



May 22-24 2007



Santa Clara, May 20-24 2007

NSTI Nanotech
The Nanotechnology Conference and Trade Show

*An Interdisciplinary Integrative Forum on
Nanotechnology, Biotechnology and Microtechnology*

The sixth

Workshop on Compact Modeling

Workshop Chair: Xing Zhou

Grand Ballroom A

Poster Exhibitions: Wed 2:00pm, Exhibit Hall



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History of WCM



2002 – Puerto Rico



2003 – San Francisco



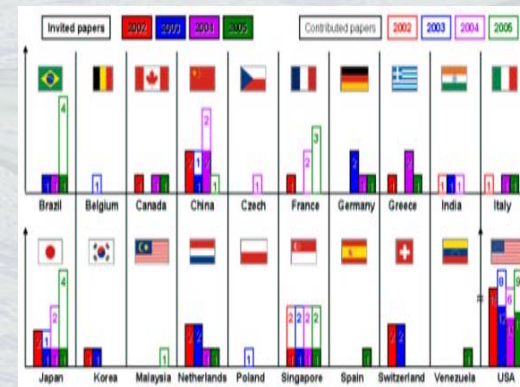
2004 – Boston



2005 – Anaheim



2006 – Boston



2002 – 2005



The 6th WCM 2007

- **23 Invited** speakers from 13 countries
- 10 contributed **Oral** papers (1 withdrawn: Y. Ma, Wed 2:50; replaced by 2 late news briefings)
- 21 contributed **Poster** papers, with 5min oral briefing — **Poster exhibits**: Wed 2pm (3:10~4:00) — please set up posters
Presenters: please load your slides to the conference PC before the two oral briefing sessions (4pm; 5:10pm) and keep your presentation within **5min**.
- **3 Late News** papers — by C.T. Sah and B.B. Jie, *Double-Gate Thin-Base MOS Transistor: The Correct Theory*, **Wed May 23, 2:50~3:10pm**
- **Nanotech Special Session** — by Arjun N. Saxena, *Monolithic Concept and the Inventions of Integrated Circuits By Kilby and Noyce*, chaired by Colin McAndrew, **Thur May 24, 8:00am**



WCM 2007... and WCM2008

- Thanks to all invited and contributed speakers as well as all sessions chairs
- Call for contribution of presentation slides
 - To be hosted at the Nanotech2007 website:
<http://www.nsti.org/Nanotech2007/WCM2007/>
 - Visit <http://www.ntu.edu.sg/home/exzhou/WCM/> for past/future WCM events
- Hope to see you all next year at WCM2008:

June 3–5 2008, Boston, MA, USA

Thank you for your participation!



Tue, May 22 2007

Session Chair: Xing Zhou

WCM-1

Bulk MOS Intrinsic Models

- 8:30** **Matthias Bucher**, *Technical University of Crete, Greece (Invited)*
Design-Oriented Characterization and Parameter Extraction Methodologies for the EKV3 MOSFET Model
- 9:00** **Carlos Galup-Montoro**, *Universidade Federal de Santa Catarina, Brazil (Invited)*
Consistency of Compact MOSFET Models with the Pao-Sah Formulation: Consequences for Small-Signal Analysis
- 9:30** **Mitiko Miura-Mattausch**, *Hiroshima University, Japan (Invited)*
HiSIM2.4.0: Advanced MOSFET Model for the 45nm Technology Node and Beyond

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Tue, May 22 2007

Session Chair: Mitiko Miura-Mattausch



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WCM-2

Bulk MOS Intrinsic/Interface Models

- 10:30** **Chih-Tang Sah, University of Florida, USA (Invited)**
A History of Electronic Traps on Silicon Surfaces and Interfaces
- 11:00** **Zuhui Chen, Xiamen University, China (Invited)**
High Concentration of Interface Traps in MOS Transistor Modeling
- 11:30** **Bin B. Jie, Peking University, China (Invited)**
Analytical Solutions for Long-Wide-Channel Thin-Base MOS Transistors I. Effects of Remote Boundary Conditions and Body Contacts



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Tue, May 22 2007

Session Chair: Dirk Klaassen

WCM-3

Double/Multiple-Gate MOS Models

- 1:30** **Tor A. Fjeldly**, *Norwegian University of Science and Technology, Norway (Invited)*
Compact Modeling Framework for Short-Channel DG and GAA MOSFETs
- 2:00** **Jerry G. Fossum**, *University of Florida, USA (Invited)*
Modeling of Saturation-Region Characteristics of Nanoscale Double-Gate MOSFETs
- 2:30** **Chenming Hu**, *University of California at Berkeley, USA (Invited)*
A Versatile Multigate MOSFET Compact Model: BSIM-MG
- 3:00** **Benjamin Iniguez**, *University Rovira I Virgili, Spain (Invited)*
3-D Analytical Models for the Short-Channel Effect Parameters in Undoped FinFET Devices



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Tue, May 22 2007

Session Chair: Tor Fjeldly

WCM-4

Double/Multiple-Gate MOS Models

- 4:00** **Dirk Klaassen, NXP Semiconductors, The Netherlands (Invited)**
A PSP Based Scalable Compact FinFET Model
- 4:30** **Adelmo Ortiz-Conde, Simón Bolívar University, Venezuela (Invited)**
A Unified View of Drain Current Models for Undoped Double-Gate SOI
- 5:00** **Yuan Taur, University of California at San Diego, USA (Invited)**
Analytic Charge Model for Double-Gate and Surrounding-Gate MOSFETs
- 5:30** **Xing Zhou, Nanyang Technological University, Singapore (Invited)**
Unified Compact Model for Generic Double-Gate MOSFETs

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Wed, May 23 2007

Session Chair: Josef Watts

WCM-5

Atomic/Numerical-Based Models

8:30 **Mark Lundstrom, Purdue University, USA (Invited)**
Nanoscale Physics for Compact Models

9:00 **Philip Wong, Stanford University, USA (Invited)**
Carbon Nanotube Transistor Compact Model

9:30 **Robert Dutton, Stanford University, USA (Invited)**
Modeling of FET Flicker Noise and Impact of Technology Scaling

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Session Chair: Carlos Galup-Montoro



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WCM-6

Statistical/Process-Based Models

10:30

Josef Watts, IBM, USA (Invited)

Modeling MOSFET Process Variation Using PSP

11:00

R. Murali, Georgia Institute of Technology, USA

Modeling Process Variations Using a Compact Model

11:20

Jae-Eum Park, IBM, USA

Simulating CMOS Circuits Containing Multiple FET Types Including the Geometric Dependence of Correlation between FET Types

11:40

Ning Lu, IBM, USA

Optimal Skew Corners for Compact Models



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Wed, May 23 2007

Session Chair: Keith Green

WCM-7

SOI/Double-Gate/High-Voltage Models

1:30

Qiang Chen, AMD, USA

Impact of Gate Induced Drain Leakage and Impact Ionization Currents

1:50

D. Munteanu, L2MP-CNRS, France

Compact Modeling of Drain Current in Independently Driven Double-Gate MOSFETs

2:10

M. Reyboz, CEA-LETI, France

Explicit Short Channel Compact Model of Independent Double Gate MOSFET

2:30

R. Salazar, Simon Bolivar University, Venezuela

A Computationally Efficient Method for Evaluating Distortion in DG MOSFETs



Cleantech 2007



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WCM-8

Late News Briefing Session

2:50 **Chih-Tang Sah, University of Florida, USA (Late News)**

Double-Gate Thin-Base MOS Transistor: The Correct Theory

Double-Gate Thin-Base MOS Transistor: Characteristics for the Long Channel

3:10-4:00 Break

WCM Poster Exhibition – Exhibit Hall



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WCM-9 Poster Briefing 1

- 4:00 A.S. Roy, A charge based compact flicker noise model including short channel effects
- 4:05 M. Miyake, HiSIM-Varactor: Complete Surface-Potential-Based Model for RF Applications
- 4:10 M.C. Schneider, PTAT voltage generator based on an MOS voltage divider
- 4:15 L. Wagner, LINFET: A BSIM class FET model with smooth derivatives at $V_{ds}=0$
- 4:20 A.I.A. Cunha, Charge-Based Threshold Voltage Definition for Undoped Single Gate and Symmetric Double Gate MOSFETs
- 4:25 J. He, A Carrier-Based Analytic Model for Undoped Ultra-Thin-Body Silicon-on-Insulator (UTB-SOI) MOSFETs
- 4:30 J. He, An Explicit Carrier-Based Compact Model for Surrounding-Gate MOSFETs
- 4:35 H.C. Morris, Compact Models for Asymmetric Double Gate MOSFETs
- 4:40 T. Nakagawa, Transition Point Consideration for Velocity Saturating Four-terminal DG MOSFET Compact Model



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Session Chair: Mansun Chan



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WCM-10 Poster Briefing 2

- 5:10 V. Milovanovic, An Efficient Sectionalized Modeling Approach for Introduction of Distributed Avalanche Effects in Bipolar Circuit Design
- 5:15 M.C. Schneider, A Setup for Automatic MOSFET Mismatch Characterization under a Wide Bias Range
- 5:20 J. He, An Approximate Explicit Solution to General Diode Equation
- 5:25 M. Erturk, Methodology and Design Kit Integration of a Broadband Compact Inductor Model
- 5:30 Y.Z. Xu, A Compact Model for Temperature and Frequency Dependence of Spiral Inductor
- 5:35 P.B.Y. Tan, SPICE Modeling of Hook Shaped I_{dsat} Curve for I/O 2.5V MOS Transistors
- 5:40 Y. Iino, HiSIM- Replacement of BSIM4 in UDSM Circuit Simulations
- 5:45 Y. Mahajan, Process Aware Hybrid SPICE Models using TCAD and Silicon Data
- 5:50 K. Horio, Simulation of Buffer-Related Current Slump in AlGaIn/GaN HEMTs
- 5:55 B.C. Paul, A Circuit Compatible Analytical Device Model for Nanowire FET Considering Ballistic and Drift-Diffusion Transport
- 6:00 J.M. Lopez-Gonzalez, Numerical Modeling for Comparison of Emitter-Base Designs of InGaP/GaAs Heterojunction Bipolar Transistors



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Thur, May 24 2007

Session Chair: Colin McAndrew

Nanotech/WCM **Special Session**

**8:00 Arjun N. Saxena, Rensselaer International
Science Company, USA (Invited)**

**Monolithic Concept and the Inventions of
Integrated Circuits By Kilby and Noyce**



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Thur, May 24 2007

Session Chair: Jamal Deen

WCM-11

Interconnect/Parasitic/Process Models

8:30 **Narain Arora, Cadence Design System, USA (Invited)**

RCL Modeling and Characterization of X Architecture Diagonal Lines for Sub-100nm SoC Design

9:00 **Mansun Chan, Hong Kong University of Science and Technology, Hong Kong (Invited)**

Modeling the Geometry-Dependent Parasitics in Multi-Fin FinFETs

9:30 **Colin McAndrew, Freescale Semiconductor, USA (Invited)**

Analysis of Implanted MOSFETs

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Thur., May 24 2007

Session Chair: Narain Arora

WCM-12

FET/HBT Models

10:30 **Jamal Deen, McMaster University, Canada (Invited)**
Modeling the Electrical Characteristics of FET-type Biosensors

11:00 **Michael Schröter, University of Technology Dresden, Germany (Invited)**
Non-standard Geometry Scaling Effects

11:30 **A.S. Roy, EPFL, Switzerland**
Theory of Source-Drain Partitioning in MOSFET

11:50 **Guan Hwei See, Nanyang Technological University, Singapore**
Gummel Symmetry with Higher-order Derivatives in MOSFET Compact Models

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