMPLANTATION ON THE COMPOSITIONAL DISORDERING OF GaAs-AlAs SUPERLATTICES T. Nakamura, S. Komiya, T. Inata, S. Muto, S. Hiyamizu, and I. Umebu	339
 PART V: Si-Ge AND RELATED SYSTEMS	
EQUALLY STRAINED Si/SiGe SUPERLATTICES ON Si SUBSTRATES E. Kasper, H.-J. Herzog, H. Daembkes, and G. Abstreiter	347
MEASUREMENT OF THE BANDGAP OF Ge <sub>x</sub> Si <sub>1-x</sub> /Si STRAINED-LAYER HETEROSTRUCTURES D.V. Lang, R. People, J.C. Bean, and A.M. Sergent	359
OPTICAL ABSORPTION PROBABILITY FOR THE ZONE-FOLDING INDUCED QUASI-DIRECT GAP IN Ge(x)Si(1-x)/Si STRAINED LAYER SUPERLATTICES S.A. Jackson and R. People	365
MONTE CARLO STABILITY ANALYSIS OF STRAINED LAYER SUPER- LATTICE INTERFACES Brian W. Dodson	371
ORDER-DISORDER TRANSITIONS IN STRAINED SEMICONDUCTOR SYSTEMS A. Ourmazd and J.C. Bean	377

MODULATION WAVELENGTH DEPENDENCE OF THE INTERDIFFUSION IN AMORPHOUS Si/Ge MULTILAYER FILMS S.M. Prokes and F. Spaepen	383
RAMAN SCATTERING AND X-RAY DIFFRACTION CHARACTERIZATION OF AMORPHOUS SEMICONDUCTOR MULTILAYER INTERFACES J. Gonzalez-Hernandez, D.D. Allred, O.V. Nguyen, D. Martin, and D. Pawlik	389
GROWTH AND STRUCTURE OF COMPOSITIONALLY MODULATED AMORPHOUS SUPERLATTICES P.D. Persans, B. Abeles, T. Tiedje, and C. Roxlo	395
LIGHT-INDUCED EXCESS CONDUCTIVITY AND THE ROLE OF ARGON IN THE DEPOSITION OF DOPING-MODULATED AMORPHOUS SILICON SUPERLATTICES F.-C. Su, S. Levine, P.E. Vanier, and F.J. Kampas	399
PART VI: LAYERED STRUCTURES	
ELASTIC PROPERTIES OF METAL SUPERLATTICES A.F. Jankowski and T. Tsakalakos	407
MULTILAYER X-RAY MIRRORS, A FIRST STEP TOWARDS THE CUSTOM DESIGN OF NEW MATERIAL PROPERTIES Eberhard Spiller	419
MULTILAYER X-RAY REFLECTORS: EFFECTS OF LAYER IMPERFECTIONS J. Wood, N. Grupido, K. Hart, S. Flessa, A. Kadin, J. Keem, and D. Ferris	435
THERMAL STABILITY OF W/C MULTILAYER FILMS Yasuo Takagi, David A. Pawlik, Alan M. Kadin, Steven A. Flessa, Keith L. Hart, John E. Keem, and John E. Tyler	441
X-RAY DIFFRACTION CHARACTERIZATION OF ELASTIC STRAIN IN COMPOSITION MODULATED LAYERED STRUCTURES A.F. Jankowski and P.A. Steinmeyer	447
UPPER CRITICAL FIELD OF Mo-Ni HETEROSTRUCTURES Ctirad Uher, W.J. Watson, J.L. Cohn, and Ivan K. Schuller	455
SUPERCONDUCTING PROPERTIES OF TERNARY GRAPHITE INTERCALATION COMPOUNDS A. Chaiken, G. Roth, T. Enoki, N.C. Yeh, M.S. Dresselhaus, and P. Tedrow	461

STRUCTURAL AND ELECTRONIC PROPERTIES OF POTASSIUM HYDROGEN INTERCALATED GRAPHITE N.C. Yeh, T. Enoki, L. Salamanca-Riba, and G. Dresselhaus	467
MULTILAYER ANODIZATION PROFILE (MAP) - A NOVEL DEPTH PROFILE TECHNIQUE FOR METALLIC-BASED LAYERED STRUCTURES A.M. Kadin, R.W. Burkhardt, and J.E. Keem	473
AUTHOR INDEX	479
SUBJECT INDEX	483

---

---

PART I

## Epitaxial Growth of Semiconductors

