SESSION 8 – TAPA I
RRAM

Wednesday, June 16, 8:30 a.m.
Chairpersons: J. Lutze, Sandisk Corp.
S. Ohnishi, SHARP Corp.

8.1 - 8:30 a.m.
Novel Ultra-Low Power RRAM with Good Endurance and Retention, C.H. Cheng, A. Chin, F.S. Yeh, National Tsing Hua University, National Chiao-Tung University

We report high performance RRAM of ultra-low 4 uW set power (-3.5 uA at -1.1 V), 16 pW reset power (0.12 nA at 0.13 V), large extrapolated 10-year on/off retention window of 4E5 at 85oC, good 1 million cycling endurance and fast 50 ns switching for the first time. These were achieved using novel covalent-bond-dielectric/metal-oxide and low cost electrodes.

8.2 - 8:55 a.m.
A New Approach for Improving Operating Margin of Unipolar ReRAM using Local Minimum of Reset Voltage, Y. Sakotsubo, M. Terai, S. Kotsuji, Y. Saito, M. Tada, Y. Yabe, H. Hada, NEC Corporation, Japan

We propose a new approach for improving switching operation margin of Ta2O5/plasma oxidized TiO2 stacked unipolar ReRAM. It is found that reset voltage can be minimized by using local minimum against resistance of low resistance state. In addition, weakening the plasma oxidation condition reduced the power consumption and the variation of reset voltage. Excellent switching operation margin and more than 105 switching cycle times was successfully demonstrated using the integrated device.

8.3 - 9:20 a.m.
A Novel Cu_xSi_yO Resistive Memory in Logic Technology with Excellent Data Retention and Resistance Distribution for Embedded Applications, M. Wang, W. Luo, Y. Wang, L. Yang, W. Zhu, P. Zhou, J. Yang, X. Gong, Y. Lin, R. Huang*, S. Song*, Q. Zou*, H. Wu*, J. Wu*, M. Chi*, Fudan University, *Semiconductor Manufacturing International Corp., China

A new CuxSiyO resistive memory is integrated in standard logic technology for the first time. Key breakthrough is that data retention, resistance distribution and disturbance immunity significantly improved with integration simplicity advantage, as demonstrated on a 1Mb test chip. The activation energy of Cu vacancy migration in CuxSiyO increases by 5 times than that in CuxO, giving rise to the great performance improvement.

8.4 - 9:45 a.m.
A Novel TiTe Buffered Cu-GeSbTe/SiO_2 Electrochemical Resistive Memory (ReRAM), Y.-Y. Lin, F.-M. Lee, Y.-C. Chen, W.-C. Chien, C.-W. Yeh, K.-Y. Hsieh, C.-Y. Lu, Macronix International Co., Ltd, Taiwan

A novel solid-electrolyte based electrochemical induced conductive bridge resistive memory is fabricated and characterized. The new device consists of a Cu-doped GeSbTe ion source, a SiO2 memory layer, and a TiTe ion buffer layer. The ion-buffer layer separates the Cu conducting path from the Cu-ion supply layer thus greatly increases the stability. This tri-layer device greatly improves reliability, yet maintains both low thermal budget BEOL processing and excellent electrical properties.