

TABLE OF CONTENTS

<i>Preface</i>	<i>iii</i>
<i>Conference organization</i>	<i>iv</i>
Section I	1
Advances in Rapid Thermal Processing Equipment	
1. Intra-die temperature non-uniformity related to front side emissivity dependence during Rapid Thermal Annealing <i>C. Laviron, R. Lindsay, A. Michallet, A. Halimaoui and E. Granneman</i>	3
2. Pattern effects during spike annealing of ultra-shallow implants <i>J. Niess, Z. Nényei, W. Lerch and S. Paul</i>	11
3. Time-resolved analysis of flash-assist RTP thermal pulse progression in SOI and bulk silicon wafers <i>K. Elliott, S. McCoy, D.M. Camm, J.C. Gelpey, R. Tichy and L. Larson</i>	17
4. A novel hot-wall furnace-based RTP System with sequenced H ₂ and wet-H ₂ for advanced dielectric applications <i>Y. Liu and J. Hebb</i>	25
Section II	33
Ultra-Shallow Source/Drain Junctions by Ion-Implantation and Rapid Thermal Annealing	
5.* Junction scaling for 90 nm and beyond <i>J. Hwang, H. Kennel, P. Packan, M. Taylor, M. Liu, R. James and M. Kuhn</i>	35
6. Rapid thermal solid phase epitaxy annealing for ultra-shallow junction formation <i>W. Lerch, S. Paul, D. F. Downey and E. A. Arevalo</i>	43
7.* Cluster ion beam process technology <i>I. Yamada, N. Toyoda, J Matsuo and L P. Allen</i>	51
8. A first principles examination of the diffusion of boron in silicon during Microwave Rapid Thermal Processing <i>K. Thompson, C.J. Bonifas, R.F. Cooper and J.H. Booske</i>	61
9. Structure and thermal evolution of small clusters found after ultralow-energy high-dose boron implantation in Si <i>X. Hebras, F. Cristiano, N Cherkashin, W. Lerch, S.Paul, B. Pawlak, R. Surdeanu and A. Claverie</i>	67

10*	Relation between thermal evolution of interstitial defects and Transient Enhanced Diffusion in silicon <i>A. Claverie, F. Cristiano, B. Colombeau, X. Hebras, P. Calvo, N. Cherkashin, Y. Lamrani, E. Scheid, B. de Mauduit and E. Lampin</i>	73
11*	Ultra-shallow junction formation: current manufacturability issues and future prospects <i>J. Hebb, A Agarwal, H. Gossmann, M. Ameen, A. Stevenson and M. Jones</i>	83
12.	Performance enhancements for 50-nm PMOS by angled pre-amorphization implants and fluorine implants <i>P.R. Chidambaram, S. Ekbote, S. Chakravarthi, A. Chatterjee, C.F. Machala and S F. Johnson</i>	93
13.	The role of fluorine with Ge pre-amorphization in forming pMOS junctions for the 65-nm CMOS technology node <i>B.J. Pawlak, R. Lindsay, R. Surdeanu, X. Pages, W. Vandervorst and K. v. d. Jeugd</i>	99
14.	Dose loss and diffusion in BF ₂ -implanted silicon during Rapid Thermal Annealing <i>O. Dokumaci, P. Ronsheim, S. Hegde and C. Cabral, Jr.</i>	105
15.	Ultra-shallow implant anneal using a short-wavelength flash light source <i>W.S. Yoo and K. Kang</i>	111
Section III		117
Ultra-Shallow Source/Drain Junctions by Alternative Doping and Annealing Methods		
16*	Electrical characterization of silicon diodes formed by laser annealing of implanted dopants <i>L.K. Nanver, J. Slabbekoorn, A. Burtsev, T.L.M. Scholtes, R. Surdeanu, F. Simon, H.-J. Kalhert and J.W. Slotboom</i>	119
17.	Laser thermal processing for ultra-shallow junction formation: experiment and modelling <i>J. Venturini, M. Hernandez, T. Sarnet, G. Kerrien, C. Laviron, J.L. Santailier and J. Boulmer</i>	131
18.	Excimer laser annealing: a solution for the future technology nodes? <i>V. Privitera, A. La Magna, G. Mannino, G. Fortunato, L. Mariucci and B.G. Svensson</i>	137
19.	Ultra-shallow junction formation by Gas Immersion Laser Doping (GILD) on silicon bulk and SOI substrate <i>M. Hernandez, T. Sarnet, D. Débarre, J. Boulmer, G. Kerrien, C. Laviron and M. N. Semeria</i>	145

Section IV	153
Advanced Contacts to Ultra-Shallow Source/Drain Junctions	
20. Sidewall grooving on narrow CoSi ₂ lines <i>O. Chamirian, M. de Potter, A. Lauwers, O. Richard, R. Lindsay, C. Vrancken and K. Maex</i>	155
21. High resolution investigation of atomic interdiffusion during Co/Ni/Si phase transition <i>A. Alberti, B. Cafra, C. Bongiorno, F. La Via and C. Spinella</i>	161
22*. Silicide scaling: Co, Ni or CoNi ? <i>A. Lauwers, J.A. Kittl, A. Akheyar, M. Van Dal, O. Chamirian, M. de Potter, R. Lindsay and K. Maex</i>	167
23. Ni-based silicides: material issues for advanced CMOS applications <i>J.A. Kittl, A. Lauwers, O. Chamirian, M. Van Dal, A. Akheyar, O. Richard, J.G. Lisoni, M. De Potter, R. Lindsay and K. Maex</i>	177
24. Study on Ge/Si ratio and formation of Ni/ P ⁺ Si _{1-x} Ge _x and Ni/Si/ P ⁺ Si _{1-x} Ge _x <i>T.-H. Yang, E.Y. Chang, G. Luo, K.M. Chen, T.-Y. Yang, H.-C. Tseng and C.-Y. Chang</i>	183
25. Design of experiment on the Co silicide process: impact of thickness and anneals on main CMOS Parameters <i>F. Wacquand, C. Régnier, M.-T. Basso, C. Julien, A. Humbert and C. Jenny</i>	191
26. Co-silicide, Co(Ni)-silicide and Ni-silicide to source/drain contact resistance <i>A. Akheyar, A. Lauwers, J.A. Kittl, M. De Potter, O. Chamirian, R. Jonckheere, P. Leunissen, M. van Dal, R. Lindsay, G. Tempel and K. Maex</i>	197
Section V	205
Advanced MOS Gate Stacks I	
27*. Application of high-k dielectrics in CMOS technology and emerging new technology <i>R. Liu and T.-B. Wu</i>	207
28. Growth and characterization of Al ₂ O ₃ :HfO ₂ nanolaminate films deposited by Atomic Layer Deposition <i>C.P. D'Emic, E.P. Gusev, M. Copel, J. Newbury, H. Hovel, P. Kozlowski, J. Bruley and R. Murphy</i>	217
29. Batch Atomic Layer Deposition for MIM capacitors <i>R. de Blank, G.J. Snijders, S. Beulens, L. Vandezande, R. Wilhelm and A. Hasper</i>	225
30.* First principles modelling of the deposition process for high-k dielectric films <i>S.D. Elliott</i>	231

31.	Pathways for advanced transistors using hafnium-based oxides by Atomic Layer Deposition <i>A.R. Londergan, S. Ramanathan, J. Winkler, T.E. Seidel, J. Gutt, G. Brown and R.W. Murto</i>	243
32.*	Development of 12 Å plasma nitrided gate dielectrics through characterization of process, physical and electrical parameters <i>G. Miner, P. Kraus, T.-C. Chua, J. Holland, C. Olsen, K. Ahmed, A. Hegedus, S. Hung, F. Nouri, A. Herrera-Gomez, A. Lepert and P. Meissner</i>	251
33.	Advanced layer-by-layer deposition and annealing process for high-quality high-k dielectrics formation <i>K.Iwamoto, T.Tominaga, T.Yasuda, T.Nabatame and A.Toriumi</i>	265
34.	Rapid thermal annealing of atomic layer deposited hafnium-silicate / poly-silicon layers <i>Z.M. Rittersma, D. Massoubre, F. Roozeboom, M.A. Verheijen, J.G.M. van Berkum, Y.Tamminga, T. Dao, J.H.M. Snijders, E. Vainonen-Ahlgren E. Tois, M. Tuominen and S. Haukka</i>	273
35.	Rapid thermal process Atomic Layer Deposition of high dielectric constant ultrathin ZrO ₂ for sub-65 nm silicon CMOS technology <i>M. Fakhruddin, R. Singh, K. F. Poole, S. V. Kondapi and S. Kar</i>	281
36.	Ultrathin plasma nitrided oxide gate dielectrics for sub-100 nm generation CMOS technology <i>J. Jeon, P. Yeh, B. En, K. Wiczorek, F. Graetsch, J. Bernard, H.S. Kim, E. Ibok, C. Olsen, R. Zhao and B. Ogle</i>	287
	Section VI	293
	Applications of SiGe Alloys in Future Device Technologies and Other Applications	
37.*	High-k dielectric processing for germanium channel MOSFETs <i>P.C. McIntyre, D. Chi, H. Kim, C.O. Chui, B.B. Triplett and K.C. Saraswat</i>	295
38.*	Fabrication of SiGe-on-Insulator substrates for high-performance strained SOI-MOSFETs by germanium condensation technique <i>T. Tezuka, N. Sugiyama, T. Mizuno, S. Nakaharai and S. Takagi</i>	305
39.*	MOSFET channel engineering using strained Si, SiGe and Ge channels <i>E.A. Fitzgerald, M.L. Lee, C.W. Leitz and D.A. Antoniadis</i>	315
40.	Growth of nickel silicide quantum dot arrays on epitaxial Si _{0.7} Ge _{0.3} on (001) silicon with a sacrificial amorphous silicon interlayer <i>L. J. Chen, W. W. Wu, S. L. Cheng and S. W. Lee</i>	325

41. Electrical characterization of thick localized SOI substrates manufactured by Rapid Thermal Processing for high-voltage integrated circuits <i>O. Gonnard, S. Roux, F. Bernizet, M. Bafleur and J.-M. Dilhac</i>	331
Section VII	337
Advanced MOS Gate Stacks II	
42. The diffusion, activation and microstructure evolution of phosphorus implanted into polysilicon <i>L.S. Adam, Y. Wang and M. Mansoori</i>	339
43.* Roadblocks and detours for poly-silicon / metal-oxide MOS integration <i>D.C. Gilmer, C. Hobbs, J. Grant, R. Hegde, H. Tseng, D. Triyoso, D. Roan, R. Cotton, J. Smith, V. Dhandapani, R. Garcia, L. Dip, R. Rai, J. Conner, S. Samavedam, B. Taylor and P. J. Tobin</i>	345
44. Poly-Si gate CMOS with hafnium silicate gate dielectric <i>C. Hobbs, J. Grant, S. Kher, V. Dhandapani, B. Taylor, L. Dip, R. Hegde, C. Metzner, H. Tseng, D. Gilmer, A. Franke, R. Garcia, L. Hebert, M. Azrak, D. Sing, T. Stephens, C. Scrogum, R. Rai, V. Becnel, J. Conner, B. White and P. Tobin</i>	361
45.* TaN metal gate MOSFETs with aggressively scaled HfO ₂ dielectrics <i>R. Lander, T. Schram, G.S. Lujan, J. Hooker, J. Vertommen, S. Lee, W. de Weerd, W. Boullart, S. van Elshocht, R. Carter, S. Kubicek, K. Demeyer, S. De Gendt and M. Heyns</i>	367
46. Evaluation of CMOS gate metal materials using in situ characterization techniques <i>C. Cabral, Jr., C. Lavoie, A.S. Ozcan, R.S. Amos, V. Narayanan, E.P. Gusev, J.L. Jordan-Sweet and J.M.E. Harper</i>	375
47. Selective oxidation of tungsten gate stacks in high-volume DRAM production <i>G. Roters, R. Hayn, W. Kegel, O. Storbeck, S. Frigge, G. Feldmeyer, H. J. Meyer and E. Schroer</i>	385
48. New metal gate architecture achieved by Chemical Vapor Deposition for a complete tunnel fill <i>C. Régnier, F. Wacquant, F. Leverd, S. Harrison, P. Coronel, B. Tavel and T. Skotniki</i>	391
49. Silicon damage and dopant behaviour studies of rapid thermally processed arsenic-implanted silicon <i>D. Girginoudi, N. Georgoulas, A. Thanailakis and E. Polychroniadis</i>	397

Section VIII	403
High-k Dielectrics for Advanced Transistors and Capacitors	
50.* Effect of starting surface in Atomic Layer Deposition <i>S. Haukka, M. Tuominen, E. Vainonen-Ahlgren, E. Tois, W.-M. Li and J.W. Maes</i>	405
51. Charges in HfO ₂ ALD gate dielectrics <i>G. Bersuker, P. Zeitzoff, G. Brown, Y. Kim, A. Hou, C. Lim, C. Young, P. Lysaght, M. Gardner, R. W. Murto and H. R. Huff</i>	417
52. Atomic Layer Deposition of high-k metal oxides for gate and capacitor dielectrics <i>Y. Senzaki, S.G. Park, R. Higuchi, H. Chatham, L. Bartholomew, S. Al-Lami, C. Barelli, S.-I. Lee and A. Helms, Jr.</i>	423
53. Effect of thermal annealing on mist-deposited HfSiO ₄ /SiO _x /Si structures <i>K Chang, D.-O. Lee, K. Shanmugasundaram, P. Roman, J. Shallenberger, J. Wang, P. Mumbauer, R. Grant and J. Ruzyllo</i>	429
54. Modelling of HfO ₂ film deposition from Hf(mmp) ₄ <i>T. Yano, A. Kagatsume, T. Fujimoto, M. Hoshino, T. Watanabe, M. Asai, S. Horii, H. Miya, M. Kamiya and K. Hirao</i>	437
55. HfO ₂ Films by UV-assisted and thermal injection liquid source MOCVD <i>B.J. O'Sullivan, P.K. Hurley, M. Modreanu, F. Roussel, H. Roussel, M.A. Audier, C. Jimenez, C. Dubourdieu, J.P. Senateur, H. Davies, S. Rushworth, I.W. Boyd, Q. Fang, J.M. Decams and H. Guillon</i>	443
56. Performance of nitrated Hf-silicate high-k gate dielectrics <i>J. Jeon, Q. Xiang, F. Arasnia, J. Zhang, J.-S. Goo, A. Halliyal, H.S. Kim, B. Clark-Phelps, H. Zhong and B. Ogle</i>	451
57. Atomic Vapor Deposition of complex high-k thin films for sub-90 nm CMOS devices <i>J. Lindner, S. Miedl, M. Schumacher, P. Lehnen, U. Weber, P.K. Baumann and T. McEntee</i>	459
58. Investigation of HfO ₂ dielectrics for inter-poly dielectrics and Metal-Insulator-Metal capacitors <i>T.-H. Perng, C.-H. Chien, C.-W. Chen and C.-Y. Chang</i>	465
Section IX	471
Author Index and Key Word Index	
Author Index	473
Key Word Index	477