

SEMATECH Symposium Taiwan 2011

**Hsinchu, Taiwan
13 September 2011**

ISBN: 978-1-61839-384-5

Printed from e-media with permission by:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571



Some format issues inherent in the e-media version may also appear in this print version.

Copyright© (2011) by SEMATECH
All rights reserved.

Printed by Curran Associates, Inc. (2012)

For permission requests, please contact SEMATECH
at the address below.

SEMATECH
2706 Montopolis Drive
Austin, Texas 78741

Phone: (512) 356-3500
Fax: (512) 356-7848

www.sematech.org

Additional copies of this publication are available from:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: 845-758-0400
Fax: 845-758-2634
Email: curran@proceedings.com
Web: www.proceedings.com

SEMATECH Symposium Taiwan

13 September 2011
Hsinchu, Taiwan

** Additional presentations may be made available following the Symposium. Please note, however, that not all presentations will be available.*

Plenary Session

Technology and Manufacturing Innovations: New SEMATECH Initiatives	1	Daniel Armbrust, SEMATECH
Si-Based Integrated Technology Innovation	20	Dr. Jack Sun, TSMC
3D IC Standardization: OSATS Perspective	31	Dr. Yi-Shao Lai, ASE Group
Resistive Random Access Memory Based on ALD HfO₂	42	Dr. Ming-Jer Kao, ITRI

Pushing the Patterning Limits: Advances in EUV Lithography

FEI Tool Applications – EUV Mask Blank Defect Reduction Program	62	Eric Van Cappellan, FEI
EUVL Development at SEMATECH	72	Bryan Rice, SEMATECH
Protection of EUV Reticle Handling	83	Bill Chiu, Gudeng

Realizing the Potential: Driving 3D Into Mainstream Manufacturing

3D TSV Interconnects / 3D Enablement Center – SEMATECH	93	Sitaram Arkalgud, SEMATECH
TSV Interposers: The Most Cost-Effective Integrator for 3D IC Integration	114	John Lau, ITRI

Advanced CMOS Devices and Beyond: Innovations in Materials and Nanostructures

Materials and Structural Transitions	129	Paul Kirsch, SEMATECH
Non-planar Outlook and Module Development for High Mobility Ge/III-V Channels	131	Chris Hobbs, SEMATECH
3D Charge Trapping NAND Flash Memory	145	Yen-Hao Shih, Macronix

The Industry's Enabler: Perspectives on Metrology Challenges

Metrology Program Overview	161	John Warlaumont, SEMATECH
Low K1 Lithography Manufacturing and Metrology Requirements	168	Chih-Ming Ke, TSMC
Multiwavelength Raman and PL Spectroscopy: Promising In-Line Diagnostic Metrology for 20nm Technology Node and Beyond	179	Woo Sik Yoo, Wafermasters
High Volume, Automated TEM-based Metrology	192	Larry Dworkin, FEI
Top 5 Lithography Metrology Challenges	202	Bryan Rice, SEMATECH

Accelerating Momentum: Innovation and Collaboration in the 450 mm Transition

Effective Collaboration for 450mm	208	Jonathan Chang, TSMC
The 450 mm Transition: Consortium Status, Plans, and Strategy	217	Richard Young, SEMATECH
The 450 mm Transition: An Equipment Supplier's Perspective	231	Neil Hanson, LAM
450-mm Wafer Carrier Development in Taiwan	241	Bill Chiu, Gudeng
Q/A, Closing Remarks	250	Richard Young, SEMATECH

Semiconductor Factory Evolution: Opportunities for Increased Productivity

Opening Remarks	253	Sanjay Rajguru, ISMI
SEMATECH Industry Economic Model	262	Marcus Lentz, ISMI
New Fab Design Concepts – Facilities Council Presentation	272	Terry Behrens, CH2M Hill
Energy Reduction Concepts for New and Existing Fab	304	Steve Trammell, ISMI
Collaboration for Equipment Productivity Gains	320	Julian Richards, ISMI

Statistics for the Semiconductor Industry

[Intelligent Statistical Methods for Safer and More Robust
Qualifications](#) 334

Michael Haslam,
Wayne J. Levin
Predictum