

Preliminary Program

Semiconductor Technology for Ultra Large Scale Integrated Circuits and Thin Film Transistors

29 July – 3 August 2007

Il Ciocco Hotel and Conference Center, Barga, Italy

Conference Chair

Dr. Yue Kuo
Texas A&M University

Conference Co-Chairs

Prof. Michael Shur
Rensselaer Polytechnic Institute
Dr. Dieter Ast
Cornell University

ECI

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Sunday, July 29, 2007

16:30 – 18:30 Registration
18:30 – 20:00 Opening Reception
20:00 – 21:30 Opening Dinner

Monday, July 30, 2007

07:30 – 08:30 Breakfast Buffet
08:30 – 08:45 Welcome and Conference Overview
Y. Kuo, D.G. Ast, and M. Shur
ECI Technical Liaison N. Li
08:45 – 09:30 **Nanotechnology for the Post- CMOS Scaling ERA**
T.C. Chen, IBM
09:30 – 10:15 **Low-Temperature Polysilicon History and a CPU with an
Operating Frequency in the GHZ Range**
S. Yamazaki, SEL
10:15 – 10:45 Coffee Break
10:45 – 12:30 **Challenges in Scaling and Devices**
Session Chairs: M. Shur, Rensselaer Polytechnic University
S. Hamaguchi, Osaka University, Japan
10:45 – 11:10 **Performance Limitations of SI Bulk CMOS And
Alternatives for Future ULSI**
K.C. Saraswat, Stanford University
11:10 – 11:35 **Electrical Performance and Reliability Aspects of Strain
Engineered Deep Submicron CMOS Technologies**
C. Claeys, IMEC
11:35 – 12:00 **Technology Trend and Application of TFT-LCDS**
Y. Yamamoto, Sharp
12:00 – 12:25 **The Small Differences Between 45nm and 45 Inches**
C. Reita, CEA-LETI
12:25 – 12:30 Questions/Announcements
12:30 – 14:00 Lunch
14:00 – 17:00 Free Time for leisure, recreation, discussion, *ad hoc* sessions
17:00 – 17:30 Afternoon Coffee

17:30 – 19:30	<p>Challenges in Devices, Scaling, etc. Session Chairs: K. Saraswat, D. Buckley</p>
17:30 – 17:55	<p>Device Performance and Reliability of Fully Depleted SOI Transistors Low-Temperature Poly-Si TFTS M. Hatano, M. Matsumura, M. Tai, Y. Toyota, M. Ohkura, Hitachi</p>
17:55 – 18:20	<p>TFT Technologies for Large Area Electronics J. Jang, Kyung Hee University</p>
18:20 – 18:45	<p>Nanoscale Large Area Electronics – Device and Material Integration Challenges A. Nathan, University College London</p>
18:45 – 19:10	<p>ULSIC vs. TFT – What can they learn from each other? Y. Kuo, Texas A&M University</p>
19:10 – 19:30	Discussion
20:00 – 21:30	Dinner
21:30 – 22:30	Social Hour

Tuesday, July 31, 2007

- 07:30 – 08:30 Breakfast Buffet
- 08:30 – 10:35 **Challenges in Dielectrics and Semiconductors in ULSIC**
Session Chairs: R. Street, PARC
J. Jang, KyungHee University
- 08:30 – 08:55 **Electrical Characterization of Advanced Gate Dielectrics for Scaled CMOS Technology**
T.P. Ma, Yale University
- 08:55- 09:20 **Nano-Length Scales for Coherent D-State PI-Bonding: A New Approach to Electron and Hole Asymmetric Trapping in HfO₂ Gate Dielectrics, and Defects at LAALO₃-SRTIO₃ Hetero-Junction Transition Metal(TM) Rare Earth (RE) Atom Oxide Interfaces**
G. Lucovsky, North Carolina State University
- 09:20 – 09:45 **Scanning Transmission Electron Microscopy of High-K Gate Stacks for Silicon CMOS**
S. Stemmer, UCSB
- 09:45 – 10:10 **HfO₂ as a Gate Dielectric for Future CMOS Technology**
E. Cartier, B. P. Linder, V. K. Paruchuri, V. Narayanan, IBM SRDC
- 10:10 – 10:40 Coffee Break
- 10:40 – 12:30 **Challenges in Dielectrics and Semiconductors in TFTs**
Session Chairs: A. Nathan, University College London
G. Lucovsky, North Carolina State University
- 10:40 – 11:05 **Polymer Semiconductors for Displays and Image Sensors**
R. Street, M. Chabinyk, J. Northrup, PARC
- 11:05 – 11:30 **Improvement of Silicon Based Thin Film Transistors Performances by Modifying Technological Fabrication Process Steps: A Similar Approach with ULSI Technology**
O. Bonnaud, T. Mohammed- Brahim, University of Rennes 1
- 11:30 – 11:55 **Grain Boundary Characterization in Sequentially Laterally Solidified Polycrystalline-Silicon Thin Film Transistors**
A. Valletta, A. Bonfiglietti, M. Rapisarda, L. Mariucci, A. Pecora, G. Fortunato, S.D. Brotherton, IFN – CNR
- 11:55 – 12:10 **Transparent OTFTs with Color Filtering Functional Gate Insulators**
C.-S. Chuang, F.-C. Chen, H.-P.D. Shieh, NCTU
- 12:10 – 12:25 **Verase Improvement for Split-Gate Embedded Flash Through Poly Grain Size Reduction**
H.S. Ng, H.M Tan, X-FAB
- 12:25 – 12:30 Discussion

12:30 – 14:00	Lunch
14:00 – 17:00	Free Time for leisure, recreation, discussion, <i>ad hoc</i> sessions
17:00 – 17:30	Afternoon Coffee
17:30 – 20:00	<p><u>Challenges In Dielectrics and Semiconductors in General</u></p> <p>Session Chairs: T.P. Ma, Yale University O. Bonnaud, University of Rennes 1</p>
17:30 – 17:45	<p>Defects and Defect Precursor Reductions in Non-Crystalline Thin Films: Intermediate States Generated by Chemical Bonding Self-Organizations Which Include Broken Bond-Bending Constraints</p> <p>G. Lucovsky, J.C. Phillips, S.O. Kasap, North Carolina State University</p>
17:45 – 18:00	<p>Electron Spin Resonance Studies of Silicon Nano-Crystal Flash Memory Devices</p> <p>J.T. Ryan, P.M. Lenahan, L. Visnubhotla, S. Straub, M. Ramachandran, R. Rao, T. Merchant, Pennsylvania State University</p>
18:00 – 18:15	<p>Improved Electrical Characteristics of MOS Devices With Ultrathin Gate Oxide Grown by Chemical Oxidation</p> <p>N. DasGupta, B.J. Kailath, A. DasGupta, Indian Institute of Technology, Madras</p>
18:15 – 18:30	<p>Improved Electrical Properties of NILC-TFT Using Simple Gettering Methods</p> <p>Y.C.S. Wu, C.-C Lin, C.-M. Hu, P.H. Hsiao, NCTU</p>
18:30 – 20:00	<p><u>Panel Discussion: Challenges in Devices, Materials, and Applications</u></p> <p>Moderators: S. Uchikoga, Toshiba, Japan C. Claeys, IMEC, Belgium</p> <p>Panelists: G. Bersuker, O. Bonnaud, I. Boyd, M.K. Han, M. Hatano, G. Lucovsky, M. Orlovski, K. Saraswat, D.N. Buckley, C. Claeys, T.P. Ma, T. Motooka, W.A. Hennessy, P.M. Lenahan</p>
20:15 – 21:45	Dinner
21:45 – 22:45	Social Hour

Wednesday, August 1, 2007

- 07:30 – 08:30 Breakfast Buffet
- 08:30 – 10:35 **Challenges in Interconnects, Contacts, and Defect Inspections**
Session Chairs: D. Ast, Cornell University
G. Bersuker, Sematech
- 08:30 – 08:55 **Air Cavity Generation for Interconnect and High Resolution Displays**
P.A. Kohl, Georgia Tech
- 08:55 – 09:20 **Low and UltraLow-K Dielectrics for High Performance Interconnects**
A. Grill, V. Patel, S. Gates, S. Nguyen, C. Dimitrakopoulos,
D. Restaino, IBM
- 09:20 – 09:45 **AFM Observation of Nanostructure and Morphology of Electrodeposited Copper Metallization during Room-Temperature Aging**
D.N. Buckley, S. Ahmed, T.T. Ahmed, S. Nakahara, University of Limerick
- 09:45 – 10:10 **In-Line Automatic Defect Inspection and Repair Method for A High Yield TFT Array Production**
H. Honoki, N. Nakasu, T. Arai, K. Yoshimura, T. Edamura, Hitachi
- 10:10 – 10:25 **Heterojunction between Silicon and Semiconducting Metal Silicides**
M. Baleva, N. Todorov, M. Marinova, Aleksander
- 10:25 – 10:55 Coffee Break
- 10:55 – 12:40 **Challenges in Modeling, Theories, etc.**
Session Chairs: P. Kohl, Georgia Tech
A. Grill, IBM
- 10:55 – 11:20 **Modeling of Thin Film Transistors with Non-Ideal Contacts**
M.S. Shur, D. Veksler, A. Kudymov, B. Iñiguez, W. Jackson, RPI
- 11:20 – 11:35 **Spice Modeling of Single-Grain SI TFTS Using BSIMSOI**
A. Baiano, R. Ishihara, N. Karaki, S. Inoue, W. Metselaar, K. Beernakker
- 11:35 – 12:00 **Fast and Slow Parameter Instability Processes in High-K Gate Stack Devices**
G. Bersuker, SEMATECH
- 12:00 – 12:25 **Atomic-Scale Analyses of Non-Equilibrium Surface Reactions During Plasma Processing**
S. Hamaguchi, Osaka University

- 12:25 – 12:50 **Controlling the Nucleation Site and Crystal Orientation During Excimer-Laser Annealing Processes In Thin Amorphous SI Films on Glass: A Molecular-Dynamic Study**
T. Motooka, Kyushu University
- 12: 50 – 14:00 Lunch
- 14:00 – 18:30 Free Time for leisure, recreation, discussion *ad hoc* sessions
Optional Excursion to Lucca
- 18:30 – 20:00 **Poster session** (with wine)
Session Chairs: K. S. Karim, Simon Fraser University
 T. Serikawa, Osaka University
- Molecular Dynamics Simulations FOR Reactive Ion Etching of SiO₂ and SiCOH Dielectric Films**
T. Takizawa, S. Hamaguchi, Osaka University
- Study of Structure and Electrical Characteristics of Silicon Oxynitride Layers Synthesized by Dual Ion Implantation in Silicon and Their Annealing Behavior**
A. D. Yadav, G. Bhatt, S. K. Dubey, University of Mumbai
- Bathtub-Shaped Hazard Rate Function for Ultra-Thin Gate Dielectrics**
T. Yuan and W. Kuo, University of Tennessee
- Leakage Current-Free Pixel Structure Using a Blocking Transistor for Active-Matrix Display**
H.-S. Park and M.-K. Han, SNU
- Performance Improvement of Organic Thin-Film Transistors by Ammonia Plasma Pretreatment on the Surface of Gate Dielectric**
C.-L. Fan, T.-H. Yang, C.-H. Huang, C.-I. Lin, NTUST
- Radiation Damages to a-SI: H TFTS Induced From Fabrication Process and Environment**
Y. Kuo, H. Nominanda, C.-C. Chen, C.-C. Hwang, TAMU
- Investigation of Hump Degradation by F-N Stress for Narrow Width N-MOSFETS with Shallow Trench Isolation (STI)**
J. Y. Seo, Samsung
- SiO₂/SiC Interface Electrical Characteristics**
H. Boudinov, Rodrigo Palmieri, Claudio Radtke, UFRGS
- The Hysteresis Phenomenon In A-SI: H TFT and POLY-SI TFT in AMOLED**
S.-G. Park, J.-H. Lee, H.-S. Shin, S.-H. Choi, M.-K. Han, SNU
- Low Hysteresis Characteristics of Pentacene Thin-Film Transistor and Inverter**
C. H. Kul, S. H. Kim, J. B. Koo, S. C. Lim, J. H. Lee, J. Jang, ETRI

Surface-Treatment Effects on Organic Thin-Film Transistors by Atmospheric-Pressure Plasma Technology

K. M. Chang, C. H. Lin, S. X. Huang, NCTU

Transistor and Circuit Operation of Complimentary Organic Thin Film Devices

Y. S. Yang, S. H. Kim, S. C. Lim, J. H. Lee, C. H. Ku, ETRI

Organic Logic-Circuits Using Screen Printing Method

S. H. Kim, S. C. Lim, J. H. Lee, C. H. Ku, J. B. Koo, T. Zyung, S. Y. Nam, M. Y. Lee, ETRI

An Approach to Calculate and Plot V-I Characteristics for 4H-SiC Schottky Barrier Diode for Different Contact Metals Using Iteration Method and C++ Programming

R. Talwar and A.k.Chatterji, RIMT

20:00 – 22:00

Dinner

22:00 – 23:00

Poster Session (continued) and Social Hour

Thursday, August 2, 2007

- 07:30 – 08:30 Breakfast Buffet
- 08:30 – 10:35 **Challenges in Processes and Reliability**
Session Chairs: W. Tonti, IBM
W. Milne, Cambridge University
- 08:30 – 08:55 **Demonstration of High Performance Low Temperature Crystalline Silicon (LTCS) Thin-Film Transistors**
D. Dawson- Elli, R.G. Manley, G. Fenger, K.D. Hirschman, J.G. Couillard
C.K. Williams, J. Cites, Corning
- 08:55 – 09:20 **New LC Method for GHZ Level TFT Operation**
K. Tanaka, T. Omata, T. Moriwaka, H. Oishi, S. Yamazaki, SEL
- 09:20 – 09:45 **Reliability of Short Channel Polycrystalline Silicon Thin Film Transistor on the Glass Substrate**
M.-K. Han, SNU
- 09:45 – 10:10 **Moisture Induced Accelerated Aging of an Amorphous Silicon TFT-Photodiode Array**
W. A. Hennessy, GE
- 10:10 – 10:25 **Physics-Based Percolation Model of Oxide Breakdown**
J. Suñé, E. Wu, S. Tous, U. Autònoma Barcelona
- 10:25 – 10:55 Coffee Break
- 10:55 – 12:35 **Challenges in Reliability**
Session Chairs: M. Hatano, Hitachi
D. Dawson- Elli, Corning
- 10:55 – 11:20 **MOS Technology Drivers**
W. R. Tonti, IBM
- 11:20 – 11:45 **Electromigration Reliability Assessment of Cu-Based Metallization Systems by a Wafer-Level Approach**
M. Impronta, A. Marras, I. De Munari, A. Scorzoni, CNR-IMM
- 11:45 – 12:10 **Dielectric Reliability for Future Logic and Non-Volatile Memory Applications: A Statistical Simulation Analysis Approach**
P. Pavan, L. Larcher, A. Padovani, U. Di Modena e Reggio Emilia
- 12:10 – 12:35 **Electron Spin Resonance and Reliability Defects**
P.M. Lenahan, Pennsylvania State University
- 12:35 – 14:00 Lunch
- 14:00 – 16:00 Free Time for leisure, recreation, discussion *ad hoc* sessions
- 16:00 – 16:30 Afternoon Coffee

16:30 – 17:30	<p><u>Challenges in fabrication and Defects</u> Session Chairs: T. Motooka, Kyushu University H. -P. Shieh, National Chiao Tung University</p>
16:30 – 16:45	<p>High Quality Polycrystalline SI Thin Film Transistors with Sputter-Deposited Very-Thin Gate SiO₂ Films T. Serikawa, M. Miyashita, Y. Uraoka, T. Fuyuki. Osaka University</p>
16:45 – 17:00	<p>Fabrication of the High Resolution Poly-Si TFTS Array on 3 Inch Glass Substrate Using Ni-Induced Field Aided Lateral Crystallization H.-C Kim, Y.-B. Kim, D.-K. Choi, Hanyang University</p>
17:00 – 17:15	<p>Magnetic Resonance Studies of Reliability Defects in HfO₂ Based MOS Devices C. Cochrane, J.T. Ryan, P.M. Lenahan, G. Bersuker, Pennsylvania State University</p>
17:15 – 17:30	<p>High Performance Flexible Organic Thin Film Transistors Y. Seol, N.-E. Lee, S.H. Park, J.Y. Bae, S.S. Lee, J.H. Ahn Sungkyunkwan University</p>
17:30 – 19:00	<p><u>Panel Discussion: Challenges in Large-Area Fabrication Processes</u> Moderators: D.G. Ast, Cornell University Y. Yamamoto, Sharp</p> <p>Panelists: A. Nathan, R. Street, W. Tonti, S. Uchikoga, Y. Yamamoto, J. Jang, P. Kohl, H.-P. Shieh, C. Reita, T.C. Chen, A. Grill, H. Honoki, D. Dawson-Elli, W.B. Jackson, W. I. Milne</p>
20:00	Conference Banquet

Friday, August 3, 2007

- 07:30 – 08:30 Breakfast Buffet
- 08:30 – 09:50 **Challenges in Nano Structures and Fabrications**
Session Chairs: P. Lenahan, Pennsylvania State University
M. K. Han, Seoul National University
- 08:30 – 08:55 **Carbon Nanotubes and Their Potential Use in Electronic Devices and Circuits**
W.I. Milne, Cambridge University
- 08:55 – 09:20 **Large Area Flexible Electronics Fabricated Using Imprint Lithography**
W.B. Jackson, M. Almanza-Workman, A. Chaiken, R. Garcia, A. Jeans, H.-J. Kim, O. Kwon, H. Luo, P. Mei, C. Perlov, C. Taussig, HP
- 09:20 – 09:35 **Novel Polysilicon Thin-Film Transistors with Nanowire Channel**
M. Im, J.-W. Han, H. Lee, L.-E. Yu, S. Kim, C.-H. Kim, S. C. Jeon, K. H. Kim, G. Sung Lee, J. S. Oh, Y. C. Park, H. M. Lee, Y.-K. Choi, KAIST
- 09:35 – 09:50 **Silicon Nanowire Schottky Barrier NMOS Transistors**
E. J. Tan, K. L. Pey, G. Cui, N. Singh, G.-Q. Lo, D. Chi, P. S. Lee, Nanyang TU,
- 09:50 – 10:20 Coffee Break
- 10:20 – 12:05 **Challenges in Applications and Substrates**
Session Chairs: W.B. Jackson, HP
M. Shur, RPI
- 10:20 – 10:45 **Poly-Si TFT Fabrication on “Non-Display” Glass Substrates**
D. G. Ast, Cornell University
- 10:45 - 11:10 **CPU for HF and UHF Operation on the Glass and Flexible Substrates**
J. Koyama, Y. Kurokawa, T. Ikeda, M. Endo, H. Dembo, D. Kawae, T. Inoue, M. Kozuma, D. Ohgarane, S. Saito, K. Dairiki, H. Takahashi, S. Yamazaki, SEL
- 11:10 – 11:35 **Intelligent Pixel Architectures for Digital Medical Imaging Applications**
K. S. Karim, Simon Fraser University
- 11:35 – 11:50 **INGAN Nanostructured Materials: Controlled Synthesis, Characterizations, and Applications**
O. Kryliouk, J. Mangum, H. J. Park, T. Anderson, Z. Lilliental-Weber, University of Florida
- 11:50 – 12:05 **ZnO and Its Nanostructures for Novel Devices**
Y. Lu, J. Zhu, Y. Chen, Z. Zhang, H. Chen, G. Saraf, J. Zhong, J. Jang, Rutgers University

12:05
14:00

Lunch
Departure