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978-1-107-41346-7 - Materials Research Society Symposium Proceedings: Volume 490:
Semiconductor Process and Device Performance Modelling

Editors: Scott T. Dunham and Jeffrey S. Nelson

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Editors: Scott T. Dunham and Jeffrey S. Nelson
Frontmatter
[More information](#)

CONTENTS

Preface ix

Materials Research Society Symposium Proceedings x

PART I: BULK PROCESS MODELLING

3-D Atomistic Simulations of Submicron Device Fabrication 3
Marius M. Bunea and Scott T. Dunham

Arsenic Deactivation in Silicon 9
M.A. Berding and A. Sher

**A New Practical Approach to Implement a Transient Enhanced
Diffusion Model into an FEM-Based 2-D Process Simulator 15**
*Noriyuki Sugiyasu, Kainia Suzuki, Syuichi Kojima, Yasushi Ohyama,
and Hiroshi Goto*

**Atomistic Modelling of the Ion Implantation Step Within a 2-D
Process Simulator 21**
Bruno Schmidt, Matthias Posselt, Norbert Strecker, and Thomas Feudel

Computationally Efficient Model for 2-D Ion Implantation Simulation 27
Misha Temkin and Ivan Chakarov

**A Three-Dimensional Monte Carlo Model for Phosphorus
Implants Into (100) Single-Crystal Silicon 33**
Myung-Sik Son and Ho-Jung Hwang

First-Principles Study of Point-Defect Production in Si and SiC 41
W. Windl, T.J. Lenosky, J.D. Kress, and A.F. Voter

**The Effect of a Thin Sample on the Extended Defect Evolution
in Si⁺ Implanted Si 47**
Jing-Hong Li and Kevin S. Jones

**Atomic Force Microscope Study of Two-Dimensional Dopant
Delineation by Selective Chemical Etching 53**
*Kwang-Ki Choi, Tae-Yeon Seong, Seonghoon Lee, Hyunsang Hwang,
and Yong Sun Sohn*

***Atomic Dynamics During Silicon Oxidation and the Nature of
Defects at the Si-SiO₂ Interface 59**
S.T. Pantelides and M. Ramamoorthy

**Physical Model and Numerical Results of Dissociation Kinetics
of Hydrogen-Passivated Si/SiO₂ Interface Defects 71**
G.V. Gadiyak

*Invited Paper

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Semiconductor Process and Device Performance Modelling
Editors: Scott T. Dunham and Jeffrey S. Nelson
Frontmatter
[More information](#)

Nucleation and Growth of Voids in Silicon 77
P.S. Plekhanov, U.M. Gösele, and T.Y. Tan

***The Application of GaAs TCAD in Industry** 83
P.A. Blakey, Deepak K. Johnson, C. Recker, and S. Varadarajan

Modelling of Atom Diffusion and Segregation in Semiconductor Heterostructures 93
Hartmut Bracht, Wladek Walukiewicz, and Eugene E. Haller

Simulation of Under- and Supersaturation of Gallium Vacancies in Gallium Arsenide During Silicon In- and Outdiffusion 99
C.-H. Chen, U. Gösele, and T.Y. Tan

Fermi-Level Effect on Group III Atom Interdiffusion in III-V Compounds: Bandgap Heterogeneity and Low Silicon-Doping 105
C.-H. Chen, U. Gösele, and T.Y. Tan

Modelling of the Surface Annihilation of Excess Self-Interstitials Generated by Gold Diffusion into Silicon 111
N.A. Stolwijk, W. Lerch, and A. Giese

Gold Diffusion in Silicon During Gettering by an Aluminum Layer 117
Subhash M. Joshi, Ulrich M. Gösele, and Teh Y. Tan

Defect Reactions Induced by Reactive Ion Etching 123
Song Zhao and Lionel C. Kimerling

Influence of RTP on Vacancy Concentrations 129
M. Jacob, P. Pichler, M. Wohs, H. Ryssel, and R. Falster

Computer Simulation of Thermomigration Process 135
V.Yu. Gershanov, S.I. Garmashov, A.R. Minyaev, and A.V. Beletskaya

PART II: EQUIPMENT MODELLING

***Chemical Kinetics Models for Semiconductor Processing** 143
Michael E. Coltrin, Ellen Meeks, Joseph F. Grisar, William G. Houf, Robert J. Kee, and J. Randall Creighton

Robust Reaction-Transport Models of MOVPE Reactors 155
C. Theodoropoulos, H.K. Moffat, and T.J. Mountziaris

Optimal Design of Stagnation-Flow MOVPE Reactors with Axisymmetric Multi-Aperture Inlets 161
V. Gupta, C. Theodoropoulos, J.D. Peck, and T.J. Mountziaris

A Theoretical Study on the Fundamental Chemical Reactions in Titanium Plasma-Enhanced CVD 167
K. Tsuda, K. Watanabe, Y. Ohshita, and T. Takada

*Invited Paper

Cambridge University Press
978-1-107-41346-7 - Materials Research Society Symposium Proceedings: Volume 490:
Semiconductor Process and Device Performance Modelling
Editors: Scott T. Dunham and Jeffrey S. Nelson
Frontmatter
[More information](#)

Use of Rigorous Three-Dimensional Electromagnetic Simulation to Evaluate the Effectiveness of Optical Proximity Correction for Nonplanar Lithography 173
M.S. Yeung and E. Barouch

Modelling Analysis of Oxygen Transport During Czochralski Growth of Silicon Crystals 181
Yu.E. Egorov, Yu.N. Makarov, E.A. Rudinsky, E.M. Smirnov, and A.I. Zhmakin

Towards the Optimization of AMT Barrel Reactors for Silicon Epitaxy 187
M. Masi, G. Radaelli, N. Roda, P. Raimondi, S. Carrà, G. Vaccari, and D. Crippa

Finite Element Analysis of a MOCVD Reactor Having a Close-Spaced Injector 193
Yang Ren Sun, David W. Weyburne, and Qing S. Paduano

PART III: TOPOGRAPHY MODELLING

***The Roles of "3-D/2-D" and "3-D/3-D" Topography Simulators in Virtual Wafer Fabs** 201
T.S. Cale, T.P. Merchant, and L.J. Borucki

An Atomic-Scale Derived Continuous Approach for the Anisotropic Etching 213
N. Moldovan, S. Nedelcu, and H. Camon

Modelling of Grain Structure Evolution and its Impact on the Reliability of Al(Cu) Thin Film Interconnects 219
S.P. Riege, V. Andleigh, C.V. Thompson, and H.J. Frost

Simulation Study of IBE Process for III-V Compounds in Mesa and Trenches 225
L. Houlet, A. Rhallabi, and G. Turban

PART IV: CHARACTERIZATION AND DEVICE MODELLING

Effects of Compositional Segregation and Short Channel on Threshold Voltage of n-MOSFET 233
Julie Y.H. Lee, Tom C.H. Lee, Mike Embry, Keenan Evans, Dan Koch, and Robert Tucker

Modelling and 2-D Numerical Simulation of Transient Phenomena in Floating Body SOI MOSFETs 239
A.M. Ionescu, F. Chaudier, and A. Chovet

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Cambridge University Press
978-1-107-41346-7 - Materials Research Society Symposium Proceedings: Volume 490:
Semiconductor Process and Device Performance Modelling
Editors: Scott T. Dunham and Jeffrey S. Nelson
Frontmatter
[More information](#)

**Demonstration of Improved Quantitative Mobility Spectrum
Analysis (i-QMSA) 245**
*I. Vurgaftman, J.R. Meyer, C.A. Hoffman, D. Redfern, J. Antoszewski,
L. Faraone, and J.R. Lindemuth*

Charge Transfer Modelling for Charge-Coupled Devices 251
*James P. Lavine, Eric G. Stevens, Edmund K. Banghart,
Eugene A. Trabka, Bruce C. Burkey, and David J. Schneider*

**Light-Controlled Switching Transients in MIS Silicon Structures With
Multichannel Insulator: Physical Processes and New Device Modelling ... 257**
A. Malik and R. Martins

**Theoretical Modelling and Improved Thermoelectric Properties
in (111) and (001) Oriented PbTe/Pb_{1-x}Eu_xTe MQWs 263**
T. Koga, S.B. Cronin, T.C. Harman, X. Sun, and M.S. Dresselhaus

Author Index 269

Subject Index 271

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Semiconductor Process and Device Performance Modelling

Editors: Scott T. Dunham and Jeffrey S. Nelson

Frontmatter

[More information](#)

PREFACE

The concept of a 'virtual semiconductor fab' requires a focused effort among engineering, physics, chemistry, materials, mathematical and computational sciences. Although widely used by the semiconductor industry, current technology computer-aided design (TCAD) struggles to keep pace with new generations of IC technology. The semiconductor industry needs improved, predictive physically-based modelling and simulation capabilities to decrease cost, improve efficiency, and provide TCAD tools to process developers before production begins. Without the use of more advanced 'next generation' TCAD models, future IC technology development will slow as a result of expensive and time-consuming experimental validation of processes and device performance.

This symposium brought together researchers from industry, universities, and national laboratories to highlight recent advances in TCAD, and to identify critical areas for future emphasis. Papers were solicited in both silicon and compound semiconductor process and device performance modelling. By bringing together silicon and compound semiconductor researchers, we hoped to facilitate cross-fertilization of ideas and modelling tool sets.

The main topics of the symposium were:

1. *Bulk Process Modelling*, including ion implantation, transient-enhanced diffusion, rapid thermal annealing, extended and point defects, dopant diffusion, and interfaces
2. *Equipment Modelling*, including fluid dynamics, heat transfer, chemical vapor deposition, thermal and plasma processing
3. *Topography Modelling*, including etch, deposition, interconnect reliability and grain structure evolution
4. *Characterization and Device Modelling*, including short-channel effects, quantitative mobility spectrum analysis, charge-coupled devices, and thermoelectrics

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