The 2nd CSIS International Symposium on Spintronics-based VLSIs

and

The 8th RIEC International Workshop on Spintronics

Date: February 2nd and 3rd, 2012

Venue: Laboratory for Nanoelectronics and Spintronics,
4th Floor, Conference Room, Tohoku University,
Sendai, Japan

http://www.csis.tohoku.ac.jp/

PROGRAM

Thursday February 2nd, 2012 - Materials and Devices -		
Opening 9:00 -9:10		**Opening remarks** Hideo Ohno (Tohoku University)
Invited talk 9:10-9:45	T1	**Size-dependent sub-volume magnetic excitation in perpendicularly magnetized tunnel junctions and implications for spin-torque-based memory technologies** Jonathan Z. Sun (IBM)
Invited talk 9:45-10:05	T2	**Thermal stability factor of CoFeB/MgO perpendicular magnetic tunnel junctions** Hideo Sato, M. Yamanouchi, K. Miura, S. Ikeda, R. Koizumi, F. Matsukura, and H. Ohno (Tohoku University)
10:05-10:20	Coffee Break	
Invited talk 10:20-10:55	T3	**Tetragonal Mn-Ga alloys for MRAM application** Shigemi Mizukami (Tohoku University)
Invited talk 10:55-11:30	T4	**Magnetic properties and tunnel magneto-resistance effect of perpendicularly magnetized $L1_0$-ordered alloys** Mikihiko Oogane, M. Hosoda, H. Saruyama, N. I. Khan, G. Kim, N. Inami, H. Naganuma and Y. Ando (Tohoku University)
Invited talk 11:30-12:05	T5	**MRAM concepts for sub-20nm scaling and ultrafast precessional switching** Ricardo Sousa[1], S. Bandiera[1], M. Marins de Castro[1], B. Lacoste[1], C. Ducruet[2], S. Auffret[1], I. L.Prejbeanu[2], U. Ebels[1], C. Portemont[2], L.D. Buda-Prejbeanu[1], B. Rodmacq[1], and B. Dieny[1] ([1]SPINTEC, [2]Crocus)
12:05-14:00	Lunch	
14:00-15:30	**POSTER SESSION** See pages 5 and 6	
Invited talk 15:30-16:05	T6	**STT-MRAM development with 300-mm facilities at LEAP** Toshihiro Sugii, M. Aoki, H. Noshiro, T. Ochiai, K. Tsunoda, Y. Iba, A. Hatada, M. Nakabayashi, Y. Yamazaki, A. Takahashi, and C. Yoshida (LEAP)
Invited talk 16:05-16:25	T7	**Magnetic resonance and switching induced by the Spin Hall effect** Luqiao Liu[1], C. F. Pai[1], O. J. Lee[1], T. J. Gudmundsen[1], D. C. Ralph[1,2] and R. A. Buhrman[1] ([1]Cornell University, [2]Kavli Institute at Cornell)

Invited talk 16:25-17:00	T8	**Current induced magnetization dynamics in CoFeB/MgO nanostructures** Masamitsu Hayashi[1], J. Kim[1], J. Sinha[1], S. Mitani[1], Y. Nakatani[2] S. Fukami[3], M. Yamanouchi[3] and H. Ohno[3] ([1]NIMS, [2]University of Electro-Communications, [3]Tohoku University)
17:00-17:15	Coffee Break	
Invited talk 17:15-17:50	T9	**Current-induced domain wall motion in the presence of spin-orbit coupling** Kyung-Jin Lee[1,2,3], S.-M. Seo[1], K.-W. Kim[4], J. Ryu[4], and H.-W. Lee[4] ([1]Korea University, [2]NIST, [3]University of Maryland, [4]Pohang University of Science and Technology)
Invited talk 17:50-18:25	T10	**Magnetoresistance and spin-transfer torque in magnetic tunnel junctions** Shinji Yuasa[1,2], K.Yakushiji[1], H.Kubota[1], A.Fukushima[1] and K.Ando[1] ([1]AIST, [2]IEEE Distinguished Lecturer)
Invited talk 18:25-19:00	T11	**Racetrack Memory 2.0: a high-performance, storage class memory using perpendicularly magnetized domain-walls manipulated by current** Stuart Parkin (IBM)
Banquet 19:30-21:00	Barbaresco (Italian restaurant), Sendai Trust City Plaza, 1st floor http://www.stillfoods.com/barbaresco/location.html	

Friday February 3rd, 2012 Spintronics-based LSIs		
Invited talk 9:00-9:35	F1	**Restructuring of memory hierarchy in electrical system and no-standby-power nonvolatile logic with STT-RAM technology** Tetsuo Endoh (Tohoku University.)
Invited talk 9:35-10:10	F2	**STT MRAM: Recent strong semiconductor Industry traction** Yiming Huai, Y. Zhou, Z. Wang, R. Malmhall, R. Ranjan and J. Zhang (Avalanche Technology)
Invited talk 10:10-10:45	F3	**Embedded STT-MRAM for advanced mobile system-on-chips: Current status and prospects** Seung Kang (Qualcomm)
10:45-11:00	Coffee Break	
Invited talk 11:00-11:35	F4	**SPRAM (SPin-transfer torque RAM) technology for environmentally-friendly social innovation** Masanori Odaka (Hitachi)
Invited talk 11:35-12:10	F5	**Design considerations for 1T-1STT MTJ based embedded memory arrays** Arijit Raychowdhury (Intel)
12:10-14:00	Lunch	
Invited talk 14:00-14:35	F6	**Proposal of new MTJ-based nonvolatile memories** Takashi Ohsawa, Hiroki Koike, Shoji Ikeda, Takahiro Hanyu, Hideo Ohno, and Tetsuo Endoh (Tohoku University)
Invited talk 14:35-14:55	F7	**A content addressable memory using three-terminal magnetic domain wall motion cells** Ryusuke Nebashi[1], N. Sakimura[1], Y. Tsuji[1], S. Fukami[2], H. Honjo[1], S. Saito[1], S. Miura[1], N. Ishiwata[1], K. Kinoshita[2], T. Hanyu[2], T. Endoh[2], N. Kasai[2], H. Ohno[2], and T. Sugibayashi[1] ([1]NEC, [2]Tohoku University)
Invited talk 14:55-15:15	F8	**High-density ternary content-addressable memory using MTJ-based nonvolatile logic-in-memory architecture** Takahiro Hanyu, (Tohoku University)
15:15-15:30	Coffee Break	
Panel Discussion 15:30-17:00	"**Spintronics-based VLSIs, What remains to be done?**" Moderators : Hideo Ohno (Tohoku University), Tetsuo Endoh (Tohoku University) Panelists : *to be announced*	
Closing 17:00-17:05		**Closing remarks**

Thursday February 2nd, 2012
POSTER SESSION 14:00-15:30

P1	**Effects of rapid thermal annealing on magnetic coupling of chromium-doped indium zinc oxides** C.Y. Hsu (National Sun Yat-Sen University)
P2	**Magneto-optical studies of Co doped amorphous carbon films** H. S. Hsu[1], W. Y. Su[1,4], J. S. Lee[1], S. J. Sun[2], P. Y. Chuang[3], and C. H. Lee[3] ([1]National Pingtung University of Education, [2]National University of Kaohsiung, [3]National Tsing-Hua University, [4]National Kaohsiung Normal University)
P3	**Annealing temperature dependence of tunnel magnetoresistance in MgO magnetic tunnel junctions with thin CoFeB electrodes** H. D. Gan[1], S. Ikeda[1], M. Yamanouchi[1], H. Sato[1], K. Miura[1,2], K. Mizunuma[1], R. Koizumi[1], F. Matsukura[1], and H. Ohno[1] ([1]Tohoku University, [2]Hitachi)
P4	**B concentration dependence of magnetic anisotropy in MgO/CoFeB/Ta stack structure** R. Koizumi[1], S. Ikeda[1], H. Sato[1], M. Yamanouchi[1], K. Miura[1,2], K. Mizunuma[1], H. D. Gan[1], F. Matsukura[1] and H. Ohno[1] ([1]Tohoku University, [2]Hitachi)
P5	**Magnetotransport properties in perpendicular magnetized $L1_0$-CoPt/CoFeB and $L1_0$-FePd/CoFeB magnetic tunnel junctions** H. Naganuma, G. Kim, M. Oogane, and Y. Ando (Tohoku University)
P6	**Crystal symmetry change from rhombohedral and tetragonal by substrate temperature for $BiFeO_3$ epitaxial films** H. Naganuma, K. Mukaiyama, M. Oogane, and Y. Ando (Tohoku University)
P7	**Effect of device temperature on domain wall motion in a perpendicularly magnetized Co/Ni wire** H. Tanigawa, K. Suemitsu, Y. Ozaki, T. Suzuki, and E. Kariyada (Renesas Electronics)
P8	**Energy-assisted oxidation process of Mg layer for MgO-MTJs** H. Yamamoto[1], T. Morita[1], S. Ikeda[2], and H. Ohno[2] ([1]ULVAC, [2]Tohoku University[2])
P9	**Spin torque diode effect of perpendicularly magnetized CoFeB/MgO/CoFeB magnetic tunnel junctions** N. Inami, H. Naganuma, M. Oogane, Y. Ando, S. Ikeda and H. Ohno (Tohoku University)
P10	**Tailoring nonmagnetic-metals/Fe interfaces with perpendicular magnetic anisotropy: A first-principles study** Y. Miura, M. Tsujikawa, K. Abe and M. Shirai (Tohoku University)
P11	**Ultrafast write operation of reconfigurable spin logic block with SPRAM for 3D-stacked reconfigurable spin processor** R. Nakazawa[1], H. Kino[1], K. Kiyoyama[2], T. Tanaka[1], and M. Koyanagi[1] ([1]Tohoku University, [2]Nagasaki Institute of Applied Science)

P12	**Ab initio study on magnetic anisotropy of $L1_0$-FeNi and FeNi multilayers** S. Ozaki, Y. Kuwahara, M. Tsujikawa, Y. Miura, K. Abe and M. Shirai (Tohoku University)
P13	**Hole concentration dependence of the Curie temperature of (Ga,Mn)Sb channel in field-effect structure** S. Akita, F. Matsukura and H. Ohno (Tohoku University)
P14	**Spin-transfer switching characteristics in magnetic tunnel junctions with synthetic free layers** M. Nishimura, M. Oogane, H. Naganuma, N. Inami and Y. Ando (Tohoku University)
P15	**First principles study of interface magnetic anisotropy between transition metal nitride (carbide) and Fe(001)** M. Tsujikawa, Y. Miura and M. Shirai (Tohoku University)
P16	**Perpendicular magnetic anisotropy of Co_2FeAl/MgO interfaces** D. Mori, M. Tujikawa, Y. Miura, K. Abe and M. Shirai (Tohoku University)
P17	**7T-2MTJ-Based High-Speed Nonvolatile Fully Parallel TCAM** S. Matsunaga, A. Katsumata, M. Natsui, and T. Hanyu (Tohoku University)
P18	**Design of a Compact MTJ/MOS-Hybrid Logic Element for a Nonvolatile Field-Programmable Gate Array** D. Suzuki and T. Hanyu (Tohoku University)
P19	**Magnetic proximity effect of Co_2FeAl/(Ga,Mn)As bilayers** S. H. Nie[1,2], K. K. Meng[1], L. Chen[1], L. J. Zhu[1], X. Z. Yu[1], H. L. Wang[1], W. S. Yan[3], Y. G. Zhao[2], and J. H. Zhao[1] ([1]Chinese Academy of Sciences, [2]Tsinghua University, [3]University of Science & Technology of China)
P20	**Nonvolatile Low Power 16-bit/32-bit Binary Counter with MTJ and its Scalability** S. Togashi, T. Ohsawa and T. Endoh (Tohoku University)
P21	**A Study for Adopting PMOS Memory Cell for 1T1R STT-RAM with Asymmetric Switching Current MTJ** H. Koike, T. Ohsawa and T. Endoh (Tohoku University)