MEMS/NEMS North America TC Chapter

Meeting Summary and Minutes

SEMICON West 2016 Meetings
Thursday, July 14, 2016, 15:00 – 17:00
SF Marriott Marquis in San Francisco, California

TC Chapter Announcements

Next TC Chapter Meeting
NA Standards Fall 2016 Meetings
Monday, November 7, 2016, 15:30 – 17:30
SEMI Headquarters in San Jose, California

Table 1 Meeting Attendees

*Italics* indicate virtual participants

Co-Chairs: Win Baylies (BayTech-Resor), Steve Martell (Sonoscan)

SEMI Staff: Laura Nguyen, Inna Skvortsova

<table>
<thead>
<tr>
<th>Company</th>
<th>Last</th>
<th>First</th>
<th>Company</th>
<th>Last</th>
<th>First</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asahi Glass Company (AGC)</td>
<td>Takahashi</td>
<td>Mark</td>
<td>NIST</td>
<td>Allen</td>
<td>Richard</td>
</tr>
<tr>
<td>BayTech-Resor</td>
<td>Win</td>
<td>Baylies</td>
<td>Sonoscan</td>
<td>Martell</td>
<td>Steve</td>
</tr>
<tr>
<td>BW &amp; Associates</td>
<td>Wu</td>
<td>Bevan</td>
<td>SEMI</td>
<td>Nguyen</td>
<td>Laura</td>
</tr>
<tr>
<td>Diagnostic Biosensors</td>
<td>Tondra</td>
<td>Mark</td>
<td>SEMI</td>
<td>Skvortsova</td>
<td>Inna</td>
</tr>
</tbody>
</table>

Table 2 Leadership Changes

<table>
<thead>
<tr>
<th>Group</th>
<th>Previous Leader</th>
<th>New Leader</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 3 Ballot Results

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

Failed ballots and line items were returned to the originating task forces for re-work and re-balloting.

<table>
<thead>
<tr>
<th>Document #</th>
<th>Document Title</th>
<th>Committee Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 4 Authorized Activities

<table>
<thead>
<tr>
<th>#</th>
<th>Type</th>
<th>SC/TF/WG</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

Table 5 Authorized Ballots

<table>
<thead>
<tr>
<th>#</th>
<th>When</th>
<th>SC/TF/WG</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 6 New Action Items

| Item #          | Assigned to      | Details                                                                 
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>2016July#01</td>
<td>Laura Nguyen</td>
<td>Add discussion of ISO/IWA:23 on agenda for Fall meetings.</td>
</tr>
<tr>
<td>2016July#02</td>
<td>Rich Allen</td>
<td>Follow up with results and feedback of the Bond Void Survey for distribution.</td>
</tr>
<tr>
<td>2016July#03</td>
<td>Laura Nguyen</td>
<td>Request a digital copy of MSIG-SEMI Workshop member list from Bettina.</td>
</tr>
<tr>
<td>2016July#04</td>
<td>Laura Nguyen</td>
<td>Add to new business on agenda for Fall Meetings of whether MEMS/NEMS Spring meetings will be help elsewhere (MSIG Technical Conference)</td>
</tr>
</tbody>
</table>

Table 7 Previous Meeting Action Items

<table>
<thead>
<tr>
<th>Item #</th>
<th>Assigned to</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td></td>
<td>All items have been closed</td>
</tr>
</tbody>
</table>

1 Welcome, Reminders, and Introductions

Steve Martell called the meeting to order at 15:05. After welcoming all attendees, a round of introductions followed. The SEMI meeting reminders on membership requirements, antitrust, patentable technology, and meeting guidelines were then presented and explained.

Attachment: SEMI Standards Required Meeting Elements

2 Review of Previous Meeting Minutes

The TC Chapter reviewed the minutes of the previous meeting.

Motion: To accept the previous meeting minutes as written.

By / 2nd: Richard Allen (NIST) / Bevan Wu (BW & Associates)

Discussion: None.

Vote: 3-0 in favor. Motion passed.

Attachment: [2016Spring] NA MEMS NEMS DRAFT

3 Liaison Reports

3.1 SEMI Staff Report

Laura Nguyen (SEMI) gave the SEMI Staff Report. The key items were as follows:

- SEMI Global 2016 Calendar of Events
  - SEMICON West (July 12-14, 2016, San Francisco, California)
  - SEMICON Taiwan (September 7-9, Taipei, Taiwan)
  - SEMICON Europa (October 25-27, Grenoble, France)
  - SEMICON Japan (December 14-16, Tokyo, Japan)

- Upcoming North America Standards Meetings
  - NA Standards Fall 2016 Meetings (November 7-10, 2016, SEMI HQ in San Jose, California)
  - NA Standards Spring 2016 Meetings (April 3-6 [tentative], SEMI HQ in San Jose, California)
  - SEMICON West 2016 (July 10-13, 2017, San Francisco, California)

  - Fall 2016 adjudication
- Cycle 6: ballot submission due: July 22/Voting Period: August 1 – September 1
- Cycle 7: ballot submission due: August 17/Voting Period: August 31 – September 30
  - Spring 2017 adjudication

- Standards Publications Report

<table>
<thead>
<tr>
<th>Cycle</th>
<th>New</th>
<th>Revised</th>
<th>Reapproved</th>
<th>Withdrawn</th>
</tr>
</thead>
<tbody>
<tr>
<td>December 2015</td>
<td>2</td>
<td>20</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>January 2016</td>
<td>0</td>
<td>8</td>
<td>10</td>
<td>0</td>
</tr>
<tr>
<td>February 2016</td>
<td>2</td>
<td>3</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>March 2016</td>
<td>0</td>
<td>4</td>
<td>3</td>
<td>0</td>
</tr>
</tbody>
</table>

- Total in portfolio – 964 (includes 141 Inactive Standards)

- New Requirements/Process Reminders for TC Chapter Meetings
  - Standards Document Development Project Period
    - Project period shall not exceed three years (Regulations § 8.3.2).
      - SNARF approval to TC Chapter approval
    - If Document development activity is found to be continuing, but cannot completed within 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. (Regulations § 8.2.1).
      - If the SNARF is submitted at a TC Chapter meeting, the TC Chapter can review and approve, but the SNARF will need to be distributed for two weeks and then approved via GCS.
    - New SNARF & TFOF forms [embedded in Staff Report, see the attachments of these minutes]
    - Procedures for Correcting Nonconforming Titles of Published Standards Document (Procedure Manual 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.
        - None for NA MEMS/NEMS TC Chapter
    - MEMS/NEMS Standards needing Five-Year Review
      - None
    - SNARF 3 Year Status
      - Doc. 5267, New Standard: Specification for Microfluidic Port and Pitch Dimensions
        - Granted 1 year extension in Spring 2015, Granted additional year in Spring 2016
        - Action needed by Spring 2017
        - TC Chapter may grant a one-year extension

- Staff Contact: Laura Nguyen (lnguyen@semi.org)

Attachment: SEMI Standards Staff Report
4 Ballot Review

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

Failed ballots and line items were returned to the originating task forces for re-work and re-ballingot.

NOTE 2: TC Chapter adjudication on ballots reviewed is detailed in the Audits & Reviews (A&R) Subcommittee Forms for procedural review. The A&R forms are available as attachments to these minutes.

None.

5 Subcommittee & Task Force Reports

The following task forces are currently inactive:

- Packaging TF
- Reliability TF
- Terminology TF
- Wafer Bond TF

5.1 Materials Characterization Task Force

Rich Allen reported for the Materials Characterization Task Force. The task force reviewed and discussed SEMI Draft Document 6007 and created a list of questions to take to the MSIG SEMI TF meeting next week to work on developing the document. The objective is find out what type of test patterns they would like to see for the DRIE process.

5.2 MEMS Substrate Task Force

Steve Martell reported for the MEMS Substrate Task Force. Chris Moore began a rough draft document 6018 as a starting point, but there are still questions that still need to be address. Win offered to assist Chris with this activity. The task force reviewed and discussed SEMI Draft Document 6018. The key items were as followed:

- what would be the principle issues addressed in this document
- discussion on whether they want to specify a MEMS Substrate rather than a microtronics substrate
- what are the different properties they are looking for and to narrow down those properties

5.3 Microfluidics Task Force

Mark Tondra reported for the Microfluidics Task Force. Mark reported that the open SNARF 5267 may have some related activity to a ISO/IWA23 (International Workshop Agreement 23) working group. The IWA 23 is a consensus document developed by the workshop participants and observers in response to the need for standardization and harmonization of pitch spacing dimension, initial device classification and terminology of relevance. The chair of this working group invited Mark to participate, is still in its early stage in standards activity, and has not have any document become public known at this time. Mark will have an update of this activity at the Fall meetings.

Action Item: 2016July#01, Laura Nguyen to add discussion of ISO/IWA23 on agenda for Fall meetings.

6 Old Business

Previous action items has been closed. There is no further old business.
7 New Business

7.1 MEMS Survey - Sealed MEMS Devices and Wafer Stacking

A survey was sent out looking to gather information on how to help guide future standards activities. The results that were reported were very low, so the TC Chapter extended the survey through the month of June. Rich Allen presented the results of the bond void survey. Possibly will send out a compilation of the results with feedback and send it to the members of the 3DS-IC, MEMS/NEMS, and MSIG committees.

Attachment: Bond Void Survey Results

Action Item: 2016July#02, Rich to follow up with results for distribution.

7.2 Activity updates between SEMI and the MEMS Industry Group (MSIG)

The MSIG group meets every two weeks via phone. Bettina Weis and Steve Whalley are co-chairs of this group and has about 25 members with about 13 members who remain active. There are discussions overall about Standards and road maps. There was a MSIG-SEMI Workshop at SEMICON West 2016. Steve and Rich attended the MSIG-SEMI Workshop. There was about 50-70 attendees. Overall, key items are as follows:

- Main topics: software communications, computing and storage, sensors, and security
- Panel discussions showed interest in Standards; Steve invited them to the Standard meetings, however no one new attended
- Break out groups: addressed communication issues; possibly put up a list of Standards that are published with scope to distribute
- Hope to invite some of members to attend in the future

Action Item: 2016July#03, Laura to request a digital copy of member list from Bettina

8 Next Meeting and Adjournment

The next meeting is scheduled for Monday, November 7, 2016 at the NA Standards Fall 2016 Standards Meetings at SEMI Headquarters. See http://www.semi.org/en/events for the current list of meeting schedules.

The tentative schedule is provided below:

Monday, November 7 (Tentative)
- Microfluidics Task Force (None)
- Material Characterization Task Force (13:30 – 14:30)
- MEMS Substrate Task Force (14:30 – 15:30)
- MEMS/NEMS TC Chapter (15:30 – 17:30)

Action Item: 2016July#04, Laura to add to new business on agenda for Fall Meetings of whether MEMS/NEMS Spring meetings will be help elsewhere (MSIG Technical Conference).

Having no further business, a motion was made to adjourn. Adjournment was at 16:10.

Respectfully submitted by:
Laura Nguyen
SEMI International Standards Coordinator
Phone: +1.408.943.7019
Email: lnguyen@semi.org
Minutes approved by:

<table>
<thead>
<tr>
<th>Name</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Win Baylies (BayTech-Resor), Co-chair</td>
<td>November 7, 2016</td>
</tr>
<tr>
<td>Steve Martell (Sonoscan), Co-chair</td>
<td>November 7, 2016</td>
</tr>
</tbody>
</table>

Table 8 Index of Available Attachments*1

<table>
<thead>
<tr>
<th>Title</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>SEMI Standards Required Meeting Elements</td>
<td>Bond Void Survey Results</td>
</tr>
<tr>
<td>[2016Spring] NA MEMS NEMS Minutes DRAFT</td>
<td></td>
</tr>
<tr>
<td>Staff Report June 2016 (MEMSNEMS)</td>
<td></td>
</tr>
</tbody>
</table>

*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 Laura Nguyen at the contact information above.