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Gate Stack and Silicide Issues in Silicon Processing

Editors: L. A. Clevenger, S. A. Campbell, P. R. Besser, S. B. Herner and J. Kittl

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Frontmatter
[More information](#)

CONTENTS

Preface xi

Materials Research Society Symposium Proceedings xii

HIGH-*k* MATERIALS

The Structure of Plasma-Deposited and Annealed
Pseudo-Binary ZrO₂-SiO₂ Alloys C1.3
Gilbert Rayner, Jr., Robert Therrien, and Gerald Lucovsky

Physical and Electrical Properties of Yttrium Silicate Thin
Films C1.6
James Joseph Chambers and Gregory N. Parsons

Electrical Characteristics of TaO_xN_y for High-*k* MOS Gate
Dielectric Applications C1.8
Kiju Im, Hyungsuk Jung, Sanghun Jeon, Dooyoung Yang,
and Hyunsang Hwang,

NOVEL GATE INSULATORS

Ultrathin Gate Oxide Prepared by Nitridation In ND₃ For
MOS Device Applications C2.4
Hyungshin Kwon and Hyunsang Hwang

Amorphous Mixed TiO₂ And SiO₂ Films On Si(100) By
Chemical Vapor Deposition C2.8
Ryan C. Smith, Charles J. Taylor, Jeffrey Roberts, Noel Hoilien,
Stephen A. Campbell, and Wayne L. Gladfelter

Zr Oxide Based Gate Dielectrics With Equivalent SiO₂
Thickness Of Less Than 1.0 nm And Device Integration
With Pt Gate Electrode C2.9
Yanjun Ma and Yoshi Ono

NOVEL GATE STRUCTURES

Molybdenum As A Gate Electrode For Deep Sub-Micron
CMOS Technology C3.2
Pushkar Ranade, Yee-Chia Yeo, Qiang Lu, Hideki Takeuchi,
Tsu-Jae King, and Chenming Hu

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Gate Stack and Silicide Issues in Silicon Processing
Editors: L. A. Clevenger, S. A. Campbell, P. R. Besser, S. B. Herner and J. Kittl
Frontmatter
[More information](#)

**Structural And Chemical Characterization Of Tungsten Gate
Stack For 1Gb DRAM C3.3**
Oleg Gluschenkov, John Benedict, Larry Clevenger,
Patrick DeHaven, Chet Dziobkowski, Johnathan Faltermeier,
Chenting Lin, Irene McStay, and Keith Wong

ADVANCED GATE DIELECTRICS

***A Closer "Look" At Modern Gate Oxides C4.1**
Frieder H. Baumann, C.-P. Chang, John L. Grazul,
Avid Kamgar, C. T. Liu, and David A. Muller

**Low-Oxygen Nitride Layers Produced By UHV Ammonia
Nitridation Of Silicon..... C4.4**
Mark A. Shriver, Ted K. Higman, Steve A. Campbell,
Charles J. Taylor, and Jeffrey Roberts

**Low Temperature Nitridation Of SiO₂ Films Using A
Catalytic-CVD System C4.5**
Akira Izumi, Hidekazu Sato, and Hideki Matsumura

INTEGRATION ISSUES IN THE FEOL

***Integration Challenges For Advanced Salicide Processes And
Their Impact On CMOS Device Performance C5.1**
Karsten Wieczorek, Manfred Horstmann, Hans-Jürgen Engelmann,
Kornelia Dittmar, Werner Blum, Akif Sultan, Paul R. Besser, and
Austin Frenkel

**Development of a Post-Spacer Etch Clean to Improve Silicide
Formation C5.3**
Edward K. Yeh, Samit S. Sengupta, and Calvin T. Gabriel

**A Two-Step Spacer Etch For High-Aspect-Ratio Gate Stack
Process C5.4**
Chien Yu, Rich Wise, and Anthony Domenicucci

*Invited Paper

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Gate Stack and Silicide Issues in Silicon Processing
Editors: L. A. Clevenger, S. A. Campbell, P. R. Besser, S. B. Herner and J. Kittl
Frontmatter
[More information](#)

NOVEL SILICIDE PROCESSING

***In Situ And Ex Situ Measurements Of Stress Evolution In The Cobalt-Silicon System* C6.3**
G. Lucadamo, Christian Lavoie, Cyril Cabral, Jr.,
Roy A. Carruthers, and James M.E. Harper

Formation and Electrical Transport Properties of Nickel Silicide Synthesized By Metal Vapor Vacuum Arc Ion Implantation C6.5
Xing Wang Zhang, S.P. Wong, W.Y. Cheung, and F. Zhang

POSTER SESSION

The Physical and Electrical Properties of Polycrystalline Si_{1-x}Ge_x as a Gate Electrode Material for ULSI CMOS Structures C7.1
Sung-Kwan Kang, Dae-Hong Ko, Tae-Hang Ahn, Moon-Sik Joo,
In-Seok Yeo, Sung-Jin Whoang, Doo-Young Yang, Chul-Joo Whang,
and Hoo-Jeong Lee

A Low-Cost BiCMOS Process With Metal Gates C7.2
Henk W. van Zeijl and Lis K. Nanver

Effects Of Nitridation By N₂O Or NO On The Electrical Properties Of Thin Gate Or Tunnel Oxides C7.3
Cosimo Gerardi, Tommaso Rossetti, Massimo Melanotte,
Salvatore Lombardo, and Isodiana Crupi

Hot Wall Isothermal RTP For Gate Oxide Growth And Nitridation C7.7
Allan Laser, Christopher Ratliff, Jack Yao, Jeff Bailey,
Jean-Claude Passefort, Eric Vaughan, and Larry Page

Controlling CoSi₂ Nucleation: The Effect Of Entropy Of Mixing C7.9
Christophe Detavernier, Roland L. Van Meirhaeghe,
Karen Maex, and Felix Cardon

Effect of a Thin Ta Layer on the C49-C54 Transition..... C7.10
Francesco La Via, Francesco Mammoliti,
Maria Grazia Grimaldi, Simona Quilici, and
Franco Meinardi

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Gate Stack and Silicide Issues in Silicon Processing
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Frontmatter
[More information](#)

**Silicidation Of Titanium-Rich Titanium Boride Deposited By
Co-Sputtering On Si(100) C7.11**
Guy Sade and Joshua Pelleg

**Thin Ni-Silicides For Low Resistance Contacts And Growth Of
Thin Crystalline Si Layers..... C7.14**
Elena A. Gulians and Wayne A. Anderson

**Remote Plasma Nitridation of *In Situ* Steam Generated (ISSG)
Oxide C7.15**
Husam N. Al-Shareef, A. Karamcheti, T.T. Luo, G.A. Brown,
V.H.C. Watt, M.D. Jackson, H.R. Huff, R. Jallepally, D. Noble,
N. Tam, and G. Miner

SILICIDE FORMATION MECHANISMS

**On The Template Mechanism Of Enhanced C54-TiSi₂
Formation C8.2**
L. Kappius and R. T. Tung

**Investigation On C54 Nucleation And Growth By
Micro-Raman Imaging C8.3**
Stefania M. S. Privitera, Francesco Meinardi, Simona Quilici,
Francesco La Via, Corrado Spinella, Maria Grazia Grimaldi,
and Emanuele Rimini

**Silicide Engineering: Influence Of Alloying Elements On CoSi₂
Nucleation C8.4**
Christophe Detavernier, Roland L. Van Meirhaeghe,
Karen Maex, and Felix Cardon

SHALLOW JUNCTIONS AND SILICIDES

***Study of CoSix Spike Leakage for 0.1-um CMOS C9.1**
Ken-ichi Goto

**Modeling Self-Aligned Silicidation in 2D and 3D: Growth
Suppression by Oxygen Diffusion C9.3**
Victor Moroz and Takako Okada

*Invited Paper

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Frontmatter
[More information](#)

EPITAXIAL SILICIDES

Epitaxial CoSi₂ Formation by a Cr or Mo Interlayer C10.2
Christophe Detavernier, Roland L. Van Meirhaeghe, Felix Cardon,
K. Maex, B. Brijs, and W. Vandervorst

***In Situ* Growth and Growth Kinetics of Epitaxial (100) CoSi₂
Layer on (100)Si by Reactive Chemical Vapor Deposition..... C10.3**
Hwa Sung Rhee, Heui Seung Lee, Jong Ho Park, and
Byung Tae Ahn

Author Index

Subject Index

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Frontmatter

[More information](#)

PREFACE

This volume contains papers presented at the three-day symposium "Gate Stack and Silicide Issues in Silicon Processing," held April 25–27 at the 2000 MRS Spring Meeting in San Francisco, California. This was the first MRS symposium dedicated solely to these issues. As we move into the 21st century, the feature size of microelectronic devices is approaching the deep submicron regime. At these dimensions, the process development and integration issues related to gate stack and silicide processing are key challenges. The gate leakage is rising sharply due to direct tunneling. Power and reliability concerns are both expected to limit the ultimate scaling of SiO₂ based insulators to about 1.5 nm. New gate insulators must not deleteriously affect the interface quality, thermal stability, charge trapping, or process integration. New metal gate materials and damascene gates are being seriously investigated, perhaps in conjunction with the application of a high permittivity gate insulator to provide sufficient device performance at ULSI dimensions. The silicidation process is also coming under very strong pressure. Narrow device widths and decreasing junction depths are making the formation of low leakage, low resistance silicide straps extremely difficult. Producing shallower junctions via ion implantation is inhibited by transient enhanced diffusion and low beam currents at low implantation energies. Gate stack and contact film effects, such as point defect injection, extended defect formation, and stress on ultrashallow junction formation must be considered. To be successful in creating the next generation of advanced Si technology, these issues related to gate stack and silicide processing must be addressed. This volume has collected many relevant papers in the areas of gate stack and silicide processing.

The financial support provided by Advanced Micro Devices, Applied Materials, and International Business Machines is acknowledged.

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Frontmatter

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