# Silicon Wafer NA TC Chapter
# Meeting Summary and Minutes

SEMICON West
Tuesday, July 10, 2018
2:00 PM – 5:00 PM
San Francisco Marriott, California

**TC Chapter Announcements**

Next TC Chapter Meeting
Tuesday, April 2, 2019 Milpitas, CA in conjunction with the NA Spring Meeting 2019. Check www.semi.org/en/standards for the latest update.

### Table 1 Meeting Attendees

**Co-Chairs:** Dinesh Gupta (STA), Noel Poduje (SMS)
**SEMI Staff:** Kevin Nguyen (SEMI HQ),

| *Company* | *Last* | *First* | *Company* | *Last* | *First* |
|---|---|---|---|---|---|
| Self | Goldstein | Mike | Siltronic | Passek | Fritz |
| STA | Gupta | Dinesh | MicroSense | Perroots | Len |
| KLA-Tencor | Haller | Kurt | SMS | Poduje | Noel |
| Hitachi High-Tech | Ikota | Masami | Self | Yoshise | Masanori |
| Nordson | Martell | Steve | Self | Wagner | Peter |
| SUMCO | Nakai | Tetsuya | | | |

*Italic* indicates remote participant

### Table 2 Leadership Changes

| *WG/TF/SC/TC Name* | *Previous Leader* | *New Leader* |
|---|---|---|
| None | | |

### Table 3 Ballot Results

| *Document #* | *Document Title* | *Committee Action* |
|---|---|---|
| 6170A | Line item Revision to SEMI M49 "Guide For Specifying Geometry Measurement Systems For Silicon Wafers For The 130 nm TO 16 nm Technology Generations | Passed as balloted |
| 6355 | Reapproval of SEMI MF1049-0308 (Reapproved 0413) Practice for Shallow Etch Pit Detection on Silicon Wafers | Passed as balloted |
| 6356 | Reapproval of SEMI MF1366-0308 (Reapproved 0413) Test Method for Measuring Oxygen Concentration in Heavily Doped Silicon Substrates by Secondary Ion Mass Spectrometry | Passed as balloted |
| 6357 | Reapproval of SEMI MF1528-0413 Test Method for Measuring Boron Contamination in Heavily Doped N-Type Silicon Substrates by Secondary Ion Mass Spectrometry | Passed as balloted |
| 6358 | Reapproval of SEMI MF672-0412 Guide for Measuring Resistivity Profiles Perpendicular to the Surface of a Silicon Wafer Using a Spreading Resistance Probe | Passed as balloted |

| Document # | Document Title | Committee Action |
|---|---|---|
| 6359 | Line Item Revision Of SEMI MF1527-0412 Guide For Application Of Certified Reference Materials And Reference Wafers For Calibration And Control Of Instruments For Measuring Resistivity Of Silicon | Passed as balloted |
| 6360 | Reapproval of SEMI M74-1108 (Reapproved 0413) Specification for 450 mm Diameter Mechanical Handling Polished Wafers | Passed as balloted |
| 6361 | Reapproval of SEMI MF1530-0707 (Reapproved 0512) Test Method for Measuring Flatness, Thickness, and Total Thickness Variation on Silicon Wafers by Automated Noncontact Scanning | Passed as balloted |
| 5774A | New Standard: Guide for Sample Preparation Method for Minority Carrier Diffusion Length Measurement in Silicon Wafers by Surface Photovoltage Method | Passed with editorial changes |
| 6207 | Line Items Revision to SEMI M1-1117, Specification for Polished Single Crystal Silicon Wafers (Add Shape metrics of Bow 3p in appendix 2 which was mistakenly removed at previous ballot, and add Illustrations of Shape Metrics for Silicon Wafers in Appendix 2.) | Passed with editorial changes |
| 6284 | Revision to SEMI M56-0307 (Reapproved 0512) Practice For Determining Cost Components For Metrology Equipment Due To Measurement Variability And Bias | Passed as balloted |
| 6397 | Reapproval of SEMI M61-0612 Specification For Silicon Epitaxial Wafers With Buried Layers | Passed as balloted |
| 6398 | Reapproval of SEMI MF1451-0707 (Reapproved 0512) - Test Method for Measuring Sori on Silicon Wafers by Automated Noncontact Scanning | Passed as balloted |

#1 **Passed** ballots and line items will be submitted to the ISC Audit & Review Subcommittee for procedural review.

#2 **Failed** ballots and line items were returned to the originating task forces for re-work and re-balloting or abandoning.

**Table 4 Activities Approved by the GCS between meetings of the TC Chapter**

| # | Type | SC/TF/WG | Details |
|---|---|---|---|
| None | | | |

**Table 5 Authorized Activities**

| # | Type | SC/TF/WG | Details |
|---|---|---|---|
| 6425 | SNARF | Polished Wafer TF | Line Item Revision to SEMI M1, Specification for Polished Single Crystal Wafer |

NOTE 1: SNARFs and TFOFs are available for review on the SEMI Web site at: http://downloads.semi.org/web/wstdsbal.nsf/TFOFSNARF

**Table 6 Authorized Ballots**

| # | When | SC/TF/WG | Details |
|---|---|---|---|
| 6362 | Cycle 6-18 | ASI TF | Line Item Revision of SEMI M53-0418, Practice For Calibrating Scanning Surface Inspection Systems Using Certified Depositions Of Monodisperse Reference Spheres On Unpatterned Semiconductor Wafer Surfaces |

**Table 7 SNARF(s) Granted a One-Year Extension**

| # | TF | Title | Expiration Date |
|---|---|---|---|
| None | | | |

**Table 8 SNARF(s) Abolished**

| # | TF | Title |
|---|---|---|
| None | | |

**Table 9 Standard(s) to receive Inactive Status**

| Standard Designation | Title |
|---|---|
| None | |

**Table 10 New Action Items**

| Item # | Assigned to | Details |
|---|---|---|
| July102018-#1 | Kevin Nguyen | Check with SEMI if there is logistical issue with meeting rooms for NA Spring 2019 |
| July102018-#2 | Kevin Nguyen | Check with SEMI IT for possible virtual meeting at SEMICON Europa in November 2018 |
| July102018-#3 | Kevin Nguyen | Provide Standards usage statistic for material volume |
| July102018-#4 | Kevin Nguyen | Provide Steve Martell a copy of SEMI M59 |

**Table 11 Previous Meeting Action Items**

| Item # | Assigned to | Details | Status |
|---|---|---|---|
| April102018-#1 | Noel Poduje | To discuss with Supika on allowing flexibility of moving the TC Chapter meeting date once a ballot is issued. | Completed |

## 1 Welcome, Reminders, and Introductions

Dinesh Gupta called the meeting to order at 2:00 PM. The meeting reminders on antitrust issues, intellectual property issues and holding meetings with international attendance were reviewed. Attendees introduced themselves.

## 2 Review of Previous Meeting Minutes

The TC Chapter reviewed the minutes of the previous meeting.

**Motion:** Accept the minutes as written
**By / 2nd:** Steve Martell/Mike Goldstein
**Discussion:** None
**Vote:** 8-0

## 3 Review of Schedule for the next meeting (NA Spring Meeting, April 1-2, 2019)

3.1 Dinesh provided preliminary schedule. Steve Martell said it would be convenient if the Silicon Wafer meetings are held at SEMI HQ instead of KLA-Tencor. Since all other meetings are held at SEMI HQ, one can just attend all meetings under one roof. It is an inconvenient to drive to KLA. Kurt Haller is ok with having these meetings at SEMI HQ, but he also has no issue with hosting at KLA location either. From a sponsorship standpoint, Kevin mentioned it is great to have KLA, a big semiconductor equipment supplier, supporting SEMI standards. However, Steve has a point.

Action Item #1 - Kevin will check SEMI if there is any logistical issue with rooms at SEMI HQ.

**Attachment: 01, Sch SiWfr 0419**

## 4 Liaison Reports

4.1 *Europe TC Chapter*

4.1.1 There was no meeting since November 2018. All activities were reported in task forces. Since there will be ballot review at SEMICON Europa, Noel also suggested trying virtual meetings.

Action Item #2 – Kevin to check with SEMI IT for a trial of virtual meeting at SEMICON Europa.

4.2 *Japan TC Chapter*

4.2.1 Nakai-san reported for the Japan TC Chapter. Of note:

- Last Meeting
  - April 20, 2018 at the SEMI Standards Japan Spring Meetings
  - SEMI Japan, Tokyo, Japan
- Next Meeting
  - July 30, 2018 at the SEMI Standards Japan Summer Meetings
  - SEMI Japan, Tokyo, Japan
- International Test Method Task Force / Japan Test Method Task Force
  - Doc. 5981, TEST METHOD FOR RECOMBINATION LIFETIME OF THE EPILAYER OF THE SILICON EPITAXIAL WAFER (p/p+, n/n+) BY THE SHORT WAVELENGTH EXCITAION MICROWAVE PHOTOCONDUCTIVE DECAY METHOD

**Attachment: 02, JA_Si_Liaison_20180626 v1.0**

4.3 *SEMI Staff Report*

4.3.1 Kevin Nguyen (SEMI) gave the SEMI Staff Report. Of note:

- Next meetings
  - November 5-8, 2018
  - SEMI HQ in Milpitas, California
- 2018 Critical Dates for SEMI Standards Ballots
  - Cycle 6, 2018
    - Ballot Submission Date: July 20
    - Voting Period Starts: August 1
    - Voting Period Ends: August 31
  - Cycle 7, 2018
    - Ballot Submission Date: August 22

        - Voting Period Starts: September 5
        - Voting Period Ends: October 5
- SEMI Standards Publications
    - Total SEMI Standards in portfolio: 987
        - Includes 236 Inactive Standards
- New Forms, Regulations & Procedure Manual
    - New version of Regulations (June 8, 2018)
        - Improvements on Rules for Handling of Patented Technology (Regulations § § 16.1-16.3)
            - Patented Technology that might be material to the Standard is disclosed at the end stage of document development
                - Disclosed after the ballot is issued
                - Assessment for potential materiality and technical justifiability for inclusion shall be postponed to the next scheduled meeting.
        - A TF sometimes decides to use patented technology after it has started the document development project.
            - To require subsequent update of SNARF regarding use of Patented Technology and subsequent LOI process to ensure that TC Chapter agrees to the course of action recommended by the TF.
        - Additional Official Virtual TC Chapter Meeting Related Rules (Regulations ¶ 7.4.2 and § 9.5)
            - Loss of necessary infrastructure at the meeting location described in the Background Statement of the Letter Ballot
                - The necessary infrastructure (e.g., electrical power, internet connection, required software applications)
    - New version of Procedure Manual (June 8, 2018)
    - New TFOF & SNARF
    - New Ballot Review Templates
    - www.semi.org/standards
        - Bottom left, under Resources!

**Attachment:** 03, Staff Report July 2018_SA rev1

## 5 Regulations Change Report (if applicable)

5.1 See staff report section.

## 6 Ballot Review

### 6.1 Cycle 3-2018

6.1.1 Doc. 6170A, Line item Revision to SEMI M49 “Guide For Specifying Geometry Measurement Systems For Silicon Wafers For The 130 nm TO 16 nm Technology Generations

- Ballot passed. See attachment at the end of section 6 for further details of all ballot review.

### 6.2 Cycle 4-2018

6.2.1 Doc. 6355, Reapproval of SEMI MF1049-0308 (Reapproved 0413) Practice for Shallow Etch Pit Detection on Silicon Wafers

- Ballot passed.

6.2.2 Doc. 6356, Reapproval of SEMI MF1366-0308 (Reapproved 0413) Test Method for Measuring Oxygen Concentration in Heavily Doped Silicon Substrates by Secondary Ion Mass Spectrometry

- Ballot passed.

6.2.3 Doc. 6357, Reapproval of SEMI MF1528-0413 Test Method for Measuring Boron Contamination in Heavily Doped N-Type Silicon Substrates by Secondary Ion Mass Spectrometry

- Ballot passed.

6.2.4 Doc. 6358, Reapproval of SEMI MF672-0412 Guide for Measuring Resistivity Profiles Perpendicular to the Surface of a Silicon Wafer Using a Spreading Resistance Probe

- Ballot passed.

6.2.5 Doc. 6359, Line Item Revision of SEMI MF1527-0412 Guide For Application Of Certified Reference Materials And Reference Wafers For Calibration And Control Of Instruments For Measuring Resistivity Of Silicon

- Ballot passed.

6.2.6 Doc. 6360, Reapproval of SEMI M74-1108 (Reapproved 0413) Specification for 450 mm Diameter Mechanical Handling Polished Wafers

- Ballot passed.

6.2.7 Doc. 6361, Reapproval of SEMI MF1530-0707 (Reapproved 0512) Test Method for Measuring Flatness, Thickness, and Total Thickness Variation on Silicon Wafers by Automated Noncontact Scanning

- Ballot passed.

**6.3 Cycle 5-2018**

6.3.1 Doc. 5774A, New Standard: Guide for Sample Preparation Method for Minority Carrier Diffusion Length Measurement in Silicon Wafers by Surface Photovoltage Method

- Ballot passed.

6.3.2 Doc. 6207, Line Items Revision to SEMI M1-1117, Specification for Polished Single Crystal Silicon Wafers (Add Shape metrics of Bow 3p in appendix 2 which was mistakenly removed at previous ballot, and add Illustrations of Shape Metrics for Silicon Wafers in Appendix 2.)

- Ballot passed.

6.3.3 Doc. 6284A, Revision to SEMI M56-0307 (Reapproved 0512) Practice for Determining Cost Components For Metrology Equipment Due To Measurement Variability And Bias

- Ballot passed.

6.3.4 Doc. 6397, Reapproval of SEMI M61-0612 Specification for Silicon Epitaxial Wafers With Buried Layers

- Ballot passed.

6.3.5 Doc. 6398, Reapproval of SEMI MF1451-0707 (Reapproved 0512) - Test Method for Measuring Sori on Silicon Wafers by Automated Noncontact Scanning

- Ballot passed.

**Attachment: 04, BallotsForm**

## 7 Task Force Reports

*7.1 Int'l Advanced Wafer Geometry Task Force /Noel Poduje (SMS)*

7.1.1 Ballot review

7.1.1.1 Document 6207, Line Item Revision to SEMI M1-1016, Specification for Polished Single Crystal Silicon

- The ballot has one comment from Noel. We need to deal with upcoming Advanced 200mm requirements, specifically for the 90 and 65nm nodes. It is possible that these requirements are the same as for 300mm. On the other hand, some things may need to be changed or added. For example, Table 3 has no requirements for specific edge metrics like ESFQR or ZDD.
- The Task Force should look into this by first determining industry needs for Advanced 200mm. The result may call for no additional change, a further M49 revision or perhaps a new Standard.
- Noel did not request any specific action or New Business. The ballot passed TC review.

7.1.1.2 Document 6207 Line Item Revision to SEMI M1-1016, Specification for Polished Single Crystal Silicon Wafers (Add Shape metric Bow 3p, add Illustrations of Shape Metrics for Silicon Wafers, etc.)

- Ballot passed TC review and will be forwarded for procedural review and publication.

7.1.2 NEW BUSINESS

- John Valley asked that we encourage presentations at AWG. Specifically, he suggested information on new geometry requirements as well as metrology solutions for:
  - EUV lithography
  - Advanced 200mm
- Discussion of potential new measurement requirements regarding Advanced 200mm.
  - D. Kallus took action item to investigate and possibly present

**Attachment: 5, AWG Attachments**

*7.2 Int'l Automated Advanced Surface Inspection Task Force/ Kurt Haller (KLA-Tencor)*

7.2.1 Kurt reported.

7.2.2 Ballot development

- Doc #6362: M53, Practice for Calibrating Scanning Surface Inspection Systems Using Certified Depositions of Monodispere Reference Spheres on Unpatterned Semiconductor Wafer Surfaces (Related Information 2: Calibrated Surface Scanning Inspection System Sizes Assigned to LLS Defects With Properties Different From Calibration Reference Spheres)

**Motion:** To authorize for cycle 6 for review at SEMICON Europa
**By / 2nd:** Kurt Haller/Noel Poduje
**Discussion:** None
**Vote:** 8-0. Motion passed.

- Doc #6363 Five year review: SEMI M52-0214 GUIDE FOR SPECIFYING SCANNING SURFACE INSPECTION SYSTEMS FOR SILICON WAFERS FOR THE 130 nm TO 11 nm TECHNOLOGY GENERATIONS
  - The current version of M52 having been based on ITRS 2010
  - Kurt took the action to produce revised technology generations as proposed, producing ballotable text in time for SEMICON Europa in November.

7.2.3 New Business

- will renew the invitation to Siltronic for SEMICON West in July, 2018

7.2.4 New Business

- Five year review: SEMI M58-1109 R 0614: TEST METHOD FOR EVALUATING DMA BASED PARTICLE DEPOSITION SYSTEMS AND PROCESSES
  - Standard Reference Material PSL suspensions that are the basis for the Test Method were available at the time M58 was written (in 2009) are no longer on sale and indeed, any previously sold stock is no longer usable because their Certificates expired as of 15 May 2017.
  - Kurt will contact info for the appropriate NIST personnel who can address the issue. Kurt felt and the TF agreed that writing up a SNARF for M58 is at this time premature, but may be ready at SEMICON Europa.

**Attachment: 6, IAASI_West_09Jul2018**

7.3 *Int'l SOI Wafers TF/Gerd Pfeiffer (GlobalFoundries)*

7.3.1 5 Year Review of SEMI M71-0912 Specification for Silicon on Insulator Wafers for CMOS LSI

7.3.1.1 Gerd has been working on the revision. The draft was not presented, however a SNARF was sent to Kevin, who will distribute to TC Members for two weeks review and subsequently approval by the GCS.

*7.4 Int'l Test Methods TF/Dinesh Gupta (STA)*

7.4.1 Dinesh Gupta reported.

- All ballots are approved.
- Old business
  - SEMI MF1391-1107 (Reapproved 0912)
    "Test Method for Substitutional Atomic Carbon Content of Silicon by Infrared Absorption" was balloted for reapproval.
  - This document was balloted by Japan and reviewed at WEST 2016 as doc. 5737A. It had failed due to persuasive reject from Peter Wagner/Self.
  - Task Force (in Japan) is continuing to work on the document. The recommendation was to reballot the document after the completion of the work by the Task Force.

**Attachment: 7, Min Test Methods Mtg 0718**

*7.5 Int'l Polished Wafers (Substrates) TF/John Valley (Nanometrics)*

7.5.1 Dinesh Dupta reported.

- Murray Bullis submitted a SNARF for review. The SNARF was modified in the meeting for clarity.

**Motion:** To approve Line Item Revision of M1 (removal of PV13) SNARF
**By / 2nd:** Noel Poduje/Fritz Passek
**Discussion:** None
**Vote:** 6-1. Motion passed.

**Attachment: 8, SNARF_m1 rev**

**Attachment: 9, IPW SEMICON-West 2018 Meeting minutes draft1**

## 8 Old Business

None

## 9 New Business

9.1 5 Year Review

- Amount of standards due for 5 year is quite significant. The GCS discussed on dividing up for each region to carry the workload. It is not clear on who gets what.
- The other option is basically to do nothing. Standards will go inactive after 6th year of publication. If there is a need for revision, anyone can revise a standard as needed.
- The third option is to form a Working Group or a 5 year review TF to carry this workload. One idea is to set up an Excel spreadsheet listing all M and MF standards in chronological order by region, by task force, by standards statistic. Having standards usage statistic, it will provide TF leaders in the Silicon Wafer committee a comprehensive view.

  Action Item # 3 – Kevin will look into providing statistic on standards usage.

9.2 Int'l Terminology TF

- M59 is not being maintained since Murray is retired.
- No one is working on removing current terms in M or MF volumes to M59-1014
- GCS had a meeting and made the following decisions:
  - Reaffirmed to make no change to SEMI M59, which will let go inactive when it is due for 5 year in October of 2019
  - New term or revised term on any M or MF standards will not be added to M59
  - When an M or MF standard is revised, the M59 reference should be removed and be replaced with Compilation of Term (COT)
- Steve Martell volunteered to perform an audit on SEMI M59 versus COT and report back.

Action Item # 4 – Kevin to send Steve a copy of M59.

- Terminology TF will remain inactive on the org. chart

## 10 Next Meeting and Adjournment

10.1 The next meeting is scheduled for Tuesday, April 2, 2019 in Milpitas, CA. See http://www.semi.org/en/events for the current list of meeting schedules. Location will be determined with either KLA-Tencor or SEMI HQ in Milpitas, CA.

10.2 Having no further business, a motion was made to adjourn. Adjournment was at 5:00 PM.

Respectfully submitted by:

Kevin Nguyen,
SEMI Standards Operations Manager
Phone: 408-943-7997
Email: knguyen@semi.org

Minutes approved by:

| | |
|---|---|
| Dinesh Gupta (STA) | <Date approved> |
| Noel Poduje (SMS) | <Date approved> |

**Table 12 Index of Available Attachments#1**

| *Title* | *Title* |
|---|---|
| Sch SiWfr 0419 | IAASI_West_09Jul2018 |
| JA_Si_Liaison_20180626 v1.0 | Min Test Methods Mtg 0718 |
| Staff Report July 2018_SA rev1 | SNARF_m1 rev |
| BallotsForm | IPW SEMICON-West 2018 Meeting minutes draft1 |
| AWG Attachments | |

#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 [SEMI Staff Name] at the contact information above.