TC Chapter Announcements
Next TC Chapter Meeting
July 9, 2018, 9:00 – 10:00
San Francisco, CA

General Announcement - Spring 2018 NA HB-LED TC Meeting
SEMI Staff member assumed the duties of presiding co-chair for the duration of the TC meeting to facilitate motions.

Table 1 Meeting Attendees
*Italicics* indicate virtual participants

<table>
<thead>
<tr>
<th>Company</th>
<th>Last</th>
<th>First</th>
</tr>
</thead>
<tbody>
<tr>
<td>Innovation for X</td>
<td>Kim</td>
<td>Andrew</td>
</tr>
<tr>
<td>Nordson Sonoscan</td>
<td>Martell</td>
<td>Steve</td>
</tr>
<tr>
<td>SEMI</td>
<td>Amano</td>
<td>James</td>
</tr>
<tr>
<td>Skvortsova</td>
<td>Inna</td>
<td></td>
</tr>
</tbody>
</table>

Table 2 Leadership Changes

<table>
<thead>
<tr>
<th>WG/TF/SC/TC Name</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 Committee Structure Changes

<table>
<thead>
<tr>
<th>Previous WG/TF/SC Name</th>
<th>New WG/TF/SC Name or Status Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td></td>
</tr>
</tbody>
</table>

Table 4 Ballot Results

<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>

Note 1: **Passed** ballots and line items will be submitted to the ISC Audit & Review Subcommittee for procedural review.
Note 2: **Failed** ballots and line items were returned to the originating task forces for re-work and re-balloting or abandoning.
Table 5 Activities Approved by the GCS Prior to the Originating TC Chapter meeting

<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>

Table 6 Authorized Activities

Listing of all revised or new SNARF(s) approved by the Originating TC Chapter.

<table>
<thead>
<tr>
<th>#</th>
<th>Type</th>
<th>SC/TF/WG</th>
<th>Details</th>
</tr>
</thead>
</table>
| TBD | SNARF | n/a      | Reapproval to SEMI HB2-0613, Specification for 150 mm Open Plastic and Metal Wafer Cassettes Intended for Use for Manufacturing HB-LED Devices  
New SNARF approved by TC |

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

Table 7 Authorized Ballots

<table>
<thead>
<tr>
<th>#</th>
<th>When</th>
<th>TF</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>TBD</td>
<td>Cycle 4 or 5-2018</td>
<td>n/a</td>
<td>Reapproval to SEMI HB2-0613, Specification for 150 mm Open Plastic and Metal Wafer Cassettes Intended for Use for Manufacturing HB-LED Devices</td>
</tr>
</tbody>
</table>

Table 8 SNARF(s) Granted a One-Year Extension

<table>
<thead>
<tr>
<th>#</th>
<th>TF</th>
<th>Title</th>
<th>Expiration Date</th>
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</thead>
<tbody>
<tr>
<td>None</td>
<td></td>
<td></td>
<td></td>
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</table>

Table 9 SNARF(s) Abolished

<table>
<thead>
<tr>
<th>#</th>
<th>TF</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 10 Standard(s) to Receive Inactive Status

<table>
<thead>
<tr>
<th>Standard Designation</th>
<th>Title</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 11 New Action Items

<table>
<thead>
<tr>
<th>Item #</th>
<th>Assigned to</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>2018Apr#1</td>
<td>(SEMI staff)</td>
<td>Arrange SEMIViews access for Andrew K. for SEMI HB2 and HB4 standards</td>
</tr>
<tr>
<td>2018Apr#2</td>
<td>(SEMI staff)</td>
<td>To contact Brian Rubow (Cimetrix) for support of upcoming activities within NA HB-LED Equipment Communication Interface TF as well as standards development within China TC.</td>
</tr>
<tr>
<td>2018Apr#3</td>
<td>(SEMI staff)</td>
<td>To contact Iain Black (Philips Lumileds) for support of upcoming activities within NA HB-LED TC or official withdrawal from TC leadership team by SEMICON West</td>
</tr>
<tr>
<td>2018Apr#4</td>
<td>(SEMI staff)</td>
<td>To contact Paul Reid (Kulicke &amp; Soffa) for support of HB-LED Assembly TF or to authorize TF inactive status at SEMICON West</td>
</tr>
<tr>
<td>2018Apr#5</td>
<td>(SEMI staff)</td>
<td>To contact Mike Feng for re-engagement in NA HB-LED co-Chair role.</td>
</tr>
<tr>
<td>2018Apr#6</td>
<td>(Andrew Kim)</td>
<td>To reach out to relevant companies in NA to support standardization effort for HB-LED Equipment Communication Interface TF in NA and China regions.</td>
</tr>
</tbody>
</table>
Table 11 New Action Items

<table>
<thead>
<tr>
<th>Item #</th>
<th>Assigned to</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>2018Apr#7</td>
<td>(SEMI staff)</td>
<td>Forward to Andrew K. results of HB-LED ballots recently submitted by China Chapter in preparation for ballots adjudication.</td>
</tr>
<tr>
<td>2018Apr#8</td>
<td>(SEMI staff)</td>
<td>Issue SNARF for Reapproval of SEMI HB2 due for 5 year review</td>
</tr>
<tr>
<td>2018Apr#4</td>
<td>(SEMI staff)</td>
<td>Get recommendation from HB-LED China Chapter on scope of 5 year revision for SEMI HB4.</td>
</tr>
</tbody>
</table>

Table 12 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></td>
</tr>
</tbody>
</table>

1 Welcome, Reminders, and Introductions

Cochair Andrew Kim called the meeting to order at 10:30 AM.

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 by Inna Skvortsova (SEMI).

Attachment 01: SEMI Standards Required Elements.ppt

2 Review of Previous Meeting Minutes

The TC Chapter reviewed and approved the minutes of the previous SEMICON West 2017 Standards meeting.

Motion: To approve minutes as written.

By / 2nd: Andrew Kim (InnovationforX) / Steve Martell (Nordson Sonoscan)

Discussion: None

Vote: 2-0 in favor. Motion passed.

Attachment 02: NA HB-LED TC Meeting Minutes (SEMICON 2017).pdf

3 SEMI Standards Staff Report

Inna Skvortsova (SEMI) gave the SEMI Staff Report. Of note:

SEMI Global 2018 Calendar of Events

- SEMICON China (March 14-16, 2018, Shanghai, China)
- SEMICON Southeast Asia (May 9-10, 2018, Kuala Lumpur, Malaysia)
- SEMICON West (July 10-12, 2018, San Francisco, California)
- SEMICON Taiwan (September 5-7, 2018, Taipei, Taiwan)
- SEMICON Europa (November 13-16, 2018, Munich, Germany)
- SEMICON Japan (December 12-14, 2017, Tokyo, Japan)

Upcoming North America Meetings 2017

- SEMICON West 2018 Meetings (July 9-12, 2018, San Francisco, California)
- NA Standards Fall 2018 Meetings (November 5-8, 2018 <tentative>, SEMI HQ, Milpitas, California)
NA Standards Spring 2019 Meetings (April 1-4, 2019 <tentative>, SEMI HQ, Milpitas, California)

Letter Ballot Critical Dates for NA Standards Spring 2017 meetings

- Cycle 3-18: due Mar 9 / Voting Period: Mar 23 – Apr 23
- Cycle 4-18: due Apr 20 / Voting Period: Apr 30 – May 30
- Cycle 6-18: due July 20 / Voting Period: Aug 1 – Aug 31
- Cycle 7-18: due Aug 22 / Voting Period: Sep 5 – Oct 5


- SEMI Standards Publications

<table>
<thead>
<tr>
<th>Cycle</th>
<th>New</th>
<th>Revised</th>
<th>Reapproved</th>
<th>Withdrawn</th>
</tr>
</thead>
<tbody>
<tr>
<td>November 2017</td>
<td>0</td>
<td>4</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>December 2017</td>
<td>1</td>
<td>6</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>January 2018</td>
<td>0</td>
<td>6</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>February 2018</td>
<td>1</td>
<td>7</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>March 2018</td>
<td>5</td>
<td>10</td>
<td>22</td>
<td>0</td>
</tr>
</tbody>
</table>

Total SEMI Standards in portfolio: 985. Includes 225 Inactive Standards

<table>
<thead>
<tr>
<th>Cycle</th>
<th>Designation</th>
<th>Title</th>
<th>Committee</th>
<th>Region</th>
</tr>
</thead>
<tbody>
<tr>
<td>December 2017</td>
<td>SEMI 3D17</td>
<td>Specification for Reference Material for Bonded Wafer Stack Void Metrology</td>
<td>3D-IC</td>
<td>NA</td>
</tr>
<tr>
<td>February 2018</td>
<td>SEMI PV80</td>
<td>Specification of Indoor Lighting Simulator Requirements for Emerging Photovoltaic</td>
<td>Photovoltaic</td>
<td>CH</td>
</tr>
<tr>
<td>March 2018</td>
<td>SEMI PV81</td>
<td>Guide for Specifying Low Pressure Horizontal Diffusion Furnace</td>
<td>Photovoltaic</td>
<td>CH</td>
</tr>
</tbody>
</table>
### SNARF(s) and TFOF(s) Approved by GCS in between TC Chapter Meetings
- NONE

### SNARF Three-year status—TC Chapter may grant a one-year extension:
- NONE

### Nonconforming Titles
- NONE

NOTE: For nonconforming title please refer to Procedure Manual (PM) Appendix Table A4-1 and A4-2.

### Intercommittee Ballots
- NONE

### Documents due for Five-Year Review

<table>
<thead>
<tr>
<th>Name</th>
<th>Due for Review</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>SEMI HB2-0613</td>
<td>6/21/2018</td>
<td>Specification for Serial Alphanumeric Marking of the Front Surface of Wafers</td>
</tr>
<tr>
<td>SEMI HB4-0913</td>
<td>9/27/2018</td>
<td>Specification for Alphanumeric Marking of Silicon Wafers</td>
</tr>
</tbody>
</table>

Attachment 03: SEMI Staff Report HB-LED TC (April 2018).ppt

### 4 Liaison Reports

4.1 HB-LED Korea Working Group

Report presented by Inna Skvortsova (SEMI). Of note:

- Meeting Information
  - Last meeting: February 7, 2017 in conjunction with SEMICON Korea
  - Next meeting: TBD

- HB-LED Wafer Team
  - As HB1 Revision activity is completed, the team decided to be disbanded.
• HB-LED Source Material Task Force
  – TF requests NA HB-LED TC Chapter for Paul Ahn’s resignation of TF co-leader.
  – The TF amended 5 drafts and ask ballot authorization for cycle 7, 2017 to NA HB-LED TC Chapter.
    o •5984 (Guide for BiscyclopentadienylMagnesium(Cp2Mg) for HB-LED Manufacturing)
    o •5985 (Guide for Triethylgallium(TEGa) for HB-LED Manufacturing)
    o •5986 (Guide for Trimethylaluminum(TMAI) for HB-LED Manufacturing)
    o •5987 (Guide for Trimethylgallium(TMGa) for HB-LED Manufacturing)
    o •5988 (Guide for Triethylgallium(TEGa) for HB-LED Manufacturing)

Attachment 04: KR HB-LED Liaison (July 2017).ppt

4.4 HB LED China Liaison Report
Report presented by Inna Skvortsova (SEMI). Of note:
• Meeting Information
  o Last Meeting:
    ▪ China Standards Winter Meeting 2017, Shanghai, China, Thursday, December 28, 2017
  o Next meeting:
    ▪ China Standards Spring Meeting 2018, Quanzhou, Fujian, China, Wednesday, April 18, 2018
• Single Crystal Sapphire Task Force
  o Charter:
    ▪ Draft the standards on specifications for single crystal sapphire intended for use for manufacturing HB-LED wafers.
  o Working on:
      • Fail Ballot Cycle 8-2017 Review, rework and reballot in Cycle 2-2018
    ▪ Doc. 5946, New Standard: Test Method for Grain Boundary of Single Crystal Sapphire by Optical Homogeneity Technique (OHT)
    ▪ Doc. 5629, New Standard: Guide for Identification Defects on Bare Surfaces of Sapphire Wafers
• Sapphire Single Crystal Ingot Task Force
  o Charter:
    ▪ Define the key parameters of LED sapphire ingot, including dimension, orientation of the end face and flat, surface quality, bulk defects, etc.
    ▪ Formulate the inspection methods of the key parameters for LED sapphire ingot.
    ▪ Formulate and establish inspection standards of the key parameters for LED sapphire ingot.
  o Working on:
Fail Ballot Cycle 8-2017 Review, rework and reballot in Cycle 2-2018

- GaN based LED Epitaxial Wafer Task Force
  - Charter:
    - This Task Force is chartered to develop test methods and specifications for GaN based HB-LED epitaxial wafer in order to increase the production efficiency.
  - Working on:
      - Passed Ballot Cycle 8-2017 review with technical changes, a ratification ballot will be issued.

- Sapphire Single Crystal Orientation Task Force
  - Charter:
    - Develop the standards and measurement methods for the determination of orientations of sapphire single crystal products to enhance the consistency in measurement data and to provide the solutions for increasing measurement precision as well.
  - Working on:
      - Published as SEMI HB8-0217

- Patterned Sapphire Substrate TF
  - Working on:
    - New Standard: Specification for Dry Etching Patterned Sapphire Substrate (DPSS)
    - Plan for another SNARF on HB-LED China TC Chapter Spring meeting 2018:
      - New Standard/Test Method Standard for The Uniformity of Patterns on Dry etching Patterned Sapphire Substrate (DPSS)

- Contact information: Daniel Qi (fqi@semi.org)/China

5 Ballot Review

NOTE 1: TC Chapter adjudication on ballots reviewed is detailed in the Audits & Review (A&R) Subcommittee Forms for procedural review. The A&R forms are available as attachments to these minutes. The attachment number for each balloted document is provided under each ballot review section below.

No ballots were adjudicated at the meeting.

6 Subcommittee and Task Force Reports

6.1 HB-LED Wafer TF
No report presented by the Task Force

6.2 Patterned Sapphire Substrate (PSS) TF
No no report presented by the Task Force
6.3 HB-LED Source Materials Task Force

No report presented by the Task Force

NOTE: Due to the low volume of activities in NA HB-LED Chapter, the TC co-Chair proposed to combine Patterned Sapphire (PSS) TF and HB-LED Wafer TF under one group.

Action Item: (Inna S.) To contact Brian Rubow (Cimetrix) for support of upcoming activities within NA HB-LED Equipment Communication Interface TF as well as standards development within China TC.

Action Item: (Inna S.) To contact Iain Black (Philips Lumileds) for support of upcoming activities within NA HB-LED TC or official withdrawal from TC leadership team by SEMICON West

Action Item: (Inna S.) To contact Paul Reid (Kulicke & Soffa) for support of HB-LED Assembly TF or to authorize TF inactive status at SEMICON West

Action Item: (Inna S.) To contact Mike Feng for re-engagement in NA HB-LED co-Chair role.

Action Item: (Andrew Kim) To reach out to relevant companies in NA to support standardization effort for HB-LED Equipment Communication Interface TF in NA and China regions.

Action Item: (Inna S.) Forward to Andrew K. results of HB-LED ballots recently submitted by China Chapter in preparation for ballots adjudication.

Action Item: (Inna S.) Issue SNARF for Reapproval of SEMI HB2 due for 5 year review.

7 Old Business

7.1 Standards Due for Five-Year Review.

Inna Skvortsova addressed the TC Chapter on this topic. Of note:

<table>
<thead>
<tr>
<th>Name</th>
<th>Due for Review</th>
<th>Title</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>SEMI HB2-0613</td>
<td>6/21/2018</td>
<td>Specification for 150 mm Open Plastic and Metal Wafer Cassettes Intended for Use for Manufacturing HB-LED Devices</td>
<td>SEMI to issue reapproval SNARF and ballot in Cycle 4-2018</td>
</tr>
<tr>
<td>SEMI HB4-0913</td>
<td>9/27/2018</td>
<td>Specification of Communication Interfaces for High Brightness LED Manufacturing Equipment (HB-LED ECI)</td>
<td>Need feedback from China HBLED TC to define scope (reapproval vs revision) by SEMICON West 2018; If no recommendation from China, reapproval will be authorized at SW meeting.</td>
</tr>
</tbody>
</table>

7.2 SNARFs Approaching Three-Year Review

The TC Chapter reviewed the SNARFs approaching the three-year document development period.

- No SNARFs needed extension.
8 New Business
8.1 New TFOFs and SNARFs

- No new TFOFs approval during the meeting;
- New SNARF approval for Reapproval of SEMI HB2-0613

Motion: To approve SNARF for reapproval of SEMI HB2-0613
By / 2nd: Andrew Kim (InnovationforX) / Steve Martell (Nordson Sonoscan)
Discussion: None
Vote: 2-0 in favor. Motion passed.

8.2 New Ballots Authorized

- Ballot for Reapproval of SEMI HB2-0613, Specification for 150 mm Open Plastic and Metal Wafer Cassettes Intended for Use for Manufacturing HB-LED Devices is authorized for submission in Cycle 4-2018 or 5-2018.

Motion: To authorize ballot submission for Cycle 4/5 2018 for Reapproval of SEMI HB2-0613.
By / 2nd: Andrew Kim (InnovationforX) / Steve Martell (Nordson Sonoscan)
Discussion: None
Vote: 2-0 in favor. Motion passed.

9 Action Items Review
9.1 Previous Meeting(s) Action Items

None

9.2 New Action Items

Inna Skvortsova (SEMI) reviewed the new action items. These can be found in the New Action Items table at the beginning of these minutes.

10 Next Meeting and Adjournment

The next meeting is scheduled for July 09, 2018 at SEMI HQ, CA. See http://www.semi.org/en/events for the current list of meeting schedules.

Having no further business, a motion was made to adjourn. Adjournment was at 10:54AM.

Meeting Minutes respectfully submitted by:
Inna Skvortsova
Sr. Standards Coordinator
SEMI North America
Phone: 408-943-6996
Email: iskvortsova@semi.org
Minutes tentatively approved by:
Andrew Kim (InnovationforX), Cochair

### Table 13 Index of Available Attachments#1

<table>
<thead>
<tr>
<th>Attachment</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>SEMI Standards Required Meeting Elements.ppt</td>
</tr>
<tr>
<td>02</td>
<td>NA HB-LED TC Meeting Minutes (SEMICON West 2017).pdf</td>
</tr>
<tr>
<td>03</td>
<td>SEMI Standards Staff Report HB-LED TC (April 2018).ppt</td>
</tr>
<tr>
<td>04</td>
<td>HB-LED Korea Liaison (April 2018)</td>
</tr>
<tr>
<td>05</td>
<td>HB-LED China TC Liaison (April 2018)</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 Inna Skvortsova at the contact information above.