

TABLE OF CONTENTS

<i>PREFACE</i>	v
FULL PROCESS INTEGRATION AND DEVICE SCALING	
ULSI Process Integration for 2005 and beyond* H. Iwai and S.-I. Ohmi	3
Process Technologies for Sub-100 nm CMOS Devices* H. Wakabayashi, M. Ueki, M. Narihiro, K. Uejima, T. Fukai, M. Togo, T. Yamamoto, K. Takeuchi, Y. Ochiai and T. Mogami	34
Directions of Future Memory Technology* J.W. Park	50
FULL PROCESS INTEGRATION AND DEVICE PERFORMANCE	
Future Prospects for Sub-100 nm Lithography* A. Ishitani	71
The Scaling Issues of COB Stack DRAM Cell Technology and Its Directions for Beyond 100 nm Technology Node* K. Kim	80
Process Integration of in-situ Doped Polysilicon for ULSi Technologies* E.-X. Ping	91
Quantum Mechanical Narrow Channel Effect in Nano-scale MOSFETs* T. Hiramoto and H. Majima	102
Review of the FeRAM Process Integration: Issues and Problems* N.S. Kang	112
Three-Dimensional Integration with Copper Wafer Bonding* A. Fan and R. Reif	124
Ultra Shallow Junction Formation by Atomic Layer Doping* M. Koyanagi	133
PROCESS INTEGRATION OF SiGe TECHNOLOGIES	
Silicon Germanium Trends on Process Integration* E. Kasper	143

* Invited paper

SiGe HBT/CMOS Technology for RF and High-Speed Digital Applications*	155
K. Washio	
Modular, High Performance BiCMOS by Integration of SiGe:C HBTs *	165
D. Knoll, B. Heinemann, K.E. Ehwald, H. Rücker, B. Tillack and H.J. Osten	
Fabrication of High Quality MOS Structures with SiGe Buried Channels for CMOS Applications	178
S. Kar and P. Zaumseil	
Threshold Voltage Stability in P-Channel MOSFETs with Heavily Boron-Doped SiGeC Gate Layers	190
E. Stewart, M.S. Carroll, C.L. Chang and J.C. Sturm	
Integration issues in Silicon-Based ICs for Telecommunication Applications*	196
G. Freeman	
Low Frequency Noise in Si _{1-x} Ge _x Channel PMOSFETs	205
T. Tsuchiya, T. Matsuura and J. Murota	
Parasitic Channel in SiGe Heterojunction MOSFETs	211
Y. Hara, A. Inoue, T. Takagi, Y. Kanzawa and M. Kubo	
FRONT-END-OF-LINE PROCESS INTEGRATION OF TRANSISTOR DEVICE	
The Gate Stack/Shallow Junction Challenge for Sub-100 nm Technology Generations *	223
H.R. Huff, G.A. Brown and L.A. Larson	
Process Integration for DRAM Cell Transistor Optimization*	250
S. Lee, S. Park, I. Kim and H. Yoon	
Vertical pass Transistor Integration for Future DRAM*	260
R. Divakaruni and G. Bronner	
Improved Device Scaling & Process Simplification Through Advanced Ion Implantation Techniques*	273
J.O. Borland	
Transistor Design Methodology for Low Power CMOS Microprocessors	289
J.F. Buller, J. Cheek and D. Wristers	

* Invited paper

L-Shape Spacer Architecture for Low Cost, High Performance CMOS E. Augendre, C. Perelló, E.P. Vandamme, S. Pochet, R. Rooyackers, S. Beckx, M. De Potter, A. Lauwers and G. Badenes	297
Impact of Indium and Boron Interaction on Short Channel and Reverse Short Channel Effects for NMOSFETs S.Y. Ong, E.F. Chor, J. Lee, Y.K. Leung, A. See and L. Chan	305
Enhanced Short-Channel Effects of Sub-50 nm Gate Length MOSFETs with High-k Gate Insulator Films R. Fujimura, M. Takeda, K. Sato, S.-I. Ohmi, H. Ishiwara and H. Iwai	313
Side-Wall Protection by B in P-Doped Polysilicon in Gate Etching T. Seino, A. Fukuchi, T. Matsuura and J. Murota	324

PROCESS INTEGRATION AND DEFECT INTERACTIONS

Impact of Metallic Impurities on Integrity of Ultra-Thin Gate Oxides and Gettering in Advanced Silicon Wafers* S. Koveshnikov, D. Beauchaine and F. González	333
Thermally Induced Dislocation and Slip Defects in Silicon C.R. Cho, Y.S. Kim, J.K. Lee, S.W. Ko, D.J. Choi, C.B. Son, A.E. Stephens and G.A. Rozgonyi	350
Process-Induced Defects and Diode Leakage in ULSI FEOL Integration K. Parekh, C. Mouli, M. Hermes and F. González	359
Reduction of Substrate Leakage Current by Minimizing Trench-isolation- Induced Stress H. Miura, N. Ishitsuka, N. Suzuki, K. Ohyu and S. Ikeda	373
Plasma Induced Damage Reduction by Spin-on Low-k Dielectric Process N. Matsunaga, H. Yoshinari, N. Yamada and H. Shibata	380

PROCESS INTEGRATION IN INTEGRATED CIRCUIT APPLICATIONS

Evolution of the Metallization Concepts for Applications in the Integrated Circuits S.P. Murarka, E.S. Parker and J.S. Parker	389
Practical Roadmap and Approach for Multi-level Interconnect Technology for Realizing Over-GHz System-on-Chip* H. Shibata	402

Electromigration Failure Modes in CU Metallization*	410
M. Gall, C. Capasso, S. Thrasher, L. Zhao, P. Mulski, R. Hernandez, M. Herrick, M. Angyal, B. Boeck and H. Kawasaki	
High Density 0.16 μm Merged DRAM/Logic Technology for System-on-a-Chip	426
H. Tanaka, J. Ida, M. Takeda, H. Shinohara, E. Seo, A. Kita and F. Yokoyama	
Back-end Process Integration for Logic LSI*	434
S. Saito	
Low Resistivity Contact Materials for ULSI Applications and Metal/Semiconductor Interfaces*	447
S. Zaima and Y. Yasuda	

SUBSTRATE INTEGRATION USING SOI

MOS Transistor Scaling Challenges*	463
M. Bohr	
SOI for CMOS Logic and Memory Applications*	474
D.K. Sadana	
Device Challenges for Sub-150 nm CMOS*	489
J.C.S. Woo	
Some Manufacturing Techniques for Thin Film SOI*	495
A. Wittkower, C. Maleville, T. Barge and A. Auberton-Herve	
Technologies for Large Area Electronics on Deformable Substrates*	506
J.C. Sturm, P.I. Hsu, M. Huang, H. Gleskova, S. Miller, A. Darhuber, S. Wagner, Z. Suo and S. Troian	

FRONT-END-OF-LINE PROCESS INTEGRATION AND UNIT PROCESSES

Interface Technology for Advanced Gate Dielectrics*	519
M. Niwa, Y. Harada, K. Eruguchi and D.-L. Kwong	
Characterization of Traps in ONO Films for MONOS Nonvolatile Memories	534
H. Aozasa, I. Fujiwara, K. Nomoto, S. Tanaka and T. Kobayashi	

* Invited paper

Optimization of the Active Area Edge Protection in Shallow Trench Isolation	539
E. Augendre, R. Rooyackers, S. Pochet, L. Grau, E. Sleenckx, E.P. Vandamme and G. Badenes	
A Study on the Microstructures and Electrical Properties of ZrO ₂ Thin Films	547
S.-W. Nam, J.-H. Yoo, H.-Y. Kim, D.-H. Ko and C.-W. Yang	
Diffusion Barrier Performance of CVD-Grown Ti-Si-N Films	555
D. Anjum, S. Oktyabrsky, E. Eisenbraun, A.E. Kaloyeros, J.J. Sullivan and S. Koveshnokov	
Ni Silicide Technology for Deep Sub-Quarter Micron Transistor	565
C.-J. Choi, J.-H. Ku, S. Choi, K. Fujihara, H.-K. Kang, J.-T. Moon, H.-J. Choi and D.-H. Ko	
Formation and Properties of Co-Silicide by Using Co _{1-x} Ta _x Alloy	571
M.-J. Kim, D.-H. Lee, D.-H. Ko, J.-H. Ku, S. Choi, K. Fujihara, H.-K. Kang, S.-H. Oh, C.-G. Park and H.-J. Lee	
The Physical and Electrical Properties of Poly Si _{1-x} Ge _x as a Gate Electrode Material	581
S.-K. Kang, D.-H. Ko, T.H. Ahn, I.S. Yeo, K.C. Lee, T.W. Lee and Y.H. Lee	
A Study on the Solid Phase Reaction and Thermal Stability in the Ni-Si _{1-x} Ge _x System Using Rapid Thermal Annealing (RTA) Process	591
H.-J. Choi, H.-Y. Kim, D.-H. Ko, J.-H. Ku, C.-J. Choi, S. Choi, K. Fujihara, H.K. Kang, M-H. Yang and C.-W. Yang	
Authors Index	601
Subject Index	605

* Invited paper