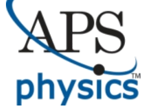
2011 International Conference on Frontiers of Characterization and Metrology for Nanoelectronics

David G. Seiler, Chief

Semiconductor Electronics Division

National Institute of Standards and Technology



On behalf of:

- **Committee Co-Chairs:**
  - David Seiler, NIST

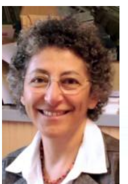
  - Alain Diebold, College of Nanoscale Science and Engineering, SUNY Albany

  - Bob McDonald, formerly of Intel (Treasurer)

  - Dan Herr, SRC

  - George Thompson, Intel

  - Amal Chabli, LETI

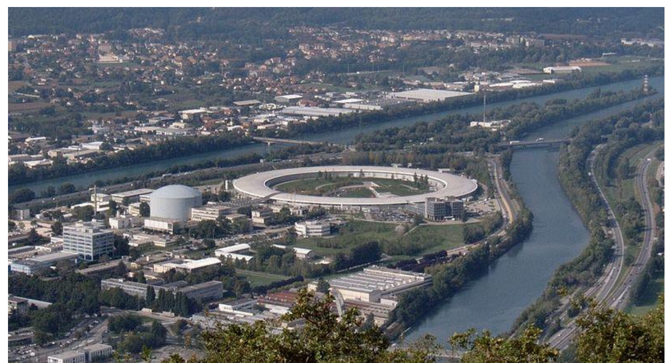


On behalf of:

- **Committee Members:**
  - Alexander Braun, formerly of Semiconductor International
  - Michael Current, Frontier Semiconductor
  - Dick Hockett, Evans Analytical Group LLC
  - Toshihiko Kanayama, AIST
  - Rajinder Khosla, NSF
  - David Kyser, Applied Materials
  - Shifeng Lu, Micron

- **Continued**
  - Ulrich Mantz, Zeiss
  - Lori S. Nye, Brewer Science, Inc.
  - Yaw Obeng, NIST
  - Sandip Tiwari, Cornell University
  - Victor Vartanian, ISMI
  - Wilfried Vandervorst, IMEC
  - Ehrenfried Zschech, Fraunhofer IZFP Dresden

Grenoble: a City of History and Science



The Synchrotron ring at the confluence of the Isère and the Drac.

The cable cars to the Bastille.

Grenoble (France), coat of arms. The first records of the three roses dates back to 1279.

Rue and porte de Bonne. Napoleon entered Grenoble through this gateway the night of March 7, 1815 at the beginning of the hundred days.

Fountain of the Three Orders (1897)

2011 FCMN at MINATEC

- First time in series the conference has been outside of the United States
- Very Special Thanks to Our CEA-LETI Hosts!
  - Amal Chabli
  - Didier Molko
  - Michel Brillouet

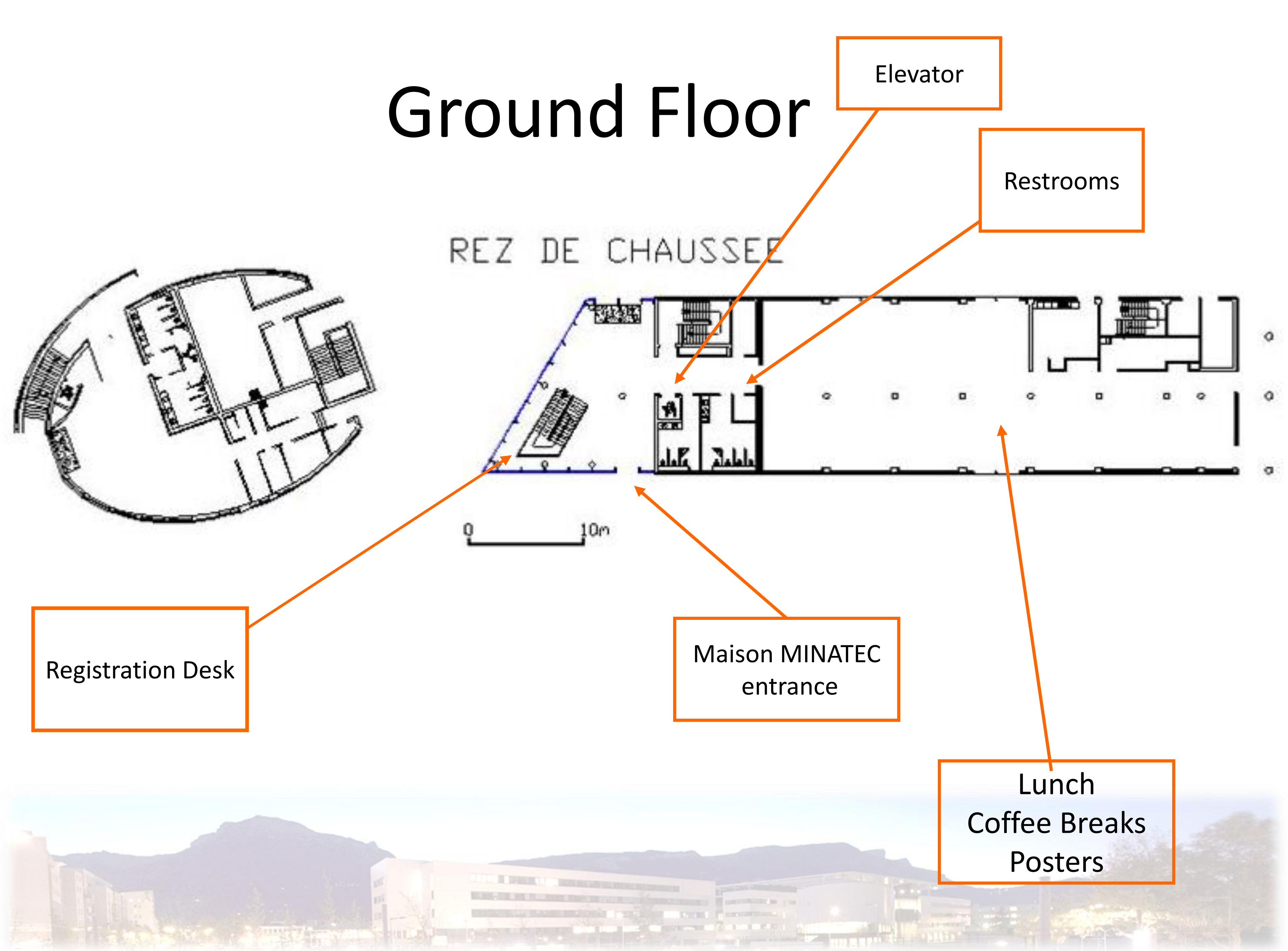
New Sponsors

- Gold Sponsors
  - City of Grenoble

  - Grenoble Suburb community

  - Rhône-Alpes Region
  - Metryx
  - CEA-LETI
  - National Institute of Standards and Technology
- Silver Sponsors
  - Jordan Valley Semiconductor, Ltd.

- Booths
  - Cameca


Ground Floor
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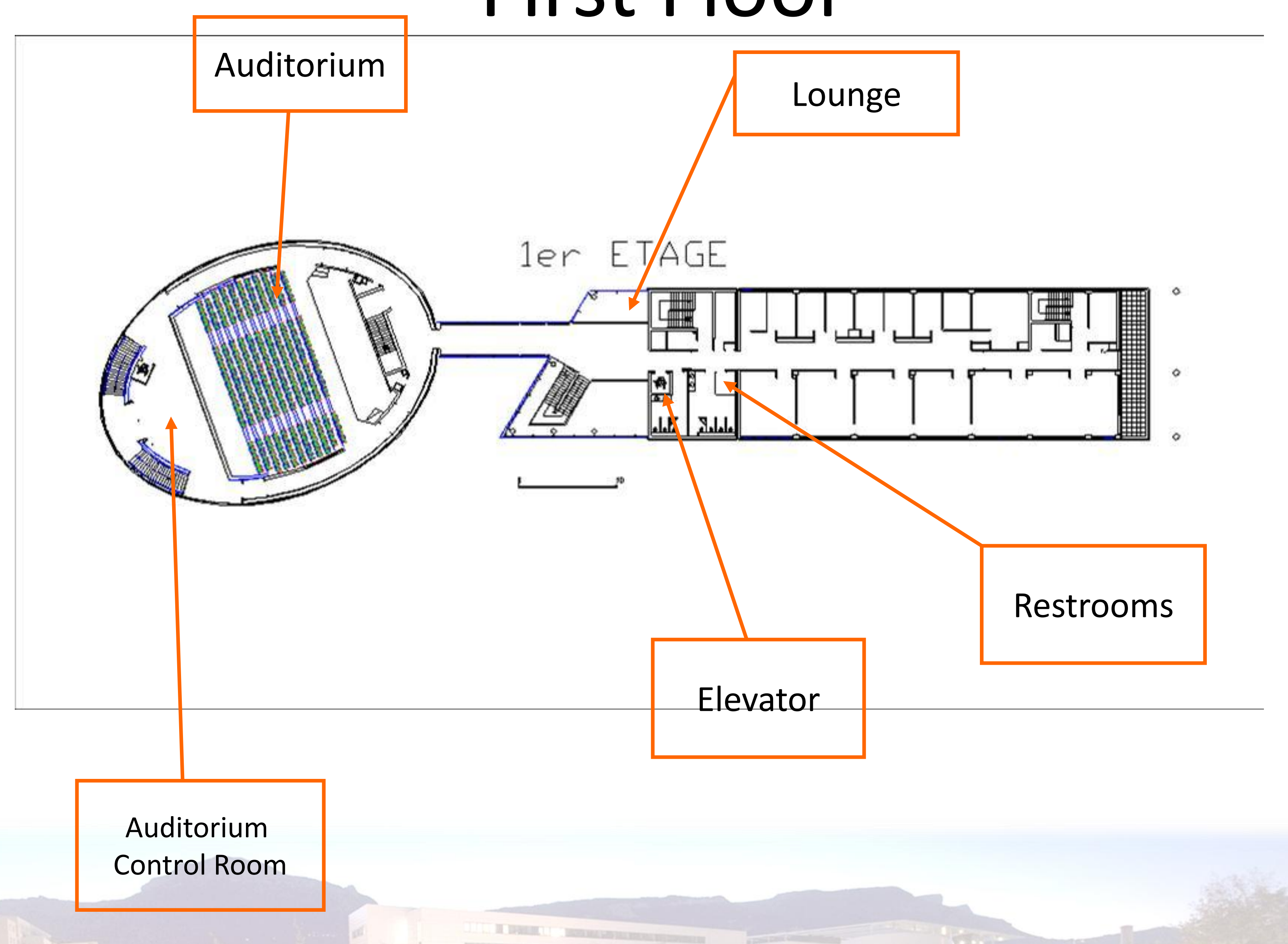
10m
Registration Desk
Maison MINATEC
entrance
Lunch
Coffee Breaks
Posters

First Floor



WIFI Access

- WIFI :

  ID : 21mmnt11

  Password :sfhvELk5

  Please note: WIFI and power outlets are available ONLY outside of the auditorium.

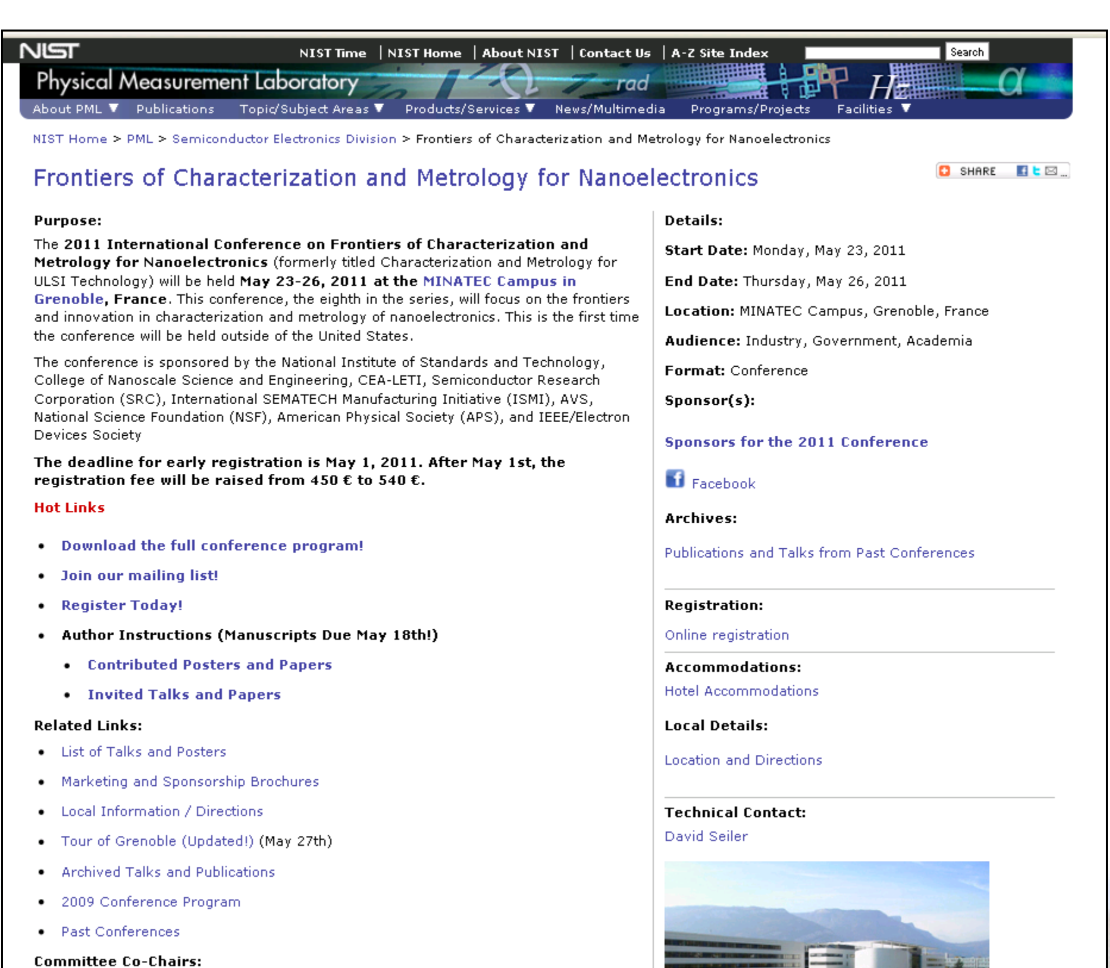
Dinner Banquet

- 6:45 PM on May 25th, by tramway and cable car. Tramway should be taken in front of the entrance of MINATEC
- "restaurant du téléphérique" at the Bastille.
  - A tramway in front of MINATEC will depart at 6:45 PM, followed by a 10 minute walk through the "Jardin de Ville" and then cable car to the restaurant.
  - For additional details, please stop by the registration desk.

Conference Website Success

www.nist.gov/pml/semiconductor/conference/

- From the year 2000 to the present the NIST metrology conference web page has received more than 2.9 million web page views
- The 2009 and 2011 Metrology Frontiers Conferences have accounted for more than 730,000 page views thus far.



Publications

- Agreement between AIP and NIST brings increased visibility to the publications in the FCMN Conference Proceedings
  - Free PDF publications now available from all past proceedings (1995-2009)
  - This represents over 15 years of outstanding research and overviews of critical topics collected from world-wide experts in the field of semiconductor characterization and metrology.
  - www.nist.gov/pml/semiconductor/conference/archives.cfm

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Frontiers of Characterization and Metrology for Nanoelectronics: Archived Publications and Talks

Archived Publications

With a very special thanks to the American Institute of Physics (AIP), we are able to provide access to these collected proceedings from the conference series free of charge. This represents over 15 years of outstanding research and overviews of critical topics collected from world-wide experts in the field of semiconductor characterization and metrology.

Please note that the links below are part of the AIP webspace. We have provided the links because they have information that may be of interest to our users. NIST does not necessarily endorse the views expressed or the facts presented on this site. Further, NIST does not endorse any commercial products that may be advertised or available on this site.

Main AIP Conference Proceedings Selection Page

- D. G. Seiler, A. C. Diebold, R. McDonald, C. M. Garner, D. Herr, R. P. Khosla, E. M. Secula, Frontiers of Characterization and Metrology for Nanoelectronics: 2009, American Institute of Physics, Melville, NY, Vol. 1173, 398 pp. (30 September 2009)
- D. G. Seiler, A. C. Diebold, R. McDonald, C. M. Garner, D. Herr, R. P. Khosla, E. M. Secula, Frontiers of Characterization and Metrology for Nanoelectronics: 2007, American Institute of Physics, Melville, NY, Vol. 931, 603 pp. (30 September 2007)
- D. G. Seiler, A. C. Diebold, R. McDonald, C. Ayre, R. Khosla, S. Zollner, E. M. Secula, Characterization and Metrology for ULSI Technology: 2005, American Institute of Physics, Melville, NY, 11747-4502, Vol 788, 667 pp. (28 September 2005)
- D. G. Seiler, A. C. Diebold, T. J. Shaffner, R. McDonald, S. Zollner, R. P. Khosla, E. M. Secula, Characterization and Metrology for ULSI Technology: 2003, American Institute of Physics, Melville, NY, Vol 683, 812 pp. (30 September 2003)
- D. G. Seiler, A. C. Diebold, T. J. Shaffner, R. C. McDonald, W. M. Bullis, P. J. Smith, E. M. Secula, Characterization and Metrology for ULSI Technology: 2000, American Institute of Physics, Melville, NY, Vol 550, pp. 1-708 (1 February 2001)
- D. G. Seiler, A. C. Diebold, W. M. Bullis, T. J. Shaffner, R. C. McDonald, E. J. Walters, Characterization and Metrology for ULSI Technology, American Institute of Physics, Melville, NY, Vol 449 (1 November 1998)
- W. M. Bullis, D. G. Seiler, A. C. Diebold, Semiconductor Characterization: Present Status and Future Needs, American Institute of Physics, Woodbury, NY, 729 p. (1995) (Coming Soon!)

Related Links:

Archived Publications and Talks

Past Conferences

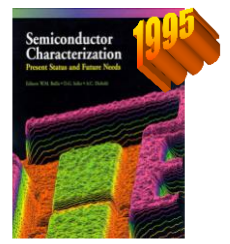
AIP Proceedings for the Semiconductor Metrology Conference Series

Final Manuscript Deadline

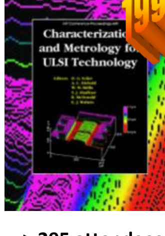
- Tuesday, June 14, 2011
- Author instructions available on-line www.nist.gov/pml/semiconductor/conference/
- You may be contacted to help review colleagues' manuscripts
- With newly increased visibility, your inclusion in the proceedings is more important than ever!
- See Erik Secula for additional details

NIST Conference Series Provides Focal Point for Frontiers of Semiconductor Metrology

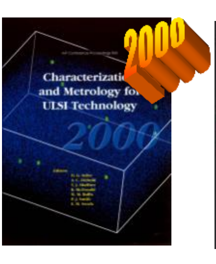
Proceedings Document Metrology Advances



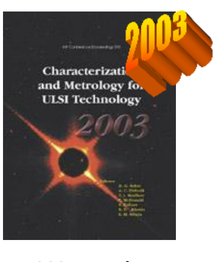
> 280 attendees



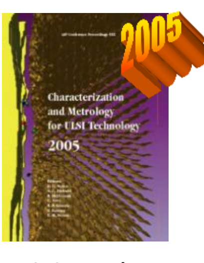
> 295 attendees



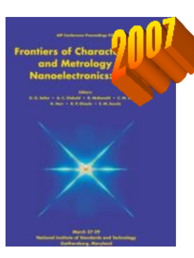
> 235 attendees



> 200 attendees

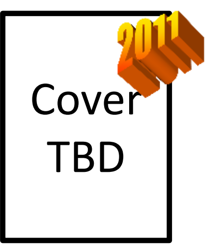


> 250 attendees



> 230 attendees

> 175 attendees



Some Keynote Speakers

Craig Barrett, formerly President, Intel

Mark Melliar-Smith, formerly President and CEO of SEMATECH

Dennis Buss, VP, Silicon Tech. Development, Texas Instruments

Bob Helms, formerly President and CEO of SEMATECH

Michael Polcari, President and CEO of SEMATECH

Mark Durcan, COO of Micron

Tze-Chiang (T.C.) Chen, IBM Fellow and VP, Science & Technology

Michel Brillouet, Senior Advisor, CEA-LETI

"If you want to meet, greet, and learn from the world's experts in metrology, this is the place to be."
Dan Hutcheson, The Chip Insider, January 11, 2007

Please Suggest a Cover Image

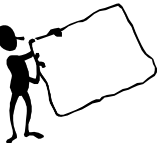
We solicit your suggestions for the new book cover. Please send your recommendations to Erik Secula (erik.secula@nist.gov) no later than July 1, 2011.

Cover TBD

Among the Topics for the 2011 FCMN…

- 3D Integration Metrology
- Atom Probe Tomography
- Atomic Force Microscopy (AFM)
- CD Metrology
- Electron Tomography
- Ellipsometry
- Helium Ion Microscopy
- Scanning Electron Microscopy (SEM)
- Scatterometry
- Time Resolved Cathodoluminescence
- Transmission Electron Microscopy (TEM)
- XPS
- X-Ray Diffraction/Reflectometry

Special Notes

- Talks on-line
  - Our intention is to put every talk on-line. We will ask the speakers for permission.
- Posters 
  - Posters can be viewed during breaks and during the daily dedicated poster sessions.
  - If you see that some poster numbers are missing, it's because those posters have been withdrawn. Please remember that the poster presenters are expected to put up their posters at the beginning of their presentation day and remove them at the end.
- Silence Cell Phones

So Let's Begin!

Keynote Talks

Session Chair: David Kyser, Applied Materials

9:00 AM

Nanocharacterization Challenges in a Changing Microelectronics Landscape

Michel Brillouet, CEA-LETI

9:45 AM

Nanoelectronics and More-than-Moore at IMEC

Marc Heyns, IMEC