NA Silicon Wafer Committee Meeting Minutes
NA Fall Standards Meetings, San Jose, CA
Tuesday, November 3rd, 2009
1:30 PM - 4:30 PM
Wafer Reclalm Services

Attendees:

**SEMI Staff**
Kevin Nguyen – SEMI NA
James Amano – SEMI HQ
Ken Okuda – SEMI Japan

**Co-chair** - Dinesh Gupta – STA

**Table 1 – Meeting Attendees**

<table>
<thead>
<tr>
<th>Count</th>
<th>Name</th>
<th>Company</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Supika Mashiro</td>
<td>Canon Anelva</td>
</tr>
<tr>
<td>2</td>
<td>Paul Langer (attended via phone)</td>
<td>Consultant</td>
</tr>
<tr>
<td>3</td>
<td>Michael Goldstein</td>
<td>Intel</td>
</tr>
<tr>
<td>4</td>
<td>Masanori Yoshise</td>
<td>KLA-Tencor</td>
</tr>
<tr>
<td>5</td>
<td>Murray Bullis</td>
<td>Materials &amp; Metrology</td>
</tr>
<tr>
<td>6</td>
<td>Jack Martinez</td>
<td>NIST</td>
</tr>
<tr>
<td>7</td>
<td>John Valley (attended via phone)</td>
<td>Raytex</td>
</tr>
<tr>
<td>8</td>
<td>Jackie Ferrell</td>
<td>SEMATECH</td>
</tr>
<tr>
<td>9</td>
<td>Len Perroots</td>
<td>Silicon Solar</td>
</tr>
<tr>
<td>10</td>
<td>Noel Poduje (Co-chair)</td>
<td>SMS</td>
</tr>
<tr>
<td>11</td>
<td>Toshio Naritomi</td>
<td>SUMCO</td>
</tr>
</tbody>
</table>

**Table 2 – Ballot Summary**

<table>
<thead>
<tr>
<th>#</th>
<th>Document Title</th>
<th>Committee Action</th>
</tr>
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<tbody>
<tr>
<td>4497</td>
<td>Revision of SEMI M71-0707, Specification for Silicon-On-Insulator (SOI) Wafers for CMOS LSI 130 nm Technology Generation and Beyond</td>
<td>To be adjudicated at SEMICON Japan</td>
</tr>
<tr>
<td>4624A</td>
<td>New Standard: Specification For Developmental 450 Mm Diameter Polished Single Crystal Silicon Wafers</td>
<td>To be adjudicated at SEMICON Japan</td>
</tr>
<tr>
<td>4635B</td>
<td>Revision of SEMI M69-0307 (Preliminary), Practice for Determining Wafer-Near-Edge Geometry Using Roll-Off Amount, ROA</td>
<td>To be adjudicated at SEMICON Japan</td>
</tr>
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<td>4733A</td>
<td>Revision to SEMI M50-1103, Test Methods For Determining Capture Rate And False Count Rate For Surface Scanning Inspection Systems By The Overlay Method, SEMI M53-1109, Practice For Calibrating Scanning Surface Inspection Systems Using Certified Depositions Of Monodisperse Reference Spheres On Unpatterned Semiconductor Wafer Surfaces and SEMI M59-1109, Terminology For Silicon Technology</td>
<td>To be adjudicated at SEMICON Japan</td>
</tr>
<tr>
<td>4790</td>
<td>Revision to SEMI MF533-1109, Test Method for Thickness and Thickness Variation of Silicon Wafers</td>
<td>To be adjudicated at SEMICON Japan</td>
</tr>
<tr>
<td>4798</td>
<td>Revision to SEMI MF1811-1109, Guide for Estimating the Power Spectral Density Function and Related Finish Parameters from Surface Profile Data</td>
<td>To be adjudicated at SEMICON Japan</td>
</tr>
</tbody>
</table>
Table 3 - Authorized Activities

<table>
<thead>
<tr>
<th>#</th>
<th>Type</th>
<th>SC/TF/WG</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>See attachment #4 below</td>
</tr>
</tbody>
</table>

Note: SNARFs and TFOFs are available for review on the SEMI Web site at: http://downloads.semi.org/web/wstdsbal.nsf/TFOFSNARF

Table 4 – Previous Meeting Actions Items

<table>
<thead>
<tr>
<th>Date</th>
<th>Details</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>0709-1</td>
<td>Murray Bullis to look into SEMI Regulations and recommend the changes to Werner Bergholz, to allow the GCS the authority to fail a ballot prior to the scheduled meeting.</td>
<td>Completed – Murray reported that such authority is not possible under the regulations at this time.</td>
</tr>
<tr>
<td>0709-2</td>
<td>Kevin to send approved ballots to ISC Audits and Reviews subcommittee for procedural review</td>
<td>Completed</td>
</tr>
<tr>
<td>0709-3</td>
<td>Dinesh Gupta to submit the survey for 22 nm epi wafer guide to Kevin to post on SEMI web site for feedback.</td>
<td>In progress</td>
</tr>
<tr>
<td>0709-4</td>
<td>Kevin to set up virtual meeting capability component for the Fall meeting</td>
<td>Completed</td>
</tr>
</tbody>
</table>

Table 5 – New Actions Items

<table>
<thead>
<tr>
<th>Date</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>1109-1</td>
<td>Murray to inform appropriate task force leaders to place outstanding standards for 5 year review on their meeting agendas</td>
</tr>
<tr>
<td>1109-2</td>
<td>Kevin Nguyen to make sure the AWG attendee list is accurate and to circulate latest copy of doc. 3335D for comment and meeting minutes among AWG TF members.</td>
</tr>
</tbody>
</table>

1.0 Call to Order

Dinesh Gupta called the meeting to order and welcomed everyone who attended. A round of self introduction was made. All SEMI standards meetings are subjected to SEMI Anti-Trust Reminder and Guidelines concerning Patentable Technology. SEMI Regulations now require all attendees to be members of SEMI standards. If not a member, please enroll at www.semi.org/standardsmembership. Agenda was reviewed and approved as written.

Attachment - 1_Required Elements July 9, 2009 rev 4.ppt.

2.0 Review of Schedule for the next meeting (March 29-April 1, 2010, San Jose, CA)

The next meeting will be in San Jose, CA, March 29-April 1, 2010. Check www.semi.org/standards for latest schedule. Tentative schedule for the next meeting is shown below. Changes may be made pending the outcome of SEMICON Japan meetings in December.

**Monday, March 29, 2010**
- Epitaxial Wafer (I-TF) 08:30-10:00 AM
- Polished Wafer (I-TF) 10:00-11:00 AM
- Terminology (I-TF) 10:00-11:00 AM
- Advanced Surface Inspection (I-TF) 11:00-Noon
- AWG (I-TF) 13:00-17:00 PM
- Standards Reception 17:30-19:00 PM

**Tuesday, March 30, 2010**
- 450 mm Handling Wafer (I-TF) 8:30-11:00 AM
- Test Methods (I-TF) 11:00- Noon
- Silicon Wafer (C) 13:00-16:00 PM
3.0 Review and Approval of the Minutes from SEMICON West Meeting, July 2009.
The meeting minutes reviewed. No changes were made.

Motion: Accept the minutes of the previous meeting as submitted
By / 2nd: Mike Goldstein (Intel)/Murray Bullis (Materials & Metrology)
Discussion: None
Vote: 6-0. Motion passed

Attachment - 2_Si Wafer minutes0709.pdf

4.0 Staff Report
Kevin thanked Wafer Reclaim Services (WRS) for their generous support in hosting and catering for our meetings. In recognition of hosting, members suggested SEMI to formally recognize WRS.
The following were highlighted in the staff report:

- Event Calendar:

<table>
<thead>
<tr>
<th>Event Name</th>
<th>Event Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOLARCON India</td>
<td>November 9-11, 2009</td>
</tr>
<tr>
<td></td>
<td>Hyderabad, India</td>
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<tr>
<td>SEMICON Japan</td>
<td>December 2-4, 2009</td>
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<tr>
<td>SEMICON Korea</td>
<td>February 3-5, 2010</td>
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<tr>
<td>SOLARCON Korea</td>
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<td>LED Korea</td>
<td>Seoul</td>
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<td>PV Fab Managers Forum</td>
<td>March 7-9, 2010</td>
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<td>Berlin, Germany</td>
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<tr>
<td>SEMICON China</td>
<td>March 16-18, 2010</td>
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<tr>
<td>SOLARCON China</td>
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<tr>
<td>FPD China</td>
<td>Shanghai</td>
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<tr>
<td>SEMICON Singapore</td>
<td>May 19-21, 2010</td>
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<tr>
<td>SOLARCON Singapore</td>
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<tr>
<td>Intersolar Europe 2010</td>
<td>June 9-11, 2010</td>
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<tr>
<td></td>
<td>Munich, Germany</td>
</tr>
</tbody>
</table>

- Membership Requirement
  - Standards Program Membership is required for all meeting attendees
- NA Standards Spring 2010 Meetings
  - March 28 – April 1, 2010, San Jose, CA / SEMI San Jose Office
  - Inviting local companies willing and able to host some of the meetings
  - Additional meeting details to be announced by January 2010
- Technical Ballot Critical Dates
  - Cycle 1: (For meetings after Feb 24)
    o Due January 4 (Voting period: January 18 – February 17)
  - Cycle 2: (For meetings after March 29)
    o Due February 8 (Voting period: February 22 – March 24)
  - Cycle 3 (for meetings after May 31)
    o Due April 12 (Voting Period Starts: April 26 – May 26 2010)
- SEMI Standards November 2009 Publication Cycle
  - New Standards: 3
5.0 Five year review of standards

As referenced in SEMI Regulations section 8.6.1 http://www.semi.org/cms/groups/public/documents/web_content/p041894.pdf, by the end of the fifth year of publication, the Technical Committee must decide to reapprove, revise or replace standards that are due for 5 year review. The impacting standards in Materials and Test Methods volumes are referenced in attachment #4 below. Actions are required to maintain these standards in active volume. The list was reviewed by the committee, and Murray Bullis gave his input on which task forces need to perform 5 year review.

Action Item – Murray to inform appropriate task force leaders on outstanding standards for 5 year review on their meeting agendas

Motion: Committee to perform as appropriate (revision, withdrawal, and approval) listed in attachment 4
By / 2nd: Noel Poduje (SMS)/Murray Bullis (Materials & Metrology)
Discussion: None
Vote: 8-0. Motion passed

Attachment - 4_5 year_review 11-09 v1.2 ballot status for Materials.xls

6.0 Liaison Reports

6.1 SEMI Japan

The JA liaison report was presented by Toshio Naritomi. An Impact of Wafer Geometry For Yield Improvement workshop is being planned at SEMICON Japan. Check www.semicongjapan.org for latest agenda and schedule. See attachment #5 for complete report. Highlights are as follows:

• Meeting schedule for SEMICON Japan.
  o Tuesday, Dec. 1st @SEMI Japan Office, JPR BLD 7F
    • 9:00-12:00 Int’l AWG TF
    • 13:00-15:00 Int’l 450mm Wafer TF
    • 15:00-17:00 Int’l Test Method TF
    • 15:00-16:00 Int’l ASI TF
    • 16:00-17:00 Int’l SOI TF
  o Thursday Dec. 3rd @Makuhari Messe
    • 9:00-17:00 Int’l 450mm Shipping Box TF
    • 13:00-17:00 “Advanced Wafer Tuning” Workshop
  o Friday, Dec. 4th @Makuhari Messe

Attachment - 3_Staff Report (Fall 2009).ppt
• 12:00-13:00 Silicon GCS
• 13:00-17:00 Silicon Wafer Committee
  • Advanced Wafer Tuning Workshop
    • Impact of Wafer Geometry For Yield Improvement
      • Thursday, December 3 13:00-17:00
      • International Conference Hall, Makuhari Messe
      • In Cooperation with (JEITA)
    • Program Chairs
      • Naoyuki J. Kawai, Renesas Technology
      • Michio Tajima, Japan Aerospace Exploration Science (JAXA)
  • Register by November 20 ¥16,000 / Register from November 21 ¥19,000
  • Including: Tax 5% and Proceedings (available in English). Conducted in Japanese only. No Interpretation.

Attachment - 5_JA Si Liaison for NA Si Fall Mtg_ver2.ppt

6.2 SEMI Europe
  Report was presented by James Amano. Refer to attachment #6 for details. Highlights.
  Ballot failed.
  • Doc. 3335C, New Standard for Nanotopography Measurement, will be reballoted in Cycle 1 of 2010
  • Doc. 4624, New Standard for 450 mm Developmental Wafers, will be reballoted in Cycle 7 of 2009 and reviewed at SEMICON Japan

Ballot passed
  • Doc. 4716, Revision of SEMI MF391-0708 - Test Method for Minority Carrier Diffusion Length in Extrinsic Semiconductors by Measurement of Steady-State Surface Photovoltage, approved by TC at SEMICON Europa

Preliminary Standard
  • M72-0308: Test Method for Determining Wafer Flatness Using the Moving Average Qualification Metric Based on Scanning Lithography
    • Publication period will be expired in March 2010. No interest in converting to full consensus Standard.

Attachment - 6_EU_Silicon_Wafer_Liaison_20091027.ppt

7.0 Ballot Review

7.1 All ballots will be adjudicated at SEMICON Japan in the meeting to be held on December 4, 2009. See Task Force Reports and attachments below for more information.

  7.1.1 Document 4497 - Revision of SEMI M71-0707 - Specification for Silicon-On-Insulator (SOI) Wafers for CMOS LSI 130 nm Technology Generation and Beyond
  7.1.2 Document 4624A, New Standard: Specification For Developmental 450 mm Diameter Polished Single Crystal Silicon Wafers
  7.1.3 Document 4635B - Revision of SEMI M69-0307 (Preliminary), Practice for Determining Wafer-Near-Edge Geometry Using Roll-Off Amount, ROA

Members of ISC A&R Subcommittee (Supika Mashiro and Jack Martinez) were present in the meeting clarifying issue with doc. 4635B. SEMI M69-0307 was a preliminary standard. By SEMI Regs, it has a life span of two year. Therefore, the standard should have been removed from publication in March of 2009. Nevertheless the ballot was sent out as revision to SEMI M69 instead of a new document. Noel Poduje expressed the same process was done on M67 and M68 in the past, but those were done prior to their expiration dates. Ballots passed, and removals of preliminary status were completed.
On this document, attempt was made to convert to full consensus standard, but failed due to persuasive rejection. The document was then revised and reballoted, but expiration date is now passed.

There was lack of guidance on dealing with preliminarily standards in SEMI Regulations. Is revision to preliminary standard allowed? If a preliminarily standard is revised prior to its expiration date, will the title on the ballot be New Standard or Revision? If the revision is approved, will the same standard designation or different one be assigned?

Since doc. 4635B did not receive any reject or comment, Noel recommended ISC A&R Sub not to reject it based on minor procedural issue. Discussion is resumed for SEMICON Japan meeting since official ballot adjudication will take place in December.

7.1.4 Document 4733A - Revision to SEMI M50-1103, Test Methods For Determining Capture Rate And False Count Rate For Surface Scanning Inspection Systems By The Overlay Method, SEMI M53-1109, Practice For Calibrating Scanning Surface Inspection Systems Using Certified Depositions Of Monodisperse Reference Spheres On Unpatterned Semiconductor Wafer Surfaces and SEMI M59-1109, Terminology For Silicon Technology

7.1.5 Document 4790 - Revision to SEMI MF533-1109, Test Method for Thickness and Thickness Variation of Silicon Wafers

7.1.6 Document 4798 - Revision to SEMI MF1811-1109, Guide for Estimating the Power Spectral Density Function and Related Finish Parameters from Surface Profile Data

8.0 Task Force Reports

8.1 Specifications Group

8.1.1 Int’l 450 mm Wafer TF/Mike Goldstein (Intel) Mike reported draft document 4624 - New Standard: Specification for Developmental 450 mm Diameter Polished Single Crystal Silicon Wafers, failed review at SEMICON Europa in October. A revised version for doc. 4624A was submitted for cycle 7 for reviewing at SEMICON Japan on December 4. See attachment #8 for task force report.

Attachment - 8_2009 NA fall meeting 450mm TF report.ppt

8.1.2 Int’l Epitaxial Wafer TF/Dinesh Gupta (STA) Dinesh Gupta reported the survey elements for 22 nm guide for revision to M62-0309, Specifications for Silicon Epitaxial Wafers, was discussed in the meeting. Contacts for epitaxial wafer supplier (SUMCO) and users (Intel, IBM) were identified. However, contacts for TI, Freescale, Global Foundry and others are still being pursued. The survey will be ready for submission to SEMI prior to the next meeting.

Attachment - 9_MinEpiTF1109.doc

8.2 Metrology Group

8.2.1 Int’l Advanced Wafer Geometry (AWG) Task Force/Noel Poduje(SMS) Minutes were presented by Noel Poduje.

Ballot development: document 3335D New Standard: Test Method for Measuring and Reporting Nanotopography of Unpatterned Silicon Wafers for the 130 nm to 22 nm Generations
Several negatives were received for the ballot 3335C. This new draft addresses these, mainly by changing the document from a test method to a guide, therefore requiring less rigorous descriptions. After significant discussion and several changes to the draft the TF felt that the document now addresses the negatives. The latest draft is attached. Note that change control markups do not necessarily represent only changes from the last version. Several things need improvement before going to ballot. Interested parties should review it and submit any additional suggested changes to Fritz, preferably by Nov. 15. It will be presented for further discussion in Tokyo and then for ballot.

Presentations

- Fritz Passek presented “SEMICON Europa Full versus Quarter Surface.ppt”, first given in Dresden. This proposes a “partial wafer measurement” technique which may allow 450 mm geometry tools to come to market sooner and more economically. A SNARF was approved for this in Dresden. See attachment #10 for minutes and presentation.

Action Item – Kevin Nguyen to make sure the AWG attendee list is accurate and to circulate latest copy of doc. 3335D for comment and meeting minutes among AWG TF members.

Attachment - 10_AWG TF reports.zip

8.2.2 Int’l Advanced Surface Inspection Task Force/John Stover (The Scatter Works)
Minutes were submitted by John Stover.

Attachment - 11_MINUTES 091102.doc

8.3 Committee Task Forces

8.3.1 Int’l Test Methods TF/Dinesh Gupta (STA)
Dinesh Gupta presented TF report.

Attachment - 12_MinTestMethodsMtg1109.doc

8.3.2 Int’l Terminology TF/Murray Bullis (Materials and Metrology)
Murray reported meeting summary.

Document 4733A had two line items
- Changes to move the term light scattering equivalent (formerly latex sphere equivalent) from M53 to M59, remove the definitions of the terms dynamic range and threshold altogether and adjust the parts of M50 and M53 where these terms were used to reflect the new usage
  - 64.71% return; 20 accept (including 1 comment), 29 abstain, 1 reject
- Revise other parts of M53 as proposed by the ASI TF
  - 64.71% return; 19 accept (including 1 comment), 30 abstain, 1 reject
- The negative and comment were discussed. This discussion spanned both the Terminology TF and the ASI TF meetings. In both task forces recommend that the ballot pass and the negatives be found non-persuasive.

Document 4798 modified SEMI MF1811 to remove the term dynamic range
- 64.71% return; 19 accept (including 1 comment), 31 abstain, 0 reject
- This ballot was discussed in the ASI TF meeting. The comment related to a figure. The terms in the figure will be editorially placed in the proper fonts so that they are in agreement with the remainder of the document

Terminology remaining:
- Oxide Characterization — still in progress; SEMI M51 and perhaps SEMI M60 will be forwarded to the Japan committee members by SEMICON Japan; the remaining four documents will follow later.
Definition of *ingot*

- The definition proposed by the PV Committee will be balloted for inclusion in SEMI M59 as follows:
  - *ingot, silicon* — a cylindrical or rectangular solid of silicon resulting from a crystallization process, generally of slightly irregular dimensions.

Attachment - 13_Terminology Minutes.ppt

9.0 Old Business
- None

10.0 New Business
- James Amano reported a SNARF (doc. 4768) Test Method for Neutron Activation Analysis for Poly-Silicon, which was approved at SEMICON West in July this year, is an interest of PV committee. During the previous European PV committee meeting in September 22 in Hamburg, Germany, the PV committee proposed to take over this SNARF due to significant interest within Int’l PV Analytical TF. Formal agreement needs to be made for transferring this activity from Silicon Wafer to PV committee.

Motion: To transfer SNARF 4768 over to PV committee
By / 2nd: Noel Poduje (SMS)/Jack Martinez (NIST)
Discussion: None
Vote: 7-0. Motion passed

Attachment - 14_SNARF_NAA_SiWfrC.doc

11.0 Action Item Reviews

<table>
<thead>
<tr>
<th>Date</th>
<th>Details</th>
</tr>
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<tr>
<td>1109-1</td>
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</table>

12.0 Ballots for next meetings

See attachment #4 in section 5, Five Year Review of Standards, above.

13.0 Adjourn

The meeting was adjourned at 4:30 PM.

These minutes are respectfully submitted by:

Kevin Nguyen,
SEMI NA Standards Committee Manager

Approved by:

Silicon Wafer Committee co-chairs:
Noel Poduje – SMS
Dinesh Gupta – STA

All attachments available from www.semi.org/standards (meeting minutes section). If you have any questions, please email to Kevin Nguyen at knguyen@semi.org or phone at 408-943-7997.