

Cambridge University Press

978-1-558-99361-7 — Nanophase and Nanocomposite Materials II

Edited by Sridhar Komarneni , John C. Parker , Heinrich J. Wollenberger

Frontmatter

[More Information](#)

Nanophase and Nanocomposite Materials II

Cambridge University Press
978-1-558-99361-7 — Nanophase and Nanocomposite Materials II
Edited by Sridhar Komarneni, John C. Parker, Heinrich J. Wollenberger
Frontmatter
[More Information](#)

**MATERIALS RESEARCH SOCIETY
SYMPOSIUM PROCEEDINGS VOLUME 457**

Nanophase and Nanocomposite Materials II

Symposium held December 2–5, 1996, Boston, Massachusetts, U.S.A.

EDITORS:

Sridhar Komarneni
*Pennsylvania State University
University Park, Pennsylvania, U.S.A.*

John C. Parker
*Nanophase Technologies Corporation
Burr Ridge, Illinois, U.S.A.*

Heinrich J. Wollenberger
*Hahn-Meitner Institute
Berlin, Germany*



PITTSBURGH, PENNSYLVANIA

Cambridge University Press

978-1-558-99361-7 — Nanophase and Nanocomposite Materials II

Edited by Sridhar Komarneni, John C. Parker, Heinrich J. Wollenberger

Frontmatter

[More Information](#)

CAMBRIDGE
UNIVERSITY PRESS

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

Cambridge University Press is part of the University of Cambridge.

It furthers the University's mission by disseminating knowledge in the pursuit of education, learning and research at the highest international levels of excellence.

www.cambridge.org

Information on this title: www.cambridge.org/9781558993617

CODEN: MRSPDH

Copyright 1996 by Materials Research Society.

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.

A catalogue record for this publication is available from the British Library

Library of Congress Cataloguing in Publication data

Nanophase and Nanocomposite Materials II : symposium held December 2–5, 1996, Boston, Massachusetts, U.S.A. / editors, Sridhar Komarneni, John C. Parker, Heinrich J. Wollenberger

p. cm—(Materials Research Society symposium proceedings ; v. 457)

Includes bibliographical references and index.

ISBN 1-55899-361-4

1. Nanostructure materials—Congresses. 2. Composite materials—Congresses. 3. Nanotechnology—Congresses. I. Komarneni, Sridhar II. Parker, John C. III. Wollenberger, Heinrich J. IV. Series: Materials Research Society symposium proceedings ; v. 457.

TA418.9.N35N335 1997

620.1'1—dc21

97-6975

CIF

ISBN 978-1-558-99361-7 Hardback

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.

CONTENTS

Preface	xiii
----------------------	-------------

Materials Research Society Symposium Proceedings	xiv
---	------------

PART I: NANOPHASE OXIDES

*Enhanced Thermal Conductivity Through the Development of Nanofluids	3
<i>J.A. Eastman, U.S. Choi, S. Li, L.J. Thompson, and S. Lee</i>	

*Synthesis of Polyvanadates from Solutions	13
<i>J. Livage, L. Bouhedja, C. Bonhomme, and M. Henry</i>	

Electrical/Dielectric Properties of Nanocrystalline Cerium Oxide	27
<i>Jin-Ha Hwang, Thomas O. Mason, and Edward J. Garboczi</i>	

Preparation and Sintering of Silica-Doped Zirconia by Colloidal Processing	33
<i>T. Uchikoshi, Y. Sakka, K. Ozawa, and K. Hiraga</i>	

Transition Dynamics in Ferroelectrics with Ordered Nanoregions	39
<i>I.G. Siny, R.S. Katiyar, and S.G. Lushnikov</i>	

Nanocrystalline BaTiO₃ from the Gas-Condensation Process	45
<i>Shaoping Li, J.A. Eastman, L.J. Thompson, Carl Bjormander, and C.M. Foster</i>	

The Effect of Sulfating on the Crystalline Structure of Sol-Gel Zirconia Nanophases	51
<i>Bokhim, A. Morales, O. Novaro, M. Portilla, T. Lopez, F. Tzompantzi, and R. Gomez</i>	

Cluster Formation by Laser Ablation of Zeolites	57
<i>Hiroshi T. Komiyama, Azuchi Harano, Tatsuya Okubo, and Masayoshi Sadakata</i>	

Electrical Conductivity of Pure and Doped Nanocrystalline Cerium Oxide	63
<i>E.B. Lavik and Y-M. Chiang</i>	

Low-Temperature Hydrothermal Synthesis of Nanophase BaTiO₃ and BaFe₁₂O₁₉ Powders	69
<i>Fatih Dogan, Shawn O'Rourke, Mao-Xu Qian, and Mehmet Sarikaya</i>	

*Invited Paper

Production of Nanostructured Iron Oxide Particles Via Aerosol Decomposition	75
<i>J. Joutsensaari and E.I. Kauppinen</i>	
Nanophase Copper Ferrite Using an Organic Gelation Technique	81
<i>D. Sriram, R.L. Snyder, and V.R.W. Amarakoon</i>	
Nanosized Fine Droplets of Liquid Crystals for Optical Application	89
<i>Shiro Matsumoto, Marthe Houlbert, Takayoshi Hayashi, and Ken-Ichi Kubodera</i>	
Transmission Electron Microscopy and Electron Holography of Nanophase TiO₂ Generated in a Flame Burner System	93
<i>S. Turner, J.E. Bonevich, J.E. Maslar, M.I. Aquino, and M.R. Zachariah</i>	
Coulometric Titration Studies of Nonstoichiometric Nanocrystalline Ceria	99
<i>O. Porat, H.L. Tuller, E.B. Lavik, and Y-M. Chiang</i>	
Synthesis and Laser Spectroscopy of Monoclinic Eu³⁺:Y₂O₃ Nanocrystals	105
<i>Bipin Bihari and Brian M. Tissue</i>	

PART II: NANOPHASE METALS, ALLOYS, AND NON-OXIDES

*Properties of Nanophase Materials Synthesized by Mechanical Attrition	113
<i>H-J. Fecht and C. Moelle</i>	
Rapid Synthesis of Nanostructural Intermetallics and Their Bulk Properties	125
<i>S.M. Pickard and A.K. Ghosh</i>	
Preparation of Nanometer Sized Aluminum Powders	131
<i>Curtis E. Johnson and Kelvin T. Higa</i>	
Three-Dimensional Superlattice Packing of Faceted Silver Nanocrystals	137
<i>S.A. Harfenist, Z.L. Wang, M.M. Alvarez, I. Vezmar, and R.L. Whetten</i>	
Application of MeV Ion Implantation in the Formation of Nanometallic Clusters in Silica	143
<i>D. Ila, Z. Wu, R.L. Zimmerman, S. Sarkisov, C.C. Smith, D.B. Poker, and D.K. Hensley</i>	
Preparation of Metal Nanosuspensions by High-Pressure dc-Sputtering on Running Liquids	149
<i>M. Wagener, B.S. Murty, and B. Günther</i>	

*Invited Paper

Self-Organized Growth and Ultrafast Electron Dynamics in Metallic Nanoparticles	155
<i>A. Stella, P. Cheyssac, S. De Silvestri, R. Kofman, G. Lanzani, M. Nisoli, and P. Tognini</i>	
Synthesis of Nanophase Noble Metal Systems Utilizing Porous Silicon	161
<i>I. Coulthard and T.K. Sham</i>	
Surface Melting of Particles: Predicting Spherule Size in Vapor-Phase Nanometer Particle Formation	167
<i>Y. Xing and D.E. Rosner</i>	
Synthesis and Characterization of Small Grain Sized Molybdenum Nitride Films	173
<i>S.L. Roberson, D. Finello, and R.F. Davis</i>	
Sintering of Sputtered Copper Nanoparticles on (001) Copper Substrates	179
<i>M. Yeadon, J.C. Yang, M. Ghaly, D.L. Olynick, R.S. Averbach, and J.M. Gibson</i>	
PART III: NANOPHASES: SIMULATION STUDIES	
Fracture of Nanophase Ceramics: A Molecular-Dynamics Study	187
<i>Aiichiro Nakano, Rajiv K. Kalia, Andrey Omeltchenko, Kenji Tsuruta, and Priya Vashishta</i>	
Molecular-Dynamic Computer Simulation of Elastic and Plastic Behavior of Nanophase Ni	193
<i>H. Van Swygenhoven and A. Caro</i>	
Three-Dimensional Simulation of the Microstructure Development in Ni-20%Fe Nanocrystalline Deposits	199
<i>Hualong Li, F. Czerwinski, and J.A. Szpunar</i>	
Structure, Mechanical Properties, and Dynamic Fracture in Nanophase Silicon Nitride Via Parallel Molecular Dynamics	205
<i>Kenji Tsuruta, Andrey Omeltchenko, Aiichiro Nakano, Rajiv K. Kalia, and Priya Vashishta</i>	
PART IV: MAGNETIC AND METAL NANOCOMPOSITES	
Ferromagnetic Nanocomposite Films from Thermally Labile Nitride Precursors	213
<i>L. Maya, M. Paranthaman, J.R. Thompson, T. Thundat, and R.J. Stevenson</i>	

Carbon Coated Nanoparticle Composites Synthesized in an rf Plasma Torch	219
<i>John Henry J. Scott, Sara A. Majetich, Zafer Turgut, Michael E. McHenry, and Maher Boulos</i>	
Magnetic Properties and Thermal Stability of Graphite-Encapsulated Cobalt Nanocrystals	225
<i>J.J. Host and V.P. David</i>	
Magnetic Microstructure of a Nanocrystalline Ferromagnet - Micromagnetic Model and Small-Angle Neutron Scattering	231
<i>J. Weissmüller, R.D. McMichael, J. Barker, H.J. Brown, U. Erb, and R.D. Shull</i>	
Optical Properties of Metal Wire Array Composites	237
<i>Laura Luo and T.E. Huber</i>	
The Formation of Metal/Metal-Matrix Nanocomposites by the Ultrasonic Dispersion of Immiscible Liquid Metals	243
<i>V. Keppens, D. Mandrus, J. Rankin, and L.A. Boatner</i>	
Energetic-Particle Synthesis of Nanocomposite Al Alloys	249
<i>D.M. Follstaedt, J.A. Knapp, J.C. Barbour, S.M. Myers, and M.T. Dugger</i>	
Microstructural Valuation of Iron-Based Composite Materials as an Ecomaterial	255
<i>Norihito Itsubo, Koumei Halada, Kazumi Minagawa, and Ryoichi Yamamoto</i>	
*Nanocrystalline Solid Solutions of Cu/Co and Other Novel Nanomaterials	261
<i>A.S. Edelstein, V.G. Harris, D. Rolison, J.H. Perepezko, and D. Smith</i>	
Microtensile Testing of Nanocrystalline Al/Zr Alloys	273
<i>M. Legros, K.J. Hemker, D.A. LaVan, W.N. Sharpe, Jr., M.N. Rittner, and J.R. Weertman</i>	
Characterization of Consolidated Rapidly Solidified Cu-Nb Ribbons	279
<i>F. Ebrahimi and M.L.C. Henne</i>	
The Composition Effect on the Nanocrystallization of Finemet Amorphous Alloys	285
<i>J. Zhu, T. Pradell, N. Clavaguera, and M.T. Clavaguera-Mora</i>	
Synthesis, Characterization, and Mechanical Properties of Nanocrystalline NiAl	291
<i>M.S. Choudry, J.A. Eastman, R.J. DiMelfi, and M. Dollar</i>	

*Invited Paper

Structural Evolution of Fe Rich Fe-Al Alloys During Ball Milling and Subsequent Heat Treatment	297
<i>H.G. Jiang, R.J. Perez, M.L. Lau, and E.J. Laverna</i>	
Microstructure, Mechanical Properties and Wear Resistance of WC/Co Nanocomposites	303
<i>Kang Jia and Traugott E. Fischer</i>	
Synthesis of Nanocomposite Thin-Film Ti/Al Multilayers and Ti-Aluminides	309
<i>R. Banerjee, X.D. Zhang, S.A. Dregia, and H.L. Fraser</i>	
Atomistic Study of Crack Propagation and Dislocation Emission in Cu-Ni Multilayers	315
<i>Jeff Clinedinst and Diana Farkas</i>	
 PART V: <u>OXIDE, NON-OXIDE, AND OXIDE-METAL NANOCOMPOSITES</u>	
*Polymerizable Complex Synthesis of Nanocomposite BaTi₄O₉/RuO₂ Photo-Catalytic Materials	323
<i>Masato Kakihana</i>	
Heat Treatment of Nanocrystalline Al₂O₃-ZrO₂	335
<i>Bridget M. Smyser, Jane F. Connelly, Richard D. Sisson, Jr., and Virgil Provenzano</i>	
Ferroelectric Lead Zirconate Titanate Nanocomposites for Thick-Film Applications	341
<i>Kui Yao, Weiguang Zhu, and Xi Yao</i>	
Rapid Consolidation of Nanophase Al₂O₃ and an Al₂O₃/Al₂TiO₅ Composite	347
<i>David A. West, Rajiv S. Mishra, and Amlia K. Mukherjee</i>	
Synthesis of Oxide-Coated Metal Clusters	357
<i>Robert A. Crane, Jonathan T. Matthews, and Ronald P. Andres</i>	
Embedded Gold Clusters: Growth in Glass and Optical Absorption Spectra	363
<i>P.G.N. Rao and R.H. Doremus</i>	
Lowered Diffusivity in TiO₂ with a Nanophase Dispersion of SiO₂	369
<i>Gary M. Crosbie</i>	
Preparation of Ceramic Nanocomposite with Perovskite Dispersoid	375
<i>T. Nagai, H.J. Hwang, M. Sando, and K. Niihara</i>	

*Invited Paper

Processing, X-ray, and TEM Studies of QS87 Series 56 kΩ/Square Thick-Film Resistors	381
<i>Gary M. Crosbie, Frank Johnson, and William T. Donlon</i>	
The Growth and Properties of Thin-Film Nanocomposites	387
<i>Keith L. Lewis, A.M. Pitt, and A.G. Cullis</i>	
Crack Deflection and Interfacial Fracture Energies in Alumina/SiC and Alumina/TiN Nanocomposites	401
<i>S. Jiao and M.L. Jenkins</i>	
Percolation Threshold in Superhard Nanocrystalline Transition Metal-Amorphous Silicon Nitride Composites: The Control and Understanding of the Superhardness	407
<i>Stan Vepřek, S. Christiansen, M. Albrecht, and H.P. Strunk</i>	
Consolidation and Evolution of Physical-Mechanical Properties of Nanocomposite Materials Based on High-Melting Compounds	413
<i>R.A. Andrievski, G.V. Kalinnikov, and V.S. Urbanovich</i>	
Nanocomposite Thin Films of Transition Metal Carbides Fabricated Using Pulsed Laser Deposition	419
<i>W.F. Brock, J.E. Krzanowski, and R.E. Leuchtner</i>	
Preparation and Characterization of Nanocomposite Composed of TiO₂ as Active Matrix	425
<i>T. Sasaki, R. Rozbicki, Y. Matsumoto, N. Koshizaki, S. Terauchi, and H. Umehara</i>	
Heterogeneous Nanocomposite Materials Based on Liquid Crystals and Porous Media	431
<i>G.P. Sinha and F.M. Aliev</i>	
 PART VI: ORGANIC-INORGANIC AND SOL-GEL NANOCOMPOSITES	
Characterization of Nanosized Silicon Prepared by Mechanical Attrition for High Refractive Index Nanocomposites	439
<i>Dorab E. Bhagwagar, Peter Wisniecki, and Fotios Papadimitrakopoulos</i>	
Growth of BaTiO₃ in Hydrothermally Derived (<100°C) BaTiO₃/Polymer Composite Thin Films	445
<i>David E. Collins and Elliott B. Slamovich</i>	
*Sol-Gel Routes Towards Magnetic Nanocomposites with Tailored Microwave Absorption	451
<i>Ph. Colomban and V. Vendange</i>	

*Invited Paper

Physical and Chemical Properties of $\text{CaCl}_2/\text{H}_2\text{O}$ and $\text{LiBr}/\text{H}_2\text{O}$ Systems Confined to Nanopores of Silica Gels 463*Yurii I. Aristov, Mikhail M. Tokarev, Gaetano Cacciola, Giovanni Restuccia, Gaetano DiMarco, and Valentin N. Parmon***Preparation and Characterization of Ag-Cluster in Poly(Methyl Methacrylate)** 469*Naohisa Yanagihara, Yoshitaka Ishii, Takanori Kawase, Toshimare Kaneko, Hisashi Horie, and Toru Hara***Carbon Black-Filled Polymer Blends: A Scanning Probe Microscopy Characterization** 475*Ph. Leclère, R. Lazzaroni, F. Gubbels, C. Calberg, Ph. Dubois, R. Jérôme, and J.L. Brédas***Synthesis and Characterization of Aerogel-Derived Cation-Substituted Hexaaluminates** 481*Lin-chiuan Yan and Levi T. Thompson***PART VII: NANOCOMPOSITES OF LAYERED AND MESOPOROUS MATERIALS****Enhancement of Ion Mobility in Aluminosilicate-Polyphosphazene Nanocomposites** 489*J.C. Hutchison, R. Bissessur, and D.F. Shriver***Direct Observation of Fracture Mechanisms in Polymer-Layered Silicate Nanocomposites** 495*Evangelos Manias, Wook Jin Han, Klaus D. Jandt, Edward J. Kramer, and Emmanuel P. Giannelis***Fluorophlogopite and Taeniolite: Synthesis and Nanocomposite Formation** 501*Gregory J. Moore, Peter Y. Zavalij, and M. Stanley Whittingham***Synthesis and LCST Behavior of Thermally Responsive Poly(N-Isopropylacrylamide)/Layered Silicate Nanocomposites** 507*Phillip B. Messersmith and F. Znidarsich***Fire Retardant Polyetherimide Nanocomposites** 513*Jongdoo Lee, Tohru Takekoshi, and Emmanuel P. Giannelis***Self-Assembly of Layered Aluminum Silsesquioxanes: Clay-Like Organic-Inorganic Nanocomposites** 519*L. Ukrainczyk, R.A. Bellman, K.A. Smith, and J.E. Boyd***Synthesis of Self-Assembled Functional Molecules in Mesoporous Materials** 525*Itaru Honma, H. Sasabe, and H-S. Zhou*

**Low-Temperature Synthesis of Lamellar Transition Metal
Oxides Containing Surfactant Ions 533**
*Gerald G. Janauer, Rongji Chen, Arthur D. Doble, Peter Y. Zavalij,
and M. Stanley Whittingham*

**A New Route to the Preparation of Nanophase
Composites Via Layered Double Hydroxides 539**
V.P. Isupov, K.A. Tarasov, R.P. Mitrofanova, and L.E. Chupakhina

PART VIII: LATE PAPER ACCEPTED

Computer Simulation of the Structure of Nanocrystals 547
Y. Sasajima and Shigeo Okuda

Author Index 551

Subject Index 555

Cambridge University Press

978-1-558-99361-7 — Nanophase and Nanocomposite Materials II

Edited by Sridhar Komarneni, John C. Parker, Heinrich J. Wollenberger

Frontmatter

[More Information](#)

PREFACE

This volume contains the proceedings of the symposium "Nanophase and Nanocomposite Materials II," held in Boston, MA, on December 2-5, 1996, as part of the 1996 MRS Fall Meeting. The field of nanophase and nanocomposite materials has grown tremendously since the first symposium was held on this topic at the 1992 MRS Fall Meeting. The purpose of this second symposium was to provide a platform for the presentation and discussion of advances from throughout the world in this rapidly growing field. This symposium attracted scientists from various scientific and engineering disciplines and covered a multitude of topics such as synthesis, processing, properties and applications of numerous types of nanophase and nanocomposite materials. A total of 147 papers from 19 countries were presented from a large number of academic institutions, government research laboratories and private industries. The 81 papers published in this proceedings have been refereed and presented as eight chapters.

Sridhar Komarneni
John C. Parker
Heinrich J. Wollenberger

January, 1997

MATERIALS RESEARCH SOCIETY SYMPOSIUM PROCEEDINGS

- Volume 420— Amorphous Silicon Technology—1996, M. Hack, E.A. Schiff, S. Wagner, R. Schropp, A. Matsuda 1996, ISBN: 1-55899-323-1
- Volume 421— Compound Semiconductor Electronics and Photonics, R.J. Shul, S.J. Pearton, F. Ren, C.-S. Wu, 1996, ISBN: 1-55899-324-X
- Volume 422— Rare-Earth Doped Semiconductors II, S. Coffa, A. Polman, R.N. Schwartz, 1996, ISBN: 1-55899-325-8
- Volume 423— III-Nitride, SiC, and Diamond Materials for Electronic Devices, D.K. Gaskill, C.D. Brandt, R.J. Nemanich, 1996, ISBN: 1-55899-326-6
- Volume 424— Flat Panel Display Materials II, M. Hatalis, J. Kanicki, C.J. Summers, F. Funada, 1997, ISBN: 1-55899-327-4
- Volume 425— Liquid Crystals for Advanced Technologies, T.J. Bunning, S.H. Chen, W. Hawthorne, T. Kajiyama, N. Koide, 1996, ISBN: 1-55899-328-2
- Volume 426— Thin Films for Photovoltaic and Related Device Applications, D. Ginley, A. Catalano, H.W. Schock, C. Eberspacher, T.M. Peterson, T. Wada, 1996, ISBN: 1-55899-329-0
- Volume 427— Advanced Metallization for Future ULSI, K.N. Tu, J.W. Mayer, J.M. Poate, L.J. Chen, 1996, ISBN: 1-55899-330-4
- Volume 428— Materials Reliability in Microelectronics VI, W.F. Filter, J.J. Clement, A.S. Oates, R. Rosenberg, P.M. Lenahan, 1996, ISBN: 1-55899-331-2
- Volume 429— Rapid Thermal and Integrated Processing V, J.C. Gelpey, M.C. Öztürk, R.P.S. Thakur, A.T. Flory, F. Roozeboom, 1996, ISBN: 1-55899-332-0
- Volume 430— Microwave Processing of Materials V, M.F. Iskander, J.O. Kiggans, Jr., J.Ch. Bolomey, 1996, ISBN: 1-55899-333-9
- Volume 431— Microporous and Macroporous Materials, R.F. Lobo, J.S. Beck, S.L. Suib, D.R. Corbin, M.E. Davis, L.E. Iton, S.I. Zones, 1996, ISBN: 1-55899-334-7
- Volume 432— Aqueous Chemistry and Geochemistry of Oxides, Oxyhydroxides, and Related Materials, J.A. Voight, T.E. Wood, B.C. Bunker, W.H. Casey, L.J. Crossey, 1997, ISBN: 1-55899-335-5
- Volume 433— Ferroelectric Thin Films V, S.B. Desu, R. Ramesh, B.A. Tuttle, R.E. Jones, I.K. Yoo, 1996, ISBN: 1-55899-336-3
- Volume 434— Layered Materials for Structural Applications, J.J. Lewandowski, C.H. Ward, M.R. Jackson, W.H. Hunt, Jr., 1996, ISBN: 1-55899-337-1
- Volume 435— Better Ceramics Through Chemistry VII—Organic/Inorganic Hybrid Materials, B.K. Coltrain, C. Sanchez, D.W. Schaefer, G.L. Wilkes, 1996, ISBN: 1-55899-338-X
- Volume 436— Thin Films: Stresses and Mechanical Properties VI, W.W. Gerberich, H. Gao, J.-E. Sundgren, S.P. Baker 1997, ISBN: 1-55899-339-8
- Volume 437— Applications of Synchrotron Radiation to Materials Science III, L. Terminello, S. Mini, H. Ade, D.L. Perry, 1996, ISBN: 1-55899-340-1
- Volume 438— Materials Modification and Synthesis by Ion Beam Processing, D.E. Alexander, N.W. Cheung, B. Park, W. Skorupa, 1997, ISBN: 1-55899-342-8
- Volume 439— Microstructure Evolution During Irradiation, I.M. Robertson, G.S. Was, L.W. Hobbs, T. Diaz de la Rubia, 1997, ISBN: 1-55899-343-6
- Volume 440— Structure and Evolution of Surfaces, R.C. Cammarata, E.H. Chason, T.L. Einstein, E.D. Williams, 1997, ISBN: 1-55899-344-4
- Volume 441— Thin Films—Structure and Morphology, R.C. Cammarata, E.H. Chason, S.C. Moss, D. Ila, 1997, ISBN: 1-55899-345-2
- Volume 442— Defects in Electronic Materials II, J. Michel, T.A. Kennedy, K. Wada, K. Thonke, 1997, ISBN: 1-55899-346-0
- Volume 443— Low-Dielectric Constant Materials II, K. Uram, H. Treichel, A.C. Jones, A. Legendijk, 1997, ISBN: 1-55899-347-9

MATERIALS RESEARCH SOCIETY SYMPOSIUM PROCEEDINGS

- Volume 444— Materials for Mechanical and Optical Microsystems, M.L. Reed, M. Elwenspoek, S. Johansson, E. Obermeier, H. Fujita, Y. Uenishi, 1997, ISBN: 1-55899-348-7
- Volume 445— Electronic Packaging Materials Science IX, P.S. Ho, S.K. Groothuis, K. Ishida, T. Wu, 1997, ISBN: 1-55899-349-5
- Volume 446— Amorphous and Crystalline Insulating Thin Films—1996, W.L. Warren, J. Kanicki, R.A.B. Devine, M. Matsumura, S. Cristoloveanu, Y. Homma, 1997, ISBN: 1-55899-350-9
- Volume 447— Environmental, Safety, and Health Issues in IC Production, R. Reif, A. Bowling, A. Tonti, M. Heyns, 1997, ISBN: 1-55899-351-7
- Volume 448— Control of Semiconductor Surfaces and Interfaces, S.M. Prokes, O.J. Glembocki, S.K. Brierley, J.M. Woodall, J.M. Gibson, 1997, ISBN: 1-55899-352-5
- Volume 449— III-V Nitrides, F.A. Ponce, T.D. Moustakas, I. Akasaki, B.A. Monemar, 1997, ISBN: 1-55899-353-3
- Volume 450— Infrared Applications of Semiconductors—Materials, Processing and Devices, M.O. Manasreh, T.H. Myers, F.H. Julien, 1997, ISBN: 1-55899-354-1
- Volume 451— Electrochemical Synthesis and Modification of Materials, S.G. Corcoran, P.C. Searson, T.P. Moffat, P.C. Andricacos, J.L. Deplancke, 1997, ISBN: 1-55899-355-X
- Volume 452— Advances in Microcrystalline and Nanocrystalline Semiconductors—1996, R.W. Collins, P.M. Fauchet, I. Shimizu, J.-C. Vial, T. Shimada, A.P. Alvisatos, 1997, ISBN: 1-55899-356-8
- Volume 453— Solid-State Chemistry of Inorganic Materials, A. Jacobson, P. Davies, T. Vanderah, C. Torardi, 1997, ISBN: 1-55899-357-6
- Volume 454— Advanced Catalytic Materials—1996, M.J. Ledoux, P.W. Lednor, D.A. Nagaki, L.T. Thompson, 1997, ISBN: 1-55899-358-4
- Volume 455— Structure and Dynamics of Glasses and Glass Formers, C.A. Angell, T. Egami, J. Kieffer, U. Nienhaus, K.L. Ngai, 1997, ISBN: 1-55899-359-2
- Volume 456— Recent Advances in Biomaterials and Biologically-Inspired Materials: Surfaces, Thin Films and Bulk, D.F. Williams, M. Spector, A. Bellare, 1997, ISBN: 1-55899-360-6
- Volume 457— Nanophase and Nanocomposite Materials II, S. Komarneni, J.C. Parker, H.J. Wollenberger, 1997, ISBN: 1-55899-361-4
- Volume 458— Interfacial Engineering for Optimized Properties, C.L. Briant, C.B. Carter, E.L. Hall, 1997, ISBN: 1-55899-362-2
- Volume 459— Materials for Smart Systems II, E.P. George, R. Gotthardt, K. Otsuka, S. Trolter-McKinstry, M. Wun-Fogle, 1997, ISBN: 1-55899-363-0
- Volume 460— High-Temperature Ordered Intermetallic Alloys VII, C.C. Koch, N.S. Stoloff, C.T. Liu, A. Wanner, 1997, ISBN: 1-55899-364-9
- Volume 461— Morphological Control in Multiphase Polymer Mixtures, R.M. Briber, D.G. Peiffer, C.C. Han, 1997, ISBN: 1-55899-365-7
- Volume 462— Materials Issues in Art and Archaeology V, P.B. Vandiver, J.R. Druzik, J. Merkel, J. Stewart, 1997, ISBN: 1-55899-366-5
- Volume 463— Statistical Mechanics in Physics and Biology, D. Wirtz, T.C. Halsey, J. van Zanten, 1997, ISBN: 1-55899-367-3
- Volume 464— Dynamics in Small Confining Systems III, J.M. Drake, J. Klafter, R. Kopelman, 1997, ISBN: 1-55899-368-1
- Volume 465— Scientific Basis for Nuclear Waste Management XX, W.J. Gray, I.R. Triay, 1997, ISBN: 1-55899-369-X
- Volume 466— Atomic Resolution Microscopy of Surfaces and Interfaces, D.J. Smith, R.J. Hamers, 1997, ISBN: 1-55899-370-3

Prior Materials Research Society Symposium Proceedings available by contacting Materials Research Society