Silicon Wafer NA TC Chapter Meeting Minutes  
SEMICON West Meeting 2015  
Tuesday, 14 July, 2015, 1:00 PM - 5:00 PM  
SF Marriott Marquis, San Francisco, CA

Next Committee Meeting  
Tuesday, April 5, 2016, San Jose, CA in conjunction with the NA Spring Standards Meetings. Check www.semi.org/standards for the latest update.

Attendees:

SEMI Staff  
Kevin Nguyen – SEMI HQ

Presiding Co-chair – Noel Poduje (SMS)

Table 1 – Meeting Attendees

<table>
<thead>
<tr>
<th>Last Name</th>
<th>First Name</th>
<th>Company</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bullis</td>
<td>Murray</td>
<td>Materials &amp; Metrology*</td>
</tr>
<tr>
<td>Goldstein</td>
<td>Mike</td>
<td>Intel</td>
</tr>
<tr>
<td>Gupta</td>
<td>Dinesh</td>
<td>STA</td>
</tr>
<tr>
<td>Haller</td>
<td>Kurt</td>
<td>KLA-Tencor</td>
</tr>
<tr>
<td>Ikota</td>
<td>Masami</td>
<td>Hitachi High Tech</td>
</tr>
<tr>
<td>Kawai</td>
<td>Naoyuki</td>
<td>The University of Tokyo</td>
</tr>
<tr>
<td>Lin</td>
<td>Pinyen</td>
<td>G450C</td>
</tr>
<tr>
<td>Nakai</td>
<td>Tetsuya</td>
<td>SUMCO</td>
</tr>
<tr>
<td>Nguyen</td>
<td>Bich-Yen</td>
<td>SOITEC</td>
</tr>
<tr>
<td>Passek</td>
<td>Fritz</td>
<td>Siltronic</td>
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<tr>
<td>Perroots</td>
<td>Len</td>
<td>SuperSight</td>
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<tr>
<td>Sinha</td>
<td>Jaydeep</td>
<td>KLA-Tencor</td>
</tr>
<tr>
<td>Sinton</td>
<td>Ron</td>
<td>Sinton Instruments</td>
</tr>
<tr>
<td>Takeda</td>
<td>Ryuji</td>
<td>GlobalWafers Japan</td>
</tr>
<tr>
<td>Valley</td>
<td>John</td>
<td>SSL</td>
</tr>
<tr>
<td>Wagner</td>
<td>Peter</td>
<td>Consultant</td>
</tr>
<tr>
<td>Watanabe</td>
<td>Kaori</td>
<td>Systems Engineering</td>
</tr>
</tbody>
</table>

* Attended via teleconference

Table 2 – Task Force Changes

<table>
<thead>
<tr>
<th>Group</th>
<th>Previous Leader</th>
<th>New Leader</th>
</tr>
</thead>
<tbody>
<tr>
<td>Int’l Polished Wafer TF</td>
<td></td>
<td>John Valley (Sun Edison Semiconductor) - new co-leader</td>
</tr>
<tr>
<td>Int’l 450 mm Wafer TF was disbanded</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Document #</td>
<td>Document Title</td>
<td>Committee Action</td>
</tr>
<tr>
<td>------------</td>
<td>--------------------------------------------------------------------------------</td>
<td>-----------------------------------</td>
</tr>
<tr>
<td>Doc. 5313C</td>
<td>Revision of SEMI MF1535-0707 With Title Change To: Test Method for Carrier</td>
<td>Passed</td>
</tr>
<tr>
<td></td>
<td>Recombination Lifetime in Electronic-Grade Silicon Wafers by Non-Contact</td>
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<tr>
<td></td>
<td>Measurement of Photoconductivity Decay by Microwave Reflectance</td>
<td></td>
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<tr>
<td>Doc. 5655</td>
<td>Line Item Revision to SEMI M1-0215, Specifications for Polished Single Crystal</td>
<td>Passed</td>
</tr>
<tr>
<td></td>
<td>Silicon Wafers (EE Reduction)</td>
<td></td>
</tr>
<tr>
<td>Doc. 5705</td>
<td>Revision of SEMI M67-1109 With Title Change To: Test Method for</td>
<td>Passed</td>
</tr>
<tr>
<td></td>
<td>Determining Wafer Near-Edge Geometry from a Measured Thickness Data Array</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Using the ESFQR, ESFQD, and ESBIR Metrics</td>
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</tr>
<tr>
<td>Doc. 5706</td>
<td>Revision of SEMI M70-1109 With Title Change To: Test Method for</td>
<td>Passed</td>
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<tr>
<td></td>
<td>Determining Wafer-Near-Edge Geometry Using Partial Wafer Site Flatness</td>
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<tr>
<td>Doc. 5744</td>
<td>Line Item Revision to SEMI M49-1014, Guide for Specifying Geometry</td>
<td>Failed and returned to TF for</td>
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<tr>
<td></td>
<td>Measurement Systems for Silicon Wafers for the 130 nm to 16 nm Technology</td>
<td>reballot</td>
</tr>
<tr>
<td></td>
<td>Generations</td>
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<tr>
<td>Doc. 5746</td>
<td>Line Item Revision of SEMI ME1392-1109, Guide for Angle Resolved Optical</td>
<td>Passed</td>
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<tr>
<td></td>
<td>Scatter Measurements on Specular or Diffuse Surfaces</td>
<td></td>
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<tr>
<td>Doc. 5805</td>
<td>Revision of SEMI M50-0310, Test Method for Determining Capture Rate and</td>
<td>Passed</td>
</tr>
<tr>
<td></td>
<td>False Count Rate for Surface Scanning Inspection Systems by the Overlay</td>
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</tr>
<tr>
<td></td>
<td>Method</td>
<td></td>
</tr>
<tr>
<td>Doc. 5806</td>
<td>Revision of SEMI M68-0315 With Title Change To: Test Method for</td>
<td>Passed</td>
</tr>
<tr>
<td></td>
<td>Determining Wafer-Near-Edge Geometry Using Partial Wafer Site Flatness</td>
<td></td>
</tr>
<tr>
<td>Doc. 5807</td>
<td>Revision of SEMI M67 -1110 With Title Change To: Test Method for</td>
<td>Passed</td>
</tr>
<tr>
<td></td>
<td>Determining Wafer Near-Edge Geometry Using Roll-Off Amount, ROA</td>
<td></td>
</tr>
<tr>
<td>Doc. 5845</td>
<td>Reapproval of SEMI M16-1110 - Specification for Polycrystalline Silicon</td>
<td>Passed</td>
</tr>
<tr>
<td>Doc. 5846</td>
<td>Reapproval of SEMI M17-1110 - Guide for a Universal Wafer Grid</td>
<td>Passed</td>
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<tr>
<td>Doc. 5847</td>
<td>Reapproval of SEMI M66-1110 Test Method to Extract Effective Work Function</td>
<td>Passed</td>
</tr>
<tr>
<td></td>
<td>in Oxide and High-K Gate Stacks Using the MIS Flat Band Voltage-Insulator</td>
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</tr>
<tr>
<td></td>
<td>Thickness Technique</td>
<td></td>
</tr>
<tr>
<td>Doc. 5848</td>
<td>Reapproval of SEMI MF1153-1110 - Test Method for Characterization of Metal-</td>
<td>Passed</td>
</tr>
<tr>
<td></td>
<td>Oxide Silicon (MOS) Structures by Capacitance-Voltage Measurements</td>
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<tr>
<td>Doc. 5849</td>
<td>Line Item Revision of SEMI MF1389-1110 - Test Methods for</td>
<td>Passed</td>
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<tr>
<td></td>
<td>Photoluminescence Analysis of Single Crystal Silicon for III-V Impurities</td>
<td></td>
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<tr>
<td>Doc. 5850</td>
<td>Reapproval of SEMI MF1529-1110 - Test Method for Sheet Resistance</td>
<td>Passed</td>
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<td></td>
<td>Uniformity Evaluation by In-Line Four-Point Probe with the Dual-Configuration</td>
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<td>Procedure</td>
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<td>Doc. 5851</td>
<td>Reapproval of SEMI MF1618-1110 - Practice for Determination of Uniformity of</td>
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<td>Thin Films on Silicon Wafers</td>
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<td>Doc. 5852</td>
<td>Reapproval of SEMI MF1725-1110 - Practice for Analysis of Crystallographic</td>
<td>Passed</td>
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<tr>
<td></td>
<td>Perfection of Silicon Ingots</td>
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<tr>
<td>Doc. 5853</td>
<td>Reapproval of SEMI MF1726-1110 - Practice for Analysis of Crystallographic</td>
<td>Passed</td>
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<tr>
<td></td>
<td>Perfection of Silicon Wafers</td>
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<tr>
<td>Doc. 5854</td>
<td>Reapproval of SEMI MF1727-1110 - Practice for Detection of Oxidation Induced</td>
<td>Passed</td>
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<td></td>
<td>Defects in Polished Silicon Wafers</td>
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<tr>
<td>Doc. 5855</td>
<td>Reapproval of SEMI MF1771-1110 Test Method for Evaluating Gate Oxide</td>
<td>Failed and returned to TF for</td>
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<tr>
<td></td>
<td>Integrity by Voltage Ramp Technique</td>
<td>reballot</td>
</tr>
<tr>
<td>Doc. 5856</td>
<td>Reapproval of SEMI MF1809-1110 - Guide for Selection and Use of Etching</td>
<td>Passed</td>
</tr>
<tr>
<td></td>
<td>Solutions to Delinate Structural Defects in Silicon</td>
<td></td>
</tr>
<tr>
<td>Doc. 5857</td>
<td>Withdrawal of SEMI MF2166-1110 - Practices for Monitoring Non-Contact</td>
<td>Passed</td>
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<tr>
<td></td>
<td>Dielectric Characterization Systems Through Use of Special Reference Wafers</td>
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</tr>
<tr>
<td>Doc. 5858</td>
<td>Reapproval of SEMI MF1810-1110 - Test Method for Counting Preferentially</td>
<td>Passed</td>
</tr>
<tr>
<td></td>
<td>Etched or Decorated Surface Defects in Silicon Wafers</td>
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### Table 4 – Authorized Ballots

<table>
<thead>
<tr>
<th>#</th>
<th>Type</th>
<th>SC/TF/WG Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>5855A</td>
<td>Cycle 7-15 Int'l Test Methods T</td>
<td>Line Item Revision of SEMI MF1771-1110 Test Method for Evaluating Gate Oxide Integrity by Voltage Ramp Technique</td>
</tr>
<tr>
<td>5737</td>
<td>Cycle 6-15 Int'l Test Methods TF</td>
<td>Revision of SEMI MF1391-1107 (Reapproved 0912), Test Method for Substitutional Atomic Carbon Content of Silicon by Infrared Absorption</td>
</tr>
<tr>
<td>5804</td>
<td>Cycle 6-15 Int'l Automated Advanced Surface Inspection TF</td>
<td>Revision of SEMI M53-0310, Practice for Calibrating Scanning Surface Inspection Systems Using Certified Depositions of Monodisperse Reference Spheres on Unpatterned Semiconductor Wafer Surfaces</td>
</tr>
<tr>
<td>5859</td>
<td>Cycle 6-15 Int'l Automated Advanced Surface Inspection TF</td>
<td>Line Item Revision of SEMI MF1811-0310, Guide for Estimating the Power Spectral Density Function and Related Finish Parameters from Surface Profile Data</td>
</tr>
<tr>
<td>5910</td>
<td>Cycle 7-15 Int'l Annealed Wafer TF</td>
<td>Line Item Revision of SEMI M57-0515, Specifications for Silicon Annealed Wafers</td>
</tr>
<tr>
<td>5911</td>
<td>Cycle 7-15 Int'l Epi Wafer TF</td>
<td>Line Item Revision of SEMI M62-0515, Specifications for Silicon Epitaxial Wafers</td>
</tr>
<tr>
<td>TBD</td>
<td>Cycle 7-15 Int'l Test Methods TF</td>
<td>Reapproval of:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• SEMI MF42-1105 (Reapproved 0611) Test Methods for Conductivity Type of Extrinsic Semiconducting Materials</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• SEMI MF43-0705 (Reapproved 0611) Test Methods for Resistivity of Semiconductor Materials</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• SEMI MF81-1105 (Reapproved 0611) Test Method for Measuring Radial Resistivity Variation on Silicon Wafers</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• SEMI MF154-1105 (Reapproved 0611) Guide for Identification of Structures and Contaminants Seen on Specular Silicon Surfaces</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• SEMI MF674-0705 (Reapproved 0611) Practice for Preparing Silicon for Spreading Resistance Measurements</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• SEMI MF847-0705 (Reapproved 0611) Test Method for Measuring Crystallographic Orientation of Flats on Single Crystal Silicon Wafers by X-Ray Techniques</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• SEMI MF951-0305 (Reapproved 0211) Test Method for Determination of Radial Interstitial Oxygen Variation in Silicon Wafers</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• SEMI MF1152-0305 (Reapproved 0211) Test Methods for Dimensions of Notches on Silicon Wafers</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• SEMI MF1239-0305 (Reapproved 0211) Test Method for Oxygen Precipitation Characteristics of Silicon Wafers by Measurement of Interstitial Oxygen Reduction</td>
</tr>
<tr>
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<td></td>
<td>• SEMI MF2139-1103 (Reapproved 1110) Test Method for Measuring Nitrogen Concentration in Silicon Substrates by Secondary Ion Mass Spectrometry</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• SEMI MF1617-0304 (Reapproved 0710) Test Method for Measuring Surface Sodium, Aluminum, Potassium, and Iron on Silicon and EPI Substrates by Secondary Ion Mass Spectrometry</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• SEMI MF533-0310 Test Method for Thickness and Thickness Variation of Silicon Wafers</td>
</tr>
</tbody>
</table>
### Table 5 – Authorized Activities

<table>
<thead>
<tr>
<th>#</th>
<th>Type</th>
<th>SC/TF/WG</th>
<th>Details</th>
</tr>
</thead>
</table>
| 5070   | SNARF              | Int'l 450 mm Wafer TF                         | Revision to SEMI M76-0710, Specification for Developmental 450 mm Diameter Polished Single Crystal Silicon Wafers  
• SNARF was abandoned                                                                 |
| 5071   | SNARF              | Int'l 450 mm Wafer TF                         | Revision to M76, Specification for developmental 450 mm diameter polished single crystal silicon wafers  
• SNARF was abandoned                                                                 |
|        |                    | Int'l 450 mm Wafer TF                         | SEMI M76-0710, Specification for Developmental 450 mm Diameter Polished Single Crystal Silicon Wafers  
• Voted to be inactive                                                                 |
| 5794   | SNARF              | Int'l 450 mm Wafer TF                         | New Standard: Specification Of Developmental 450mm Diameter Polished Single Crystal Notchless Silicon Wafers With Back Surface Fiducial Mark  
• SNARF was abandoned                                                                 |
| 5893   | SNARF              | Int'l Polished Wafer TF                       | Revision of SEMI M1-0215 Specifications for Polished Single Crystal Silicon Wafers  
• SNARF was abandoned                                                                 |
| 5915   | SNARF              | Int'l AWG TF                                   | Line Item Revision to SEMI M1 (illustration of Geometry Parameters)                                                                 |
| 5910   | SNARF              | Int'l Annealed Wafer TF                       | Line Item Revision of SEMI M57-0515, Specifications for Silicon Annealed Wafers                                                                 |
| 5911   | SNARF              | Int'l Epi Wafer TF                             | Line Item Revision of SEMI M62-0515, Specifications for Silicon Epitaxial Wafers                                                                 |
| TBD    | SNARFs             | Int'l Test Methods TF                         | Reapproval of:  
• SEMI MF42-1105 (Reapproved 0611) Test Methods for Conductivity Type of Extrinsic Semiconducting Materials  
• SEMI MF43-0705 (Reapproved 0611) Test Methods for Resistivity of Semiconductor Materials  
• SEMI MF81-1105 (Reapproved 0611) Test Method for Measuring Radial Resistivity Variation on Silicon Wafers  
• SEMI MF154-1105 (Reapproved 0611) Guide for Identification of Structures and Contaminants Seen on Specular Silicon Surfaces  
• SEMI MF674-0705 (Reapproved 0611) Practice for Preparing Silicon for Spreading Resistance Measurements  
• SEMI MF847-0705 (Reapproved 0611) Test Method for Measuring Crystallographic Orientation of Flats on Single Crystal Silicon Wafers by X-Ray Techniques  
• SEMI MF951-0305 (Reapproved 0211) Test Method for Determination of Radial Interstitial Oxygen Variation in Silicon Wafers  
• SEMI MF152-0305 (Reapproved 0211) Test Methods for Dimensions of Notches on Silicon Wafers  
• SEMI MF1239-0305 (Reapproved 0211) Test Method for Oxygen Precipitation Characteristics of Silicon Wafers by Measurement of Interstitial Oxygen Reduction  
• SEMI MF2139-1103 (Reapproved 1110) Test Method for Measuring Nitrogen Concentration in Silicon Substrates by Secondary Ion Mass Spectrometry  
• SEMI MF1617-0304 (Reapproved 0710) Test Method for Measuring Surface Sodium, Aluminum, Potassium, and Iron on Silicon and EPI Substrates by Secondary Ion Mass Spectrometry  
• SEMI MF533-0310 Test Method for Thickness and Thickness Variation of Silicon Wafers                                                                 |

**Note:** SNARFs and TFOFs are available for review on the SEMI Web site at:  
http://downloads.semi.org/web/wstdsbal.nsf/TFOFSNARF
**Table 6 – Previous Meeting Actions Items**

<table>
<thead>
<tr>
<th>Item #</th>
<th>Assigned to</th>
<th>Details</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>0315-1</td>
<td>Tetsuya Nakai (SUMCO)</td>
<td>To take over the abandoned SNARF 5540 (Line Item Rev. to M1) and submit a New SNARF to add Illustration of Flatness and Shape Metrics in SEMI M1 as related information.</td>
<td>Completed</td>
</tr>
</tbody>
</table>

**Table 7 – New Actions Items**

<table>
<thead>
<tr>
<th>Item #</th>
<th>Assigned to</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>0715-1</td>
<td>Leaders of Int’l Polished Wafer TF</td>
<td>To review charter and scope of the Int’l Polished Wafer TF and modify as necessary.</td>
</tr>
</tbody>
</table>

1. **Call to Order**

Noel Poduje 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. Membership enrollment is at [www.semi.org/standardsmembership](http://www.semi.org/standardsmembership). Agenda was reviewed and proceed.

2. **Review of Schedule for the Next Meeting (NA Spring Standards Meeting, Tuesday, April 5, 2016)**

The NA TC Chapter will not meet at the NA Fall meetings since there are two other international meetings to be held in October for Europe and in December for Japan. However, task forces may hold meetings during the Fall. If any task force (TF) is planning to hold a meeting, the TF leader should inform SEMI Staff at least a month before the NA Fall meeting so arrangement can be made.

The next TC Chapter meeting is scheduled at the NA Spring Standards Meeting, Tuesday, April 5, 2016 in San Jose, CA. Check [www.semi.org/standards](http://www.semi.org/standards) on the calendar of entry for the latest schedule and meeting location.

See attachment for tentative schedule.

Attachment – 1, Sch SiWfr 0416

3. **Review and Approval of the Minutes from NA Spring Standards meetings, March 31, 2015 in Milpitas, CA**

The meeting minutes were reviewed.

**Motion:** Accept the minutes of the previous meeting as written.

By / 2–: Dinesh Gupta(STA)/John Valley (SunEdison Semiconductor)

**Discussion:** None

**Vote:** 12/0 in favor. Motion passed

Attachment – 2, Minutes NA SiWfr 20150331

4. **Liaison Reports**

4.1. **GCS**

Noel reported the GCS discussed and modified the Silicon Wafer Global Technical Committee Charter. The charter was then modified in the TC meeting to read
Charter – Silicon Wafer Global Technical Committee:

To develop international technical Standards applicable to silicon wafers used in electronic device manufacturing.

These Standards include:

- Specifications and guides for silicon wafers (bare and processed).
- Test methods and practices for wafer properties and quality.
- Specifications and guides for silicon wafer metrology.
- Specifications for wafer shipping boxes.

The International Silicon Wafer Technical Committee will also work to promote technical communication and understanding between and among silicon suppliers, equipment suppliers and users, within the framework of SEMI Standards regulations, and to maintain active liaison with other Technical Committees, e.g., Traceability regarding wafer ID.

Motion: To approve the revised charter as written.
By / 2+: Dinesh Gupta (STA)/John Valley (SunEdison Semiconductor)
Discussion: The NA TC Chapter accepted the new charter, Europe and Japan TC Chapters will also need to approve before recommending to the ISC for final approval.
Vote: 11-0 in favor. Motion passed

Noel also reported the GCS discussed no NA TC meeting for Fall meeting. In addition, the merger of the Polished Wafer and 450 mm Wafer TFs was also mentioned.

Attachment – 3, Charter 150713 rev1
Attachment – 4, GCS150713

4.2. Europe Committee
Kevin Nguyen reported there was no meeting since October 2014. The report was given from the previous meeting in November 2014.

4.3. Japan Committee
Nakai-san reported. Highlights.

- Last Meeting
  - June 12, 2015 during Japan Summer Meetings 2015 at SEMI Japan, Tokyo, Japan
- Next Meeting
  - Sept 18, 2015 during Japan Fall Meetings 2015 at SEMI Japan, Tokyo, Japan
- Transfer JEITA/JEIDA Standards to SEMI
  - JEITA and SEMI is working on the contract about copyright. Some of the standards are being transferred. See below.
    - EM-3503 → 5737: Revision of SEMI MF1391-1107, Test Method for Substitutional Atomic Carbon Content of Silicon by Infrared Absorption (drafting for cycle 6)
    - EM-3506 → will be worked after JEIDA-53 transferred (SEMI MF1535)
    - EM-3508 → 5770: New Standard, Test Method for Bulk Micro Defect Density and Denuded Zone Width in Annealed Silicon Wafers (drafting for cycle 6)
    - EM-3503 → 5737: Revision of SEMI MF1391-1107, Test Method for Substitutional Atomic Carbon Content of Silicon by Infrared Absorption (drafting)
- EM-3506 → will be worked after JEIDA-53 transferred (SEMIMF1535)
- EM-3508 → 5770: New Standard, Test Method for Bulk Micro Defect Density and Denuded Zone Width in Annealed Silicon Wafers (drafting)
- JEIDA 61 → Transferred to M44
- EM3510 → Transferred to SEMI M77

- Fiducial Mark Interoperability TF
  o The task force currently work on the SNARF to move description of marking for 300mm into M1 from T7.
  o Ballot document will be submitted for Cycle7 and will be reviewed at the TC Chapter Meeting during SEMICON Japan this year.

- New Japan staff - Junko Collins (jcollins@semi.org)

**Attachment – 5, 1507_JA_SiW_LR_for_SW2015_R0.1**

### 5. Regulations Change Report

Kevin reported major changes in the March 2015 edition of the *Regulations* especially on Ratification ballot. All other changes was re-emphasized in the Staff report below.

### 6. Staff Report

Report was given by Kevin. Highlights:

- **Upcoming NA Meetings**
  - 2015
    - NA Fall, Nov 2-5, 2015 at SEMI HQ in San Jose, California
  - 2016
    - NA Spring, April 4-7, 2016, at SEMI HQ in San Jose, California
    - SEMICON West, July 11-14, 2016, San Francisco, California

- **There are now 9 ballots cycle for 2015**
  - http://www.semi.org/Standards/Ballots

- **SEMI Standards Publications**
  - Total SEMI Standards in portfolio: 937

- **New Requirements/Process Reminders for TC Chapter Meetings from December 2014 Regulations**
  - Standards Document Development Project Period
    - Project period shall not exceed 3 years (Regs 8.3.2)
    - If document development activity is found to be continuing, but cannot completed with the project period, TC Chapter may grant one-year extension at a time, as many times as necessary.
  - SNARF Review Period
    - A submitted SNARF for a new, or for a major revision to an existing, Standard or Safety Guideline is made available to all members of a TC Chapter’s parent global technical committee for two weeks for their review and comment. (Regs 8.2.1)
      - If the SNARF is submitted at a TC Chapter meeting, the committee can review and approve, but the SNARF will need to be distributed for two weeks and then approved via GCS.
  - Procedures for Correcting Nonconforming Titles of Published Standards Document (PM Appendix 4)
    - Some Standards qualify for a special procedure where a line item change can be used to correct the titles. Otherwise, the corrective action will likely require a major revision.

**Attachment – 6, SEMI Staff Report (West 2015) SiWafer rev1**
6.0 Ballot Review

6.1 Cycle 4-15 ballots

6.1.1 Doc. 5313C, Revision of SEMI MF1535-0707 With Title Change To: Test Method for Carrier Recombination Lifetime in Electronic-Grade Silicon Wafers by Non-Contact Measurement of Photoconductivity Decay by Microwave Reflectance

6.1.2 Doc. 5746, Line Item Revision of SEMI ME1392-1109, Guide for Angle Resolved Optical Scatter Measurements on Specular or Diffuse Surfaces

6.1.3 Doc. 5655, Line Item Revision to SEMI M1-0215, Specifications for Polished Single Crystal Silicon Wafers (EE Reduction)

6.1.4 Doc. 5705, Revision of SEMI M67-1109 With Title Change To: Test Method for Determining Wafer Near-Edge Geometry from a Measured Thickness Data Array Using the ESFQR, ESFQD, and ESBIR Metrics

6.1.5 Doc. 5706, Revision of SEMI M70-1109 With Title Change To: Test Method for Determining Wafer-Near-Edge Geometry Using Partial Wafer Site Flatness

6.1.6 Doc. 5744, Line Item Revision to SEMI M49-1014, Guide for Specifying Geometry Measurement Systems for Silicon Wafers for the 130 nm to 16 nm Technology Generations

6.1.7 Doc. 5806, Revision of SEMI M68-0315 With Title Change To: Test Method for Determining Wafer Near-Edge Geometry from a Measured Height Thickness Data Array Using a Curvature Metric, ZDD

6.1.8 Doc. 5807, Revision of SEMI M77-1110 With Title Change To: Test Method for Determining Wafer Near-Edge Geometry Using Roll-Off Amount, ROA

6.2 Cycle 5-15 ballots

6.2.1 Doc. 5805, Revision of SEMI M50-0310, Test Method for Determining Capture Rate and False Count Rate for Surface Scanning Inspection Systems by the Overlay Method

6.2.2 Doc. 5845, Reapproval of SEMI M16-1110 - Specification for Polycrystalline Silicon

6.2.3 Doc. 5846, Reapproval of SEMI M17-1110 - Guide for a Universal Wafer Grid

6.2.4 Doc. 5847, Reapproval of SEMI M66-1110 Test Method to Extract Effective Work Function in Oxide and High-K Gate Stacks Using the MIS Flat Band Voltage-Insulator Thickness Technique

6.2.5 Doc. 5848, Reapproval of SEMI MF1153-1110 - Test Method for Characterization of
Metal-Oxide Silicon (MOS) Structures by Capacitance-Voltage Measurements

6.2.5.1 Ballot passed. See attached for detail of adjudication.

6.2.6 Doc. 5849, Line Item Revision of SEMI MF1389-1110 - Test Methods for Photoluminescence Analysis of Single Crystal Silicon for III-V Impurities

6.2.6.1 Ballot passed. See attached for detail of adjudication.

6.2.7 Doc. 5850, Reapproval of SEMI MF1529-1110 - Test Method for Sheet Resistance Uniformity Evaluation by In-Line Four-Point Probe with the Dual-Configuration Procedure

6.2.7.1 Ballot passed. See attached for detail of adjudication.

6.2.8 Doc. 5851, Reapproval of SEMI MF1618-1110 - Practice for Determination of Uniformity of Thin Films on Silicon Wafers

6.2.8.1 Ballot passed. See attached for detail of adjudication.

6.2.9 Doc. 5852, Reapproval of SEMI MF1725-1110 - Practice for Analysis of Crystallographic Perfection of Silicon Ingots

6.2.9.1 Ballot passed. See attached for detail of adjudication.

6.2.10 Doc. 5853, Reapproval of SEMI MF1726-1110 - Practice for Analysis of Crystallographic Perfection of Silicon Wafers

6.2.10.1 Ballot passed. See attached for detail of adjudication.

6.2.11 Doc. 5854, Reapproval of SEMI MF1727-1110 - Practice for Detection of Oxidation Induced Defects in Polished Silicon Wafers

6.2.11.1 Ballot passed. See attached for detail of adjudication.

6.2.12 Doc. 5855, Reapproval of SEMI MF1771-1110 Test Method for Evaluating Gate Oxide Integrity by Voltage Ramp Technique

6.2.12.1 Ballot failed and returned to task force for reballot. See attached for detail of adjudication.

6.2.13 Doc. 5856, Reapproval of SEMI MF1809-1110 - Guide for Selection and Use of Etching Solutions to Delineate Structural Defects in Silicon

6.2.13.1 Ballot passed. See attached for detail of adjudication.

6.2.14 Doc. 5857, Withdrawal of SEMI MF2166-1110 - Practices for Monitoring Non-Contact Dielectric Characterization Systems Through Use of Special Reference Wafers

6.2.14.1 Ballot passed. See attached for detail of adjudication.

6.2.15 Doc. 5858, Reapproval of SEMI MF1810-1110 - Test Method for Counting Preferentially Etched or Decorated Surface Defects in Silicon Wafers

6.2.15.1 Ballot passed. See attached for detail of adjudication.

Attachment – 7, BallotReviewJuly 2015

7.0 Task Force Reports
7.1 Joint Int’l 450 mm Wafer TF and Int’l Polished Wafer TF/Mike Goldstein (Intel)

Mike Goldstein reported.

- Doc. 5655, Line Item Revision to SEMI M1-0215, Specifications for Polished Single Crystal Silicon Wafers (Revise SEMI M1 to add notchless 450 mm diameter wafers with an edge exclusion of 1.5 mm.)
  - Ballot passed and will be submitted to the ISC A&R Subc for procedural review.
  - This document is already covered in SEMI M1. Therefore, the TF is no longer pursuing the effort.

  Motion: To abandon SNARF 5794
  By / 2=: Mike Goldstein (Intel)/John Valley (SunEdison Semiconductor)
  Discussion: None.
  Vote: 11-0 in favor. Motion passed

- A SNARF for Revision of SEMI M1-0215 Specifications for Polished Single Crystal Silicon Wafers, was presented.

  Motion: To approve M1 SNARF
  By / 2=: Mike Goldstein (Intel)/John Valley (SunEdison Semiconductor)
  Discussion: None.
  Vote: 11-0 in favor. Motion passed

- SEMI M76-0710 - Specification for Developmental 450 mm Diameter Polished Single Crystal Silicon Wafers is due for 5 year review. Mike reported this document should be inactive.

  Motion: To allow M76 to go inactive
  By / 2=: John Valley (SunEdison Semiconductor)/ Mike Goldstein (Intel)
  Discussion: None.
  Vote: 11-0 in favor. Motion passed

- Also, Kevin mentioned SNARF 5070, Revision to SEMI M76-0710, Specification for Developmental 450 mm Diameter Polished Single Crystal Silicon Wafers was granted for a one year extension in March 2015. However, Michael said the TF is no longer wish to pursue SNARF 5070.

  Motion: To abandon SNARF 5070
  By / 2=: John Valley (SunEdison Semiconductor)/ Mike Goldstein (Intel)
  Discussion: None.
  Vote: 11-0 in favor. Motion passed

- The 450 mm activities are now completed. Michael reported all future activities will be handled by the Int’l Polished Wafer TF.

  Motion: To disband Int’l 450 mm Wafer TF
  By / 2=: John Valley (SunEdison Semiconductor)/ Mike Goldstein (Intel)
  Discussion: On behalf of Silicon Wafer Committee, Noel expressed appreciation to Michael Goldstein for his outstanding contribution in guiding 450 mm activities for many years.
  Vote: 11-0 in favor. Motion passed

- The Polished Wafer TF has no leadership in NA. Murray will help for ballot preparation, but a leader is needed in chairing and running the meeting. John Valley is willing to be an interim leader.

  Motion: To nominate John Valley as the co-leader for the Polished Wafer TF
  By / 2=: Dinesh Gupta (STA)/Peter Wagner (Self)
  Discussion: The charter and scope of the Polished Wafer TF may need to be updated. Noel asked the leaders of Polished Wafer to review and modify as necessary.
  Vote: 11-0 in favor. Motion passed
7.2 Int’l Advanced Wafer Geometry TF/ Jaydeep Sinha (KLA-Tencor)

- Minutes were presented by Noel Poduje.
  - Ballot review
    - Doc. 5744, Line Item Revision to M49 (exclusion window)
      - Failed review.
    - Doc. 5705, Revision of SEMI M67-1109 With Title Change To: Test Method for Determining Wafer Near-Edge Geometry from a Measured Thickness Data Array Using the ESFQR, ESFQD, and ESBIR Metrics
      - Passed and forwarded to ISC Subc for procedural review.
    - Doc. 5706, Revision of SEMI M70-1109 With Title Change To: Test Method for Determining Wafer-Near-Edge Geometry Using Partial Wafer Site Flatness
      - Passed and forwarded to ISC Subc for procedural review.
    - Doc. 5806, Revision of SEMI M68-0315 With Title Change To: Test Method for Determining Wafer Near-Edge Geometry from a Measured Height Thickness Data Array Using a Curvature Metric, ZDD
      - Passed and forwarded to ISC Subc for procedural review.
    - Doc. 5807, Revision to SEMI M77 -1110 With Title Change To: Test Method for Determining Wafer Near-Edge Geometry Using Roll-Off Amount, ROA
      - Passed and forwarded to ISC Subc for procedural review.
  - Presentations.
    - John Valley of SunEdison presented “Proposed Approach to Nanotopography for Lithography (Litho-NT). He presented data showing that NT metrics based on thickness (not individual surfaces) is more robust and easier to filter. He presented suggestions for filtering and metrics oriented toward go-nogo wafer inspection for high volume manufacturing.
    - Oleg Gluschenkov of IBM gave an interesting presentation titled “Role of Backside Wafer Geometry in Advanced Process Control”.
  - Ballot development
    - Line Item Rev. to M1 - illustration of Geometry Parameters. Nakai has taken over this work from Peter Wagner. The previous SNARF 5540 was terminated at the NA Spring meeting.

  **Motion:** To approve SNARF
  **By / 2:** Tetsuya Nakai (SUMCO)/Peter Wagner (Self)
  **Discussion:** Murray also has a ballot for revision of M1. Both M1 ballots cannot be issued in parallel. Nakai-san will pursue his ballot after Murray’s ballot is completed for that major revision.
  **Vote:** 11-0 in favor. Motion passed

Attachment – 8, AWGJuly2015Attachment

7.3 Int’l Automated Advanced Surface Inspection TF/Kurt Haller (KLA-Tencor)

- Kurt reported the following.
  - Doc. 5746, Line Item SEMI ME1392-1109, Guide for Angle Resolved Optical Scatter Measurements on Specular or Diffuse Surface
    - Passed review and forwarded to ISC for procedural review.
  - Doc. 5805, Revision of SEMI M50-0310, Test Method for Determining Capture Rate and False Count Rate for Surface Scanning Inspection Systems by the Overlay Method
    - Passed review and forwarded to ISC for procedural review.
  - Doc. 5804, Revision of SEMI M53-0310 - Practice for Calibrating Scanning Surface Inspection Systems Using Certified Depositions of Monodispere Reference Spheres on Unpatterned Semiconductor Wafer Surfaces, is ready for ballot submission.
    - **Motion:** To issue doc. 5804 for cycle 6-15 for review at SEMICON Europa
By / 2nd: Kurt Haller (KLA-Tencor)/Mike Goldstein (Intel)
Discussion: None.
Vote: 10-0 in favor. Motion passed

  - Motion: To issue doc. 5859 for cycle 6-15 for review at SEMICON Europa
  By / 2nd: Kurt Haller (KLA-Tencor)/Mike Goldstein (Intel)
  Discussion: None.
  Vote: 10-0 in favor. Motion passed

- Joann Qiu presented a status update of an ongoing study of the implementation of model-based calibration procedures conducted by Intel, Siltronic, and KLA-Tencor.

Attachment – 9, IAASIMinutes_13July2015_updated

7.4 Int’l SOI TF/Bich-Yen Nguyen (SOITEC USA)
- Dinesh Gupta reported for Bich-Yen Nguyen. The TF is looking at high resistivity for SOI for revision of M71. It was reported that Philippe Absil, Director at IMEC, will be invited for speaking at SEMICON West 2015 to speak on feasibility study for SOI, but it did not happen.
- Dinesh also said Bich-Yen may not be able to continue, a new leader is needed soon.

Attachment – 10, SOI TF NA July 13, 2015-AI

7.5 Int’l Annealed Wafer TF/Dinesh Gupta (STA)
- Dinesh Gupta reported SEMI M57-0414, Specifications for Silicon Annealed Wafers was published in April 2014. No future revision is anticipated.
- M57 Title needs to be corrected for conformance with SEMI Procedural Manual. A SNARF was submitted to allow a title change via a line item change ballot.
  - Motion: To issue approve Line Item change for M57 for review at SEMICON Japan
  By / 2nd: Dinesh Gupta (STA)/Mike Goldstein (Intel)
  Discussion: None.
  Vote: 10-0 in favor. Motion passed

Attachment – 11, M57 Rev SNARF-Change Specifications to Specification in Title 071315
Attachment – 12, Min AW-EPI Mtg 0715

7.6 Int’l Epitaxial Wafer TF/ Dinesh Gupta (STA)
- Dinesh reported SEMI M62-0515, Specifications for Silicon Epitaxial Wafers (Re: 16 nm technology node) was published. The next revision will be adding the 11 nm technology node.
- M62 Title needs to be corrected for conformance with SEMI Procedural Manual. A SNARF was submitted to allow a title change via line item change ballot.
  - Motion: To issue approve Line Item change for M62 for review at SEMICON Japan
  By / 2nd: Dinesh Gupta (STA)/Naoyuki Kawai (The University of Tokyo)
  Discussion: None.
  Vote: 10-0 in favor. Motion passed

Attachment – 13, M62 Rev SNARF-Change Specifications to Specification in Title 071315
7.7 Int'l Test Methods TF/Dinesh Gupta (STA)

- Dinesh reported all 12 ballots passed superclean. Doc. 5313C, Revision of SEMI MF1535 also passed with editorial changes. Doc. 5855, reapproval of MF1771, failed.

**Motion:** To authorize doc. 5855B for reballot for cycle 7-15 for review at SEMICON Japan.
**By / 2nd:** Dinesh Gupta (STA)/Michael Goldstein (Intel)
**Discussion:** None
**Vote:** 10-0 in favor. Motion passed

- Doc. 5737, Revision of SEMI MF1391-1107 (Reapproved 0912), Test Method for Substitutional Atomic Carbon Content of Silicon by Infrared Absorption, is ready for ballot.

**Motion:** To authorize doc. 5737 for reballot for cycle 6-15 for review at SEMICON Europa
**By / 2nd:** Dinesh Gupta (STA)/Ryuji Takeda (Globalwafers Japan)
**Discussion:** None
**Vote:** 10-0 in favor. Motion passed

- The following documents are due for 5 year review.
  - SEMI MF42-1105 (Reapproved 0611) Test Methods for Conductivity Type of Extrinsic Semiconducting Materials
  - SEMI MF43-0705 (Reapproved 0611) Test Methods for Resistivity of Semiconductor Materials
  - SEMI MF81-1105 (Reapproved 0611) Test Method for Measuring Radial Resistivity Variation on Silicon Wafers
  - SEMI MF154-1105 (Reapproved 0611) Guide for Identification of Structures and Contaminants Seen on Specular Silicon Surfaces
  - SEMI MF674-0705 (Reapproved 0611) Practice for Preparing Silicon for Spreading Resistance Measurements
  - SEMI MF847-0705 (Reapproved 0611) Test Method for Measuring Crystallographic Orientation of Flats on Single Crystal Silicon Wafers by X-Ray Techniques
  - SEMI MF951-0305 (Reapproved 0211) Test Method for Determination of Radial Interstitial Oxygen Variation in Silicon Wafers
  - SEMI MF1152-0305 (Reapproved 0211) Test Methods for Dimensions of Notches on Silicon Wafers
  - SEMI MF1239-0305 (Reapproved 0211) Test Method for Oxygen Precipitation Characteristics of Silicon Wafers by Measurement of Interstitial Oxygen Reduction
  - SEMI MF2139-1103 (Reapproved 1110) Test Method for Measuring Nitrogen Concentration in Silicon Substrates by Secondary Ion Mass Spectrometry
  - SEMI MF1617-0304 (Reapproved 0710) Test Method for Measuring Surface Sodium, Aluminum, Potassium, and Iron on Silicon and EPI Substrates by Secondary Ion Mass Spectrometry
  - SEMI MF533-0310 Test Method for Thickness and Thickness Variation of Silicon Wafers

**Motion:** To issue 5 year ballots above for cycle 7-15 for review at SEMICON Japan 2015
**By / 2nd:** Dinesh Gupta (STA)/Naoyuki (The University of Tokyo)
**Discussion:** None
**Vote:** 10-0 in favor. Motion passed

7.8 Int'l Terminology TF/TBD

- No meeting, no report. Peter Wagner recommended disbanding the task force since all new terminologies from all standards are added by SEMI in the Compilation of Term (COT), which is accessible on the public domain. He said the process of adding term in SEMI M59 is too
cumbersome. However, Murray strongly opposed this idea. If SEMI M59 is going away, all of the existing terms in M59 need to back to their originated standards, and it will require significant amount of work.

- Noel Poduje recommended Peter to give in some thoughts and provide some idea on handling M59 and the Terminology TF in the future meeting.

8.0 Old Business
None

9.0 New Business
None

10.0 Action Item Reviews
Kevin Nguyen reviewed no old action items. There was one new action item at this meeting noted in table 7.

11.0 Adjourn
The meeting was adjourned at 5:00 PM.

These minutes are respectfully submitted by:

Kevin Nguyen,
SEMI Int’l Standards Operation Manager
Phone: 408-943-7997
Email: knnguyen@semi.org

Minutes approved by:
Dinesh Gupta (STA) – Co-chair
Noel Poduje (SMS) – Co-chair

Table 8 – Index of Attachment Summary

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#1 Due to file size and delivery issues, attachments must be downloaded separately. A .zip file containing all attachments for these minutes is available at www.semi.org. For additional information or to obtain individual attachments, please contact Kevin Nguyen at the contact information above.