

IEEE

ELECTRON DEVICE LETTERS

A PUBLICATION OF THE IEEE ELECTRON DEVICES SOCIETY



AUGUST 2016

VOLUME 37

NUMBER 8

EDLEDZ

(ISSN 0741-3106)

EDITORIAL

Changes to the Editorial Board	<i>T.-J. K. Liu</i>	947
Changes to the Editorial Board	<i>T.-J. K. Liu</i>	948
Changes to the Editorial Board	<i>T.-J. K. Liu</i>	949

LETTERS

Silicon and Column IV Semiconductor Devices

Complementary Strained Si GAA Nanowire TFET Inverter With Suppressed Ambipolarity		
..... <i>G. V. Luong, K. Narimani, A. T. Tiedemann, P. Bernardy, S. Trelenkamp, Q. T. Zhao, and S. Mantl</i>		950
Novel BF ⁺ Implantation for High Performance Ge pMOSFETs		
..... <i>W. Hsu, T. Kim, H. Chou, A. Rai, and S. K. Banerjee</i>		954
Effects of Device Scaling on the Performance of Junctionless FinFETs Due to Gate-Metal Work Function Variability and Random Dopant Fluctuations	<i>S. M. Nawaz and A. Mallik</i>	958
A Device-Level Characterization Approach to Quantify the Impacts of Different Random Variation Sources in FinFET Technology	<i>X. Jiang, S. Guo, R. Wang, X. Wang, B. Cheng, A. Asenov, and R. Huang</i>	962

Compound Semiconductor Devices

Electrical Characterization and Modeling of Gate-Last Vertical InAs Nanowire MOSFETs on Si		
..... <i>M. Berg, O.-P. Kilpi, K.-M. Persson, J. Svensson, M. Hellenbrand, E. Lind, and L.-E. Wernersson</i>		966
Ultra-High Aspect Ratio InP Junctionless FinFETs by a Novel Wet Etching Method		
..... <i>Y. Song, P. K. Mohseni, S. H. Kim, J. C. Shin, T. Ishihara, I. Adesida, and X. Li</i>		970
Effects of <i>In-Situ</i> Plasma-Enhanced Atomic Layer Deposition Treatment on the Performance of HfO ₂ /In _{0.53} Ga _{0.47} As Metal-Oxide-Semiconductor Field-Effect Transistors	<i>Q. H. Luc, S. P. Cheng, P. C. Chang, H. B. Do, J. H. Chen, M. T. H. Ha, S. H. Huynh, C. C. Hu, Y. C. Lin, and E. Y. Chang</i>	974

Memory Devices and Technology

VO ₂ -Based Selection Device for Passive Resistive Random Access Memory Application		
..... <i>K. Zhang, B. Wang, F. Wang, Y. Han, X. Jian, H. Zhang, and H. S. Philip Wong</i>		978
Area-Efficient SOT-MRAM With a Schottky Diode	<i>Y. Seo, K.-W. Kwon, and K. Roy</i>	982

(Contents Continued on Page 945)



The γ -Fe ₂ O ₃ Nanoparticle Assembly-Based Memristor Ratioed Logic and Its Optical Tuning	K. M. Lee, J. T. Jang, Y.-J. Baek, H. Kang, S. Choi, S.-J. Choi, D. M. Kim, C. J. Kang, T.-S. Yoon, H.-S. Mo, and D. H. Kim	986
Dissolvable and Biodegradable Resistive Switching Memory Based on Magnesium Oxide	S. Wu, H. Wang, J. Sun, F. Song, Z. Wang, M. Yang, H. Xi, Y. Xie, H. Gao, J. Ma, X. Ma, and Y. Hao	990
Improved Synaptic Behavior Under Identical Pulses Using AlO _x /HfO ₂ Bilayer RRAM Array for Neuromorphic Systems	J. Woo, K. Moon, J. Song, S. Lee, M. Kwak, J. Park, and H. Hwang	994
Poly-Silicon Trap Position and Pass Voltage Effects on RTN Amplitude in a Vertical NAND Flash Cell String	Y. L. Chou, T. Wang, M. Lin, Y. W. Chang, L. Liu, S. W. Huang, W. J. Tsai, T. C. Lu, K. C. Chen, and C.-Y. Lu	998
Thin-Film Transistors		
Low-Voltage pH Sensor Tag Based on All Solution Processed Organic Field-Effect Transistor	W. Tang, C. Jiang, Q. Li, W. Hu, L. Feng, Y. Huang, J. Zhao, S. Chen, and X. Guo	1002
High-Performance Top-Gate and Self-Aligned In-Ga-Zn-O Thin-Film Transistor Using Coatable Organic Insulators Fabricated at 150 °C	T. Toda, G. Tatsuoka, Y. Magari, and M. Furuta	1006
Effects of Repetitive Mechanical Bending Strain on Various Dimensions of Foldable Low Temperature Polysilicon TFTs Fabricated on Polyimide	B.-W. Chen, T.-C. Chang, Y.-J. Hung, S.-P. Huang, P.-Y. Liao, C.-Y. Yang, A.-K. Chu, T. T.-J. Wang, T.-C. Chang, B.-Y. Su, S.-C. Kuo, and I.-Y. Huang	1010
Multilevel Resistive-Change Memory Operation of Al-Doped ZnO Thin-Film Transistor	W.-H. Lee, E.-J. Kim, and S.-M. Yoon	1014
Optoelectronics, Display, Imaging		
Potential Superiority of p-Type Silicon-Based Metal-Oxide-Semiconductor Structures Over n-Type for Lateral Photovoltaic Effects	X. Huang, C. Mei, J. Hu, D. Zheng, Z. Gan, P. Zhou, and H. Wang	1018
Efficient Quantum Dots Light-Emitting Devices Using Polyvinyl Pyrrolidone-Capped ZnO Nanoparticles With Enhanced Charge Transport	O.-S. Kim, B.-H. Kang, J.-S. Lee, S.-W. Lee, S.-H. Cha, J.-W. Lee, S.-W. Kim, S.-H. Kim, and S.-W. Kang	1022
Solid-State Power and High-Voltage Devices		
W-Band MMIC Amplifiers Based on AlInN/GaN HEMTs Grown on Silicon	D. Marti, L. Lugani, J.-F. Carlin, M. Malinverni, N. Grandjean, and C. R. Bolognesi	1025
The Piezoresistive Effect in Top-Down Fabricated p-Type 3C-SiC Nanowires	H.-P. Phan, T. Dinh, T. Kozeki, T.-K. Nguyen, A. Qamar, T. Namazu, N.-T. Nguyen, and D. V. Dao	1029
Experimental Demonstration of High-Voltage 4H-SiC Bi-Directional IGBTs	S. Chowdhury, C. Hitchcock, Z. Stum, R. P. Dahal, I. B. Bhat, and T. P. Chow	1033
Trench Multiple Floating Limiting Rings Termination for 4H-SiC High-Voltage Devices	H. Yuan, Q. Song, X. Tang, L. Yuan, S. Yang, G. Tang, Y. Zhang, and Y. Zhang	1037
Validation of Fast Current Interruption Mechanism in Sub-Nanosecond High-Voltage Switching Diodes	Y. Sharabani, I. Shafir, S. Zoran, A. Raizman, A. Sher, Y. Rosenwaks, and D. Eger	1041
Unbalanced Layout Method for the 4H-SiC JBS Diode Offering Improved Tradeoff between Leakage Current and ON-Resistance	J. Geum, S. Kyoung, and M. Y. Sung	1045
Materials, Processing, and Packaging		
Barrier Property of a Ta/MnSi _x O _y Layer Formed by a Ta-Mn Alloy for a Cu Interconnect	C.-L. Hsin and K.-Y. Lin	1048
Solid-State Device Phenomena		
Quasi-2D Surface-Potential-Based Critical Length for Drift-Diffusion	A. Ajaykumar, X. Zhou, S. B. Chiah, and B. Syamal	1051
Intrinsic Robustness of TFET Subthreshold Swing to Interface and Oxide Traps: A Comparative PBTI Study of InGaAs TFETs and MOSFETs	J. Franco, A. Alian, A. Vandooren, A. S. Verhulst, D. Linten, N. Collaert, and A. Thean	1055
Sensors and Actuators		
Improving the Performances of CdTe Gamma Ray Detectors by H ₂ /Ar ECR Plasma Processing	M. Niraula, K. Yasuda, S. Kitagawa, M. Kojima, and Y. Agata	1059
Surface Acoustic Wave Devices Based on High Quality Temperature-Compensated Substrates	X.-G. Tian, L.-Q. Tao, B. Liu, C. Zhou, Y. Yang, and T.-L. Ren	1063

(Contents Continued from Page 945)

Emerging Technologies and Devices

Analog Synapse Device With 5-b MLC and Improved Data Retention for Neuromorphic System
..... *K. Moon, E. Cha, J. Park, S. Gi, M. Chu, K. Baek, B. Lee, S. H. Oh, and H. Hwang* 1067

IEEE ELECTRON DEVICES SOCIETY MEETINGS CALENDAR 1071

Information for Authors 1075

ANNOUNCEMENTS

Call for Papers—24th International Symposium on Semiconductor Manufacturing 1076

Call for Papers—IEEE TRANSACTIONS ON ELECTRON DEVICES Special Issue on Power Semiconductor Devices and
Smart Power IC Technologies 1077

Call for Papers—IEEE TRANSACTIONS ON ELECTRON DEVICES Special Issue on Flexible Electronics 1078
