

# **2007 International Workshop on Junction Technology**

**Kyoto, Japan  
8-9 June 2007**



**IEEE Catalog Number:**  
**ISBN:**

**07EX1641**  
**1-4244-1103-3**

# Table of Contents

<b>Source/Drain Technology for Nanoscale MIS Field Effect Devices.....</b>	<b>1</b>
<i>Yoshio Nishi</i>	
<b>FinFET Process and Integration Technology for High Performance LSI in 22 nm node and beyond .....</b>	<b>3</b>
<i>H. Kawasaki, A. Kaneko, A. Yagishita, K. Okano, T. Izumida, T. Kanemura, K. Suguro*, K. Eguchi*, Y. Tsunashima, S. Inaba, N. Aoki, K. Ishimaru and Y. Toyoshima</i>	
<b>Oxide Islands Design for Elimination of Ultra-shallow Junction Formation.....</b>	<b>8</b>
<i>Jyi-Tsong Lin and Yi-Chuen Eng</i>	
<b>Device performance improvement with Nitrogen implanted during LDD sequence.....</b>	<b>12</b>
<i>N. Auriac, C. Laviron, N. Cagnat, J. Singer, B. Duriez, R. Gwoziecki, G. Chabanne, C. Rando</i>	
<b>Predictive Simulations and Optimization of Advanced Ultra-Shallow Junction formation for Nano-CMOS devices.....</b>	<b>15</b>
<i>B. Colombeau, K.R.C. Mok, S.H. Yeong, F. Bénistant, M. Jaraiz and S. Chu</i>	
<b>MD study of damage structures with poly-atomic boron cluster implantation.....</b>	<b>21</b>
<i>Takaaki Aoki, Toshio Seki and Jiro Matsuo</i>	
<b>Dual-Pearson Parameter Extraction for In Tilt Implantation.....</b>	<b>23</b>
<i>Kentaro Shibahara, Takanori Eto and Tetuya Fukunaga</i>	
<b>LEAP Tomography of Electronic Materials .....</b>	<b>25</b>
<i>Thomas F. Kelly, Jay Roberts and Keith Thompson</i>	
<b>Deep-UV Raman Scattering Analysis of Re-Crystallization in Ultra-Shallow Junction Implanted Si under Various Annealing Conditions.....</b>	<b>33</b>
<i>Takashi Sasaki, Shintaro Nishibe, Hiroaki Minami, Kenji Kisoda, Toshiyuki Isshiki, Masahiro Yoshimoto, Woo Sik Yoo and Hiroshi Harima</i>	
<b>Latest Advances In Ion Implantation &amp; Annealing For Gate And Channel (USJ) Doping Optimization .....</b>	<b>37</b>
<i>John Borland, Wade Krull, Masayasu Tanjyo, Mark Namaroff and Andrzej Buczkowski</i>	
<b>Dopant Activation and Leakage Current Aspects of SDE/Halo CMOS Junctions Measured with Non-contact Junction Photo-Voltage Methods.....</b>	<b>41</b>
<i>Michael Current, Vladimir Faifer, Jeffri Halim and Naotsugu Ohno</i>	
<b>Determination of Activated Dopant Profiles with a Novel FastGate® Probe.....</b>	<b>45</b>
<i>Robert J. Hillard, C. Win Ye, Mark C. Benjamin and Kyoichi Suguro</i>	
<b>The difference of chemical binding states between ultra shallow plasma doping (PD) and ion implantation (I/I) samples studied by hard X-ray photoelectron spectroscopy (HX-PES).....</b>	<b>47</b>
<i>C. G. Jin, Y. Sasaki, K. Okashita, B. Mizuno, M. Kobata, J. J. Kim, E. Ikenaga, K. Kobayashi</i>	
<b>Cluster Ion Implantation - Prospects and Challenges.....</b>	<b>50</b>
<i>Jiro Matsuo, Takaaki Aoki and Toshio Seki</i>	
<b>Formation of Shallow Junctions Using Ge-Si Heterostructures for High Mobility Channel MOSFETs .....</b>	<b>52</b>
<i>Jungwoo Oh, Prashant Majhi, Hi-Deok Lee, Kyong-Taek Lee, Won-Ho Choi, Ji-Woon Yang, Chang Yong Kang, Rusty Harris, S. C. Song, Pankaj Kalra, Sehoon Lee, Sanjay Banerjee, Byoung Hun Lee, Hsing-Huang Tseng and Raj Jammy</i>	
<b>Sub-30-nm PMOSFET using Gas Cluster Ion Beam Boron Doping for 45-nm node CMOS and beyond.....</b>	<b>57</b>
<i>M. Kitazawa, Y. Kawasaki, M. Togawa, D. Rosser, T. Yamashita, T. Iwamatsu, H. Oda and Y. Inoue</i>	
<b>Extension Engineering using Carbon co-Implantation Technology for Low Power CMOS Design with Phosphorus- and Boron-Extension.....</b>	<b>59</b>
<i>Y. Momiyama, K. Okabe, H. Nakao, M. Kojima, M. Kase and T. Sugii</i>	
<b>Arsenic Diffusion in strained Si/relaxed Si<sub>1-x</sub>Ge<sub>x</sub> and its electrical characteristics .....</b>	<b>61</b>
<i>Takamichi Sumitomo and Satoru Matsumoto</i>	

# Table of Contents

<b>The study of plasma doping process for ultra shallow junctions.....</b>	<b>63</b>
<i>S. W. Lee, J. Y. Jeong, C. S. Park, J. H. Kim, J. Y. Ji, J. Y. Choi, Y. J. Lee, S. H. Han, K. M. Kim, W. J. Lee, S. K. Rha and J. K. Oh</i>	
<b>Improving Junction Uniformity and Quality with Optimized Diffusion-less Annealing .....</b>	<b>65</b>
<i>John Borland, Fumio Ootsuka, Takayuki Aoyama, Takashi Onizawa and Andrzej Buczkowski</i>	
<b>Molecular Dopants and High Mass Dopants for HALO and Extension Implantation.....</b>	<b>69</b>
<i>Akira Mineji, John Borland, Seiichi Shishiguchi, Masami Hane, Masayasu Tanjyo and Tsutomu Nagayama</i>	
<b>Metal-Germanide Schottky Source/Drain Transistor with High-k/Metal Gate Stack on Ge and Si<sub>0.05</sub>Ge<sub>0.95</sub>/Si Substrate .....</b>	<b>73</b>
<i>Fei Gao, Rui Li, D. Z. Chi, S. Balakumar, S. J. Lee</i>	
<b>Schottky barrier height in germanide/Ge contacts and its engineering through germanidation induced dopant segregation.....</b>	<b>77</b>
<i>D. Z. Chi, H. B. Yao, S. L. Liew, C. C. Tan, C. T. Chua and K. C. Chua, R. Li and S. J. Lee</i>	
<b>Impact of Pt Incorporation on Thermal Stability of NiGe Layers on Ge(001) Substrates.....</b>	<b>82</b>
<i>Osamu Nakatsuka, Atsushi Suzuki, Akira Sakai, Masaki Ogawa and Shigeaki Zaima</i>	
<b>Formation of High Resistivity Phases of Nickel Silicide at Small Diffusion Region .....</b>	<b>84</b>
<i>Ryuji Tomita, Hiroshi Kimura, Makoto Yasuda, Tomowo Nakayama, Kazutaka Maeda, Yousuke Sugiyama, Yoshinori Kikuchi and Masashige Moritoki</i>	
<b>Oxidation Suppression for YbSi<sub>2-x</sub> Formation and New Method to Extract Schottky Barrier Height by Admittance Measurement.....</b>	<b>88</b>
<i>Yu-Long Jiang, Guo-Ping Ru, Xin-Ping Qu and Bing-Zong Li</i>	
<b>Thermal Stable Nickel Silicide Utilizing Ni/Co/Ni/TiN structure and Two-Step RTP on Doped Substrate.....</b>	<b>94</b>
<i>Zhun Zhong, Won-Jae Lee, Ying-Ying Zhang, Shi-Guang Li, Soon-Yen Jung, Ga-Won Lee, Jin-Suk Wang and Hi-Deok Lee</i>	
<b>Thermal Stability of Nickel Silicide with Stressed Inter-Layer Dielectric Layer on Doped Si Substrate.....</b>	<b>98</b>
<i>Ying-Ying Zhang, Sung-Kyu Lim, Won-Jae Lee, Zhun Zhong, Shi-Guang Li, Soon-Yen Jung, Ga-Won Lee, Jin-Suk Wang and Hi-Deok Lee</i>	
<b>A better approach to molecular implantation.....</b>	<b>102</b>
<i>A. Renau</i>	
<b>Molecular Implants for Advanced Devices.....</b>	<b>107</b>
<i>Leonard M. Rubin, Michael S. Ameen, Mark A. Harris and Chuong Huynh</i>	
<b>Rapid Thermal Scanning for Dopant Activation for Advanced Junction Technology.....</b>	<b>113</b>
<i>Woo Sik Yoo and Kitaek Kang</i>	
<b>Requirements of the Low Energy Boron Halo Implantation for the Next Generation of LOP/LSTP Devices .....</b>	<b>115</b>
<i>Genshu Fuse, Makoto Sano, Masazumi Koike, Masaki Ito, Fumiaki Sato and Michiro Sugitani</i>	
<b>Development of Nissin new boron cluster ion implanter.....</b>	<b>119</b>
<i>Nariaki Hamamoto, Sei Umisedo, Yuji Koga, Takao Matsumoto, Tsutomu Nagayama, Masayasu Tanjyo, Nobuo Nagai, Tom Horsky, Dale Jacobson and Hilton Glavish</i>	
<b>Accurate Dose Control in High Pressure Condition on Medium Current Ion Implanters .....</b>	<b>121</b>
<i>Makoto Sano, Fumiaki Sato and Michiro Sugitani</i>	
<b>Experimental and theoretical results of dopant activation by a combination of spike and flash annealing.....</b>	<b>123</b>
<i>W. Lerch, S. Paul, J. Niess, J. Chan, S. McCoy, J. Gelpy, F. Cristiano, F. Severac, P. F. Fazzini, D. Bolze, P. Pichler, A. Martinez, A. Mineji, S. Shishiguchi</i>	
<b>Novel Junction Engineering Scheme Using Combination of LSA and Spike-RTA .....</b>	<b>129</b>
<i>S. Endo, Y. Maruyama, Y. Kawasaki, T. Yamashita, H. Oda and Y. Inoue</i>	

# Table of Contents

<b>Laser Annealed Junctions: Process Integration Sequence Optimization for Advanced CMOS Technologies .....</b>	<b>131</b>
<i>T. Hoffmann, T. Noda, S. Felch, S. Severi, V. Parihar, H. Forstner, C. Vrancken, M. de Potter, B. van Daele, H. Bender, M. Niwa, R. Schreutelkamp, W. Vandervorst, S. Biesemans and P. P. Absil</i>	
<b>Emissivity independent heating of 3D patterns.....</b>	<b>135</b>
<i>K. Vanormelingen, E.H.A. Granneman, H. Terhorst, E. Rosseel, K. Verheyden</i>	
<b>Study of Ultra-shallow Junctions Formed by Flash Lamp Annealing to Reveal Dopant Activation Phenomenon .....</b>	<b>137</b>
<i>Shinichi Kato, Takayuki Aoyama, Takashi Onizawa, Yasuo Nara and Yuzuru Ohji</i>	