

Cambridge University Press

978-1-107-41219-4 - Materials Research Society Symposium Proceedings: Volume 670:

Gate Stack and Silicide Issues in Silicon Processing II

Editors: S. A. Campbell, L. A. Clevenger, P. B. Griffin and C. C. Hobbs

Frontmatter

[More information](#)

**Gate Stack and Silicide
Issues in Silicon Processing II**

Cambridge University Press

978-1-107-41219-4 - Materials Research Society Symposium Proceedings: Volume 670:
Gate Stack and Silicide Issues in Silicon Processing II

Editors: S. A. Campbell, L. A. Clevenger, P. B. Griffin and C. C. Hobbs

Frontmatter

[More information](#)

Cambridge University Press

978-1-107-41219-4 - Materials Research Society Symposium Proceedings: Volume 670:

Gate Stack and Silicide Issues in Silicon Processing II

Editors: S. A. Campbell, L. A. Clevenger, P. B. Griffin and C. C. Hobbs

Frontmatter

[More information](#)

MATERIALS RESEARCH SOCIETY
SYMPOSIUM PROCEEDINGS VOLUME 670

Gate Stack and Silicide Issues in Silicon Processing II

Symposium held April 17–19, 2001, San Francisco, California, U.S.A.

EDITORS:

S.A. Campbell

University of Minnesota
Minneapolis, Minnesota, U.S.A.

L.A. Clevenger

IBM Microelectronics
Hopewell Junction, New York, U.S.A.

P.B. Griffin

Stanford University
Stanford, California, U.S.A.

C.C. Hobbs

Motorola APRDL
Austin, Texas, U.S.A.



Materials Research Society

Warrendale, Pennsylvania

Cambridge University Press

978-1-107-41219-4 - Materials Research Society Symposium Proceedings: Volume 670:
Gate Stack and Silicide Issues in Silicon Processing II

Editors: S. A. Campbell, L. A. Clevenger, P. B. Griffin and C. C. Hobbs

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/9781107412194

Materials Research Society

506 Keystone Drive, Warrendale, PA 15086

<http://www.mrs.org>

© Materials Research Society 2002

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 2002

First paperback edition 2013

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

CODEN: MRSPDH

ISBN 978-1-107-41219-4 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
978-1-107-41219-4 - Materials Research Society Symposium Proceedings: Volume 670:
Gate Stack and Silicide Issues in Silicon Processing II
Editors: S. A. Campbell, L. A. Clevenger, P. B. Griffin and C. C. Hobbs
Frontmatter
[More information](#)

CONTENTS

Preface..... xi

Materials Research Society Symposium Proceedings xii

HIGH-k MATERIALS

*** Materials and Physical Properties of Novel High-k and Medium-k**

Gate Dielectrics..... K1.1
Ran Liu, Stefan Zollner, Peter Fejes, Rich Gregory, Shifeng Lu,
Kim Reid, David Gilmer, Bich-Yen Nguyen, Zhiyi Yu,
Ravi Droopad, Jay Curless, Alex Demkov, Jeff Finder,
and Kurt Eisenbeiser

**Ultra-Thin Zirconium Oxide Films Deposited by Rapid Thermal
Chemical Vapor Deposition (RT-CVD) as Alternative Gate
Dielectric K1.4**
Jane P. Chang and You-Sheng Lin

*PROCESSING OF HIGH-k
GATE DIELECTRICS*

*** Challenges in Integrating the High-k Gate Dielectric Film to the
Conventional CMOS Process Flow..... K2.1**
Avinash Agarwal, Michael Freiler, Pat Lysaght,
Loyd Perrymore, Renate Bergmann, Chris Sparks, Bill Bowers,
Joel Barnett, Deborah Riley, Yudong Kim, Billy Nguyen,
Gennadi Bersuker, Eric Shero, Jae E. Lim, Steven Lin,
Jerry Chen, Robert W. Murto, and Howard R. Huff

**Engineered Tantalum Aluminate and Hafnium Aluminate ALD
Films for Ultrathin Dielectric Films With Improved Electrical and
Thermal Properties K2.2**
Robert B. Clark-Phelps, Anuranjan Srivastava, Lance Cleveland,
Thomas E. Seidel, and Ofer Sneh

**High Permittivity Oxide Gate Stacks on Silicon Incorporating
UHV Silicon Nitride Interfacial Layers..... K2.3**
Mark A. Shriver, Ann M. Gabrys, T.K. Higman,
and S.A. Campbell

**Alternating Layer Chemical Vapor Deposition (ALD) of Metal
Silicates and Oxides for Gate Insulators K2.4**
Roy G. Gordon, Jill Becker, Dennis Hausmann, and Seigi Suh

*Invited Paper

Cambridge University Press
978-1-107-41219-4 - Materials Research Society Symposium Proceedings: Volume 670:
Gate Stack and Silicide Issues in Silicon Processing II
Editors: S. A. Campbell, L. A. Clevenger, P. B. Griffin and C. C. Hobbs
Frontmatter
[More information](#)

**Characterization of TiO₂ Films Grown at Low Temperatures for
Alternative Gate Dielectric Application K2.10**
Jun-Ying Zhang and Ian W. Boyd

*GATE STACK AND SILICIDE ISSUES
IN Si PROCESSING II*

**Promising Gate Stacks With Ru and RuO₂ Gate Electrodes and
Y-Silicate Dielectrics K3.1**
Huicai Zhong, Greg Heuss, You-Seok Suh, Shin-Nam Hong,
Veena Misra, Jason Kelly, and Gregory Parsons

**Preliminary First Principles Study of Hf and Zr Aluminates as
Replacement High-k Dielectrics K3.2**
Michael Haverly, Atsushi Kawamoto, Gyuchang Jun,
Kyeongjae Cho, and Robert Dutton

**Development of Polycide Application and Control of Process
Conditions on DCS Based WSi_x K3.6**
Young-Kyou Park, Jaihyung Won, Ju-Hwan Park,
and Jung-Ho Park

**Effect of Pre-Cooling Treatment on the Formation of C54 Phase
Titanium Silicide K3.7**
Lin Zhang and Yong Keun Lee

*ELECTRICAL PERFORMANCE OF
NOVEL GATE DIELECTRICS*

*** Chemical Vapor Deposition of Titania/Silica and Zirconia Films K4.1**
Wayne L. Gladfelter, Ryan C. Smith, David Burleson,
Charles J. Taylor, Jeffrey T. Roberts, Stephen A. Campbell,
Noel Hoilien, Mike Tiner, Rama Hegde, and Christopher Hobbs

Transistors Built With ZrO₂ and HfO₂ Deposited From Nitrates K4.2
Stephen A. Campbell, Noel Hoilien, Tiezhong Ma, Fang Chen,
Ryan Smith, and Wayne Gladfelter

**Electrical Characteristics of TaO_xN_y/ZrSi_xO_y Stack Gate
Dielectric for MOS Device Applications K4.6**
Hyungsuk Jung, Hyundoek Yang, Kiju Im, and Hyunsang Hwang

*Invited Paper

Cambridge University Press
978-1-107-41219-4 - Materials Research Society Symposium Proceedings: Volume 670:
Gate Stack and Silicide Issues in Silicon Processing II
Editors: S. A. Campbell, L. A. Clevenger, P. B. Griffin and C. C. Hobbs
Frontmatter
[More information](#)

**Electrical and Structural Characteristics of Ultra-Thin
TiO₂/Ti-Si-O Stacked Gate Insulator Formed by RF Sputtering
Technique..... K4.7**
M. Koyama, A. Kaneko, M. Koike, I. Fujiwara, M. Yabuki,
M. Yoshiki, M. Koike, and A. Nishiyama

**Investigation on the Thermal and Electrical Properties of Ti-Si-O
Film Formed by the Composite Sputtering Deposition..... K4.8**
Akira Nishiyama, Akio Kaneko, Masato Koyama,
Yoshiki Kamata, Ikuo Fujiwara, Masahiro Koike,
Masahiko Yoshiki, and Mitsuo Koike

**Comparison of Conductance and Capacitance Techniques for
Measurement of Interface States in Thin Oxides K4.9**
T.K. Higman

NOVEL GATE STRUCTURES

**Dual Work Function CMOS Gate Technology Based on Metal
Interdiffusion..... K5.1**
Igor Polishchuk, Pushkar Ranade, Tsu-Jae King,
and Chenming Hu

**Molybdenum Gate Electrode Technology for Deep Sub-Micron
CMOS Generations..... K5.2**
Pushkar Ranade, Ronald Lin, Qiang Lu, Yee-Chia Yeo,
Hideki Takeuchi, Tsu-Jae King, and Chenming Hu

**Reduction of Whisker-Originated Short Between W Polymetal
and Contact Plug..... K5.6**
Yasushi Akasaka, Hiroshi Suzuki, Yuji Yokoyama,
Nobuaki Yasutake, Hitomi Yasutake, Susumu Yoshikawa,
Yusuke Kohyama, Yoshio Ozawa, Katsuhiko Hieda,
Kyoichi Suguro, and Toshihiro Nakanishi

Annealing Behavior of WSi_x Films Prepared by CVD..... K5.7
M. Katiyar, G.S. Samal, R.K. Gupta, Deepak, P.K. Sahoo,
V.N. Kulkarni, and O. Adetutu

**The Electrical Characteristics of the MOSCAP Structures With
W/WN_x/poly Si_{1-x}Ge_x Gates Stack K5.9**
S.-K. Kang, J.J. Kim, D.-H. Ko, T.H. Ahn, I.S. Yeo, T.W. Lee,
and Y.H. Lee

**A Study on the Polycrystalline Silicon Germanium Gate Electrode
Fabrication Technology for Cobalt Silicide Process..... K5.10**
Hidekazu Sato, Takae Sukegawa, Toshifumi Mori,
Kousuke Suzuki, and Haruhisa Mori

Cambridge University Press
978-1-107-41219-4 - Materials Research Society Symposium Proceedings: Volume 670:
Gate Stack and Silicide Issues in Silicon Processing II
Editors: S. A. Campbell, L. A. Clevenger, P. B. Griffin and C. C. Hobbs
Frontmatter
[More information](#)

NOVEL SILICIDE PROCESSES

X-ray Techniques for Silicides	K6.2
Douglas J. Tweet, Jer-shen Maa, and Sheng Teng Hsu	
Effects of a Ta Interlayer on the Titanium Silicide Reaction: C40 Formation and Higher Scalability of the TiSi₂ Process.....	K6.3
F. La Via, S. Privitera, F. Mammoliti, and M.G. Grimaldi	
Direct Formation of C54 Phase on the Basis of C40 TiSi₂ and Its Applications in Deep Sub-Micron Technology	K6.4
S.Y. Chen, Z.X. Shen, S.Y. Xu, A.K. See, L.H. Chan, and W.S. Li	
Increased Thermal Stability of Co-Silicide Using Co-Ta Alloy Films	K6.5
Min-Joo Kim, Hyo-Jick Choi, Dae-Hong Ko, Ja-Hum Ku, Siyong Choi, Kazuyuki Fujihara, Ho-Kyu Kang, and Hoo-Jeung Lee	
A Comparative Study of Nickel Silicide Formation Using a Titanium Cap Layer and a Titanium Interlayer	K6.6
W.L. Tan, K.L. Pey, Simon Y.M. Chooi, and J.H. Ye	
The Influence of Ti and TiN on the Thermal Stability of CoSi₂	K6.7
C. Detavernier, Guo-Ping Ru, R.L. Van Meirhaeghe, and K. Maex	
Stability Improvement of Nickel Silicide With Co Interlayer on Si, Polysilicon and SiGe.....	K6.9
Jer-shen Maa, Douglas J. Tweet, Yoshi Ono, Lisa Stecker, and Sheng Teng Hsu	
Silicide Formation for Ni and Pd Bilayers on Si(100) Substrates.....	K6.10
Xin-Ping Qu, C. Detavernier, R.L. Van Meirhaeghe, and F. Cardon	

*SHALLOW JUNCTIONS AND
INTEGRATION ISSUES IN FEOL*

Electrical Performance and Scalability of Ni-Monosilicide Towards sub 0.13 µm Technologies	K7.1
Anne Lauwers, Muriel de Potter, Richard Lindsay, An Steegen, Nico Roelandts, Fred Loosen, Christa Vrancken, and Karen Maex	

Cambridge University Press
978-1-107-41219-4 - Materials Research Society Symposium Proceedings: Volume 670:
Gate Stack and Silicide Issues in Silicon Processing II
Editors: S. A. Campbell, L. A. Clevenger, P. B. Griffin and C. C. Hobbs
Frontmatter
[More information](#)

**A Study on Solid Phase Reactions of Ni and Pt on Si-Ge Alloys as
Contacts to Ultra-Shallow P⁺N Junctions for CMOS Technology
Nodes Beyond 70 nm..... K7.2**
Jing Liu, Hongxiang Mo, and Mehmet C. Öztürk

**CoSi₂ Formation Using a Ti Capping Layer—The Influence of
Processing Conditions on CoSi₂ Nucleation K7.4**
C. Detavernier, R.L. Van Meirhaeghe, and K. Maex

Thin-Film-Edge-Induced Stresses in Substrates..... K7.5
S.P. Wong, H.J. Peng, and Shounan Zhao

**Detecting Impurities in the Ultra Thin Silicon Oxide Layer by
Hg-Schottky Capacitance-Voltage (CV) Method..... K7.7**
D. Liu, Q. Wang, H. Paravi, V. Drobny, and J. Moquin

**Electrical and Structural Properties of Catalytic-Nitrided SiO₂
Films K7.8**
Akira Izumi, Hidekazu Sato, and Hideki Matsumura

**Atomic Scale Nitridation of Silicon Oxide Surfaces by
Remote-Plasma-Excited Nitrogen..... K7.9**
Yoji Saito and Koichi Tokuda

Author Index

Subject Index

Cambridge University Press

978-1-107-41219-4 - Materials Research Society Symposium Proceedings: Volume 670:
Gate Stack and Silicide Issues in Silicon Processing II

Editors: S. A. Campbell, L. A. Clevenger, P. B. Griffin and C. C. Hobbs

Frontmatter

[More information](#)

Cambridge University Press

978-1-107-41219-4 - Materials Research Society Symposium Proceedings: Volume 670:

Gate Stack and Silicide Issues in Silicon Processing II

Editors: S. A. Campbell, L. A. Clevenger, P. B. Griffin and C. C. Hobbs

Frontmatter

[More information](#)

PREFACE

This volume contains papers presented at the three-day symposium "Gate Stack and Silicide Issues in Silicon Processing II," held April 17-19 at the 2001 MRS Spring Meeting in San Francisco, California. This symposium was a follow-up to the same symposium first organized in 2000. As technologists consider scaling microelectronic devices below the 100 nm node, it has become increasingly clear that many new materials will be introduced into the fab line, not only for interconnect, but into the basic transistor itself. Determining the best materials, the best processing techniques for depositing and using these materials, and integrating them into mainstream CMOS process flows are all extremely challenging tasks.

The largest fraction of the contributed papers dealt with attempts to find a replacement for silicon dioxide. Hafnium dioxide, zirconium dioxide, and their silicates and aluminates are the subjects of intense scrutiny, but other materials are being considered as well. Obtaining a suitably large capacitance, while simultaneously obtaining low charge density in the film, and finding a material that has adequate thermal stability is proving difficult. Physical vapor deposition, chemical vapor deposition, atomic layer deposition, molecular beam epitaxy, and the thermal oxidation of deposited metals are all being studied as possible high-k deposition processes. High-k integration issues include cross contamination, gate electrode compatibility, and thermal process compatibility. Included in this equation is the choice of gate metals, since the effects of polysilicon depletion in these deeply scaled devices may be unacceptable.

The second major focus of the symposium was the material and process used to form the self-aligned silicide. While titanium silicide is giving way to cobalt silicide, several papers presented new ways to extend the usefulness of titanium to smaller dimensions through novel processing schemes. Major issues remain in cobalt as to how the silicide forms and how best to obtain the lowest resistivity. Real time electron microscopy of metal-silicon reactions is providing valuable new insights. Finally, other novel silicides such as nickel silicide are being put forward as possible alternatives to cobalt in small geometry devices.

The organizers wish to acknowledge the financial support of this symposium, which was provided by Applied Materials, Inc., IBM, Jordan Valley AR, Inc., and Motorola.

S.A. Campbell
L.A. Clevenger
P.B. Griffin
C.C. Hobbs

November 2001

Cambridge University Press

978-1-107-41219-4 - Materials Research Society Symposium Proceedings: Volume 670:
Gate Stack and Silicide Issues in Silicon Processing II

Editors: S. A. Campbell, L. A. Clevenger, P. B. Griffin and C. C. Hobbs

Frontmatter

[More information](#)

MATERIALS RESEARCH SOCIETY SYMPOSIUM PROCEEDINGS

- Volume 633— Nanotubes and Related Materials, A.M. Rao, 2001, ISBN: 1-55899-543-9
- Volume 634— Structure and Mechanical Properties of Nanophase Materials—Theory and Computer Simulations vs. Experiment, D. Farkas, H. Kung, M. Mayo, H. Van Swygenhoven, J. Weertman, 2001, ISBN: 1-55899-544-7
- Volume 635— Anisotropic Nanoparticles—Synthesis, Characterization and Applications, S.J. Stranick, P. Searson, L.A. Lyon, C.D. Keating, 2001, ISBN: 1-55899-545-5
- Volume 636— Nonlithographic and Lithographic Methods of Nanofabrication—From Ultralarge-Scale Integration to Photonics to Molecular Electronics, L. Merhari, J.A. Rogers, A. Karim, D.J. Norris, Y. Xia, 2001, ISBN: 1-55899-546-3
- Volume 637— Microphotonics—Materials, Physics and Applications, K. Wada, P. Wiltzius, T.F. Krauss, K. Asakawa, E.L. Thomas, 2001, ISBN: 1-55899-547-1
- Volume 638— Microcrystalline and Nanocrystalline Semiconductors—2000, P.M. Fauchet, J.M. Buriak, L.T. Canham, N. Koshida, B.E. White, Jr., 2001, ISBN: 1-55899-548-X
- Volume 639— GaN and Related Alloys—2000, U. Mishra, M.S. Shur, C.M. Wetzel, B. Gil, K. Kishino, 2001, ISBN: 1-55899-549-8
- Volume 640— Silicon Carbide—Materials, Processing and Devices, A.K. Agarwal, J.A. Cooper, Jr., E. Janzen, M. Skowronski, 2001, ISBN: 1-55899-550-1
- Volume 642— Semiconductor Quantum Dots II, R. Leon, S. Fafard, D. Huffaker, R. Nötzel, 2001, ISBN: 1-55899-552-8
- Volume 643— Quasicrystals—Preparation, Properties and Applications, E. Belin-Ferré, P.A. Thiel, A-P. Tsai, K. Urban, 2001, ISBN: 1-55899-553-6
- Volume 644— Supercooled Liquid, Bulk Glassy and Nanocrystalline States of Alloys, A. Inoue, A.R. Yavari, W.L. Johnson, R.H. Dauskardt, 2001, ISBN: 1-55899-554-4
- Volume 645E—Thermal Barrier Coatings—2000, M.A. Antelo, N.P. Padture, B. Pint, S. Sampath, D.J. Wortman, 2001, ISBN: 1-55899-555-2
- Volume 646— High-Temperature Ordered Intermetallic Alloys IX, J.H. Schneibel, S. Hanada, K.J. Hemker, R.D. Noebe, G. Sauthoff, 2001, ISBN: 1-55899-556-0
- Volume 647— Ion Beam Synthesis and Processing of Advanced Materials, D.B. Poker, S.C. Moss, K-H. Heinig, 2001, ISBN: 1-55899-557-9
- Volume 648— Growth, Evolution and Properties of Surfaces, Thin Films and Self-Organized Structures, S.C. Moss, 2001, ISBN: 1-55899-558-7
- Volume 649— Fundamentals of Nanoindentation and Nanotribology II, S.P. Baker, R.F. Cook, S.G. Corcoran, N.R. Moody, 2001, ISBN: 1-55899-559-5
- Volume 650— Microstructural Processes in Irradiated Materials—2000, G.E. Lucas, L. Snead, M.A. Kirk, Jr., R.G. Elliman, 2001, ISBN: 1-55899-560-9
- Volume 651— Dynamics in Small Confining Systems V, J.M. Drake, J. Klafter, P. Levitz, R.M. Overney, M. Urbakh, 2001, ISBN: 1-55899-561-7
- Volume 652— Influences of Interface and Dislocation Behavior on Microstructure Evolution, M. Aindow, M. Asta, M.V. Glazov, D.L. Medlin, A.D. Rollet, M. Zaiser, 2001, ISBN: 1-55899-562-5
- Volume 653— Multiscale Modeling of Materials—2000, L.P. Kubin, J.L. Bassani, K. Cho, H. Gao, R.L.B. Selinger, 2001, ISBN: 1-55899-563-3
- Volume 654— Structure-Property Relationships of Oxide Surfaces and Interfaces, C.B. Carter, X. Pan, K. Sickafus, H.L. Tuller, T. Wood, 2001, ISBN: 1-55899-564-1
- Volume 655— Ferroelectric Thin Films IX, P.C. McIntyre, S.R. Gilbert, M. Miyasaka, R.W. Schwartz, D. Wouters, 2001, ISBN: 1-55899-565-X
- Volume 656E—Materials Issues for Tunable RF and Microwave Devices II, S.C. Tidrow, W.D. Wilber, S. Streiffer, J. Levy, J. Talvacchio
- Volume 657— Materials Science of Microelectromechanical Systems (MEMS) Devices III, M. deBoer, M. Judy, H. Kahn, S.M. Sparing, 2001, ISBN: 1-55899-567-6
- Volume 658— Solid-State Chemistry of Inorganic Materials III, M.J. Geselbracht, J.E. Greedan, D.C. Johnson, M.A. Subramanian, 2001, ISBN: 1-55899-568-4

Cambridge University Press

978-1-107-41219-4 - Materials Research Society Symposium Proceedings: Volume 670:

Gate Stack and Silicide Issues in Silicon Processing II

Editors: S. A. Campbell, L. A. Clevenger, P. B. Griffin and C. C. Hobbs

Frontmatter

[More information](#)

MATERIALS RESEARCH SOCIETY SYMPOSIUM PROCEEDINGS

- Volume 659— High-Temperature Superconductors—Crystal Chemistry, Processing and Properties, U. Balachandran, H.C. Freyhardt, T. Izumi, D.C. Larbalestier, 2001, ISBN: 1-55899-569-2
- Volume 660— Organic Electronic and Photonic Materials and Devices, S.C. Moss, 2001, ISBN: 1-55899-570-6
- Volume 661— Filled and Nanocomposite Polymer Materials, A.I. Nakatani, R.P. Hjelm, M. Gerspacher, R. Krishnamoorti, 2001, ISBN: 1-55899-571-4
- Volume 662— Biomaterials for Drug Delivery and Tissue Engineering, S. Mallapragada, R. Korsmeyer, E. Mathiowitz, B. Narasimhan, M. Tracy, 2001, ISBN: 1-55899-572-2
- Volume 664— Amorphous and Heterogeneous Silicon-Based Films—2001, M. Stutzmann, J.B. Boyce, J.D. Cohen, R.W. Collins, J. Hanna, 2001, ISBN: 1-55899-600-1
- Volume 665— Electronic, Optical and Optoelectronic Polymers and Oligomers, G.E. Jabbour, B. Meijer, N.S. Sariciftci, T.M. Swager, 2001, ISBN: 1-55899-601-X
- Volume 666— Transport and Microstructural Phenomena in Oxide Electronics, D.S. Ginley, M.E. Hawley, D.C. Paine, D.H. Blank, S.K. Streiffer, 2001, ISBN: 1-55899-602-8
- Volume 667— Luminescence and Luminescent Materials, K.C. Mishra, J. McKittrick, B. DiBartolo, A. Srivastava, P.C. Schmidt, 2001, ISBN: 1-55899-603-6
- Volume 668— II-VI Compound Semiconductor Photovoltaic Materials, R. Noufi, R.W. Birkmire, D. Lincot, H.W. Schock, 2001, ISBN: 1-55899-604-4
- Volume 669— Si Front-End Processing—Physics and Technology of Dopant-Defect Interactions III, M.A. Foad, J. Matsuo, P. Stolk, M.D. Giles, K.S. Jones, 2001, ISBN: 1-55899-605-2
- Volume 670— Gate Stack and Silicide Issues in Silicon Processing II, S.A. Campbell, C.C. Hobbs, L. Clevenger, P. Griffin, 2001, ISBN: 1-55899-606-0
- Volume 671— Chemical-Mechanical Polishing 2001—Advances and Future Challenges, S.V. Babu, K.C. Cadien, J.G. Ryan, H. Yano, 2001, ISBN: 1-55899-607-9
- Volume 672— Mechanisms of Surface and Microstructure Evolution in Deposited Films and Film Structures, J. Sanchez, Jr., J.G. Amar, R. Murty, G. Gilmer, 2001, ISBN: 1-55899-608-7
- Volume 673— Dislocations and Deformation Mechanisms in Thin Films and Small Structures, O. Kraft, K. Schwarz, S.P. Baker, B. Freund, R. Hull, 2001, ISBN: 1-55899-609-5
- Volume 674— Applications of Ferromagnetic and Optical Materials, Storage and Magnetoelectronics, W.C. Black, H.J. Borg, K. Bussmann, L. Hesselink, S.A. Majetich, E.S. Murdock, B.J.H. Stadler, M. Vazquez, M. Wuttig, J.Q. Xiao, 2001, ISBN: 1-55899-610-9
- Volume 675— Nanotubes, Fullerenes, Nanostructured and Disordered Carbon, J. Robertson, T.A. Friedmann, D.B. Geohegan, D.E. Luzzi, R.S. Ruoff, 2001, ISBN: 1-55899-611-7
- Volume 676— Synthesis, Functional Properties and Applications of Nanostructures, H.W. Hahn, D.L. Feldheim, C.P. Kubiak, R. Tannenbaum, R.W. Siegel, 2001, ISBN: 1-55899-612-5
- Volume 677— Advances in Materials Theory and Modeling—Bridging Over Multiple-Length and Time Scales, L. Colombo, V. Bulatov, F. Cleri, L. Lewis, N. Mousseau, 2001, ISBN: 1-55899-613-3
- Volume 678— Applications of Synchrotron Radiation Techniques to Materials Science VI, P.G. Allen, S.M. Mini, D.L. Perry, S.R. Stock, 2001, ISBN: 1-55899-614-1
- Volume 679E—Molecular and Biomolecular Electronics, A. Christou, E.A. Chandross, W.M. Tolles, S. Tolbert, 2001, ISBN: 1-55899-615-X
- Volume 680E—Wide-Bandgap Electronics, T.E. Kazior, P. Parikh, C. Nguyen, E.T. Yu, 2001, ISBN: 1-55899-616-8
- Volume 681E—Wafer Bonding and Thinning Techniques for Materials Integration, T.E. Haynes, U.M. Gösele, M. Nastasi, T. Yonehara, 2001, ISBN: 1-55899-617-6
- Volume 682E—Microelectronics and Microsystems Packaging, J.C. Boudreaux, R.H. Dauskardt, H.R. Last, F.P. McCluskey, 2001, ISBN: 1-55899-618-4
- Volume 683E—Material Instabilities and Patterning in Metals, H.M. Zbib, G.H. Campbell, M. Victoria, D.A. Hughes, L.E. Levine, 2001, ISBN: 1-55899-619-2
- Volume 684E—Impacting Society Through Materials Science and Engineering Education, L. Broadbelt, K. Constant, S. Gleixner, 2001, ISBN: 1-55899-620-6
- Volume 685E—Advanced Materials and Devices for Large-Area Electronics, J.S. Im, J.H. Werner, S. Uchikoga, T.E. Felter, T.T. Voutsas, H.J. Kim, 2001, ISBN: 1-55899-621-4

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