HB-LED Committee China TC Chapter

Meeting Summary and Minutes

China Spring Standards Meeting 2018

Wednesday, April 18, 2018, 13:30-17:30

NanXing Building 3F, Kylin Ball Room, Quanzhou Hotel
No. 22, Zhuangfu Lane, Licheng District, 362000 Quanzhou, China

TC Chapter Announcements

Next TC Chapter Meeting

Wednesday, October 24th, 2018

Nanchang, Jiangxi, China

Table 1 Meeting Attendees

*Italic* indicates virtual participants

<table>
<thead>
<tr>
<th>Company</th>
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<td>Xu</td>
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<td>AURORA</td>
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<td>Zhen</td>
<td>TDG</td>
<td>Wenliang</td>
<td>Xu</td>
</tr>
</tbody>
</table>
Table 1 Meeting Attendees

*Italicics* indicate virtual participants

**Co-Chairs:** Yong Ji (GHTOT)

**SEMI Staff:** Daniel Qi – SEMI China, Sophia Huang – SEMI China, Emma Liu – SEMI China, Candy Zhang – SEMI China, Ein Wu – SEMI China

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<thead>
<tr>
<th>Company</th>
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<tr>
<td>DDXDF</td>
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<td>Zhen</td>
<td>HC SEMITEK</td>
<td>Jiangbo</td>
<td>Wang</td>
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<td>Advanced Team</td>
<td>Nengbo</td>
<td>Shi</td>
<td>HC SEMITEK</td>
<td>Zhihao</td>
<td>Wu</td>
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<td>Zhaohui</td>
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Table 2 Leadership Changes

<table>
<thead>
<tr>
<th>WG/TF/SC/TC Name</th>
<th>Previous Leader</th>
<th>New Leader</th>
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<tbody>
<tr>
<td>None</td>
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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>
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</thead>
<tbody>
<tr>
<td>None</td>
<td>HB-LED Equipment Communication Interface TF (new)</td>
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</table>

Table 4 Ballot Results

<table>
<thead>
<tr>
<th>Document #</th>
<th>Document Title</th>
<th>Committee Action</th>
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<tbody>
<tr>
<td>5723C</td>
<td>New Standard: Specification for Single Crystal Sapphire Intended for Use for Manufacturing HB-LED Wafers Discussion</td>
<td>Passed, with technical changes; Ratification Ballot to be issued</td>
</tr>
<tr>
<td>5775C</td>
<td>New Standard: Specification for Sapphire Single Crystal Ingot Intended for Use for Manufacturing HB-LED Wafers Discussion</td>
<td>Failed and reballot in cycle 4 or 5-2018</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>
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<tbody>
<tr>
<td>None</td>
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Table 6 Authorized Activities

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

<table>
<thead>
<tr>
<th>#</th>
<th>SC/TF/WG</th>
<th>Details</th>
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### Table 7 Authorized Ballots

<table>
<thead>
<tr>
<th>#</th>
<th>When</th>
<th>TF</th>
<th>Details</th>
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<tbody>
<tr>
<td>6192</td>
<td>Cycle 4 or 5-2018</td>
<td>Patterned Sapphire Substrate Task Force</td>
<td>New Standard: Specification for Dry Etching Patterned Sapphire Substrate (DPSS)</td>
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</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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<tbody>
<tr>
<td>5629</td>
<td>Single Crystal Sapphire Task Force</td>
<td>New Standard: Guide for Identification Defects on Bare Surfaces of Sapphire Wafers</td>
<td>2019/7/11</td>
</tr>
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</table>

### Table 9 SNARF(s) Abolished

<table>
<thead>
<tr>
<th>#</th>
<th>TF</th>
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<tbody>
<tr>
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### Table 10 Standard(s) to receive Inactive Status

<table>
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<th>Standard Designation</th>
<th>Title</th>
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### Table 11 New Action Items

<table>
<thead>
<tr>
<th>Item #</th>
<th>Assigned to</th>
<th>Details</th>
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</thead>
<tbody>
<tr>
<td>China HBLED-0418-01</td>
<td>Ruting Zhen (DDXDF)</td>
<td>Sapphire Single Crystal Orientation Task Force go to inactive status, motion by Ruting Zhen (DDXDF), Second by Yang Gan, No discussion, vote 25 passed</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>ChinaHBLED-0416-01</td>
<td>Hongbo Zuo from Aurora</td>
<td>Take over the SNARF # 5629, New Standard: Guide for Identification of Features on the Surface of Sapphire Wafers from NA, to complete the standard. <strong>ONGOING</strong></td>
</tr>
<tr>
<td>ChinaHBLED-0416-02</td>
<td>Jiangbo Wang from HC SEMITEK</td>
<td>Take over the SNARF # 5776, New Standard: Test Method for Detecting Surface Defects of GaN based LED Epitaxial Wafer Used for Manufacturing HB-LED, since the previous author was left from THTF. <strong>Go to A&amp;R</strong></td>
</tr>
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</table>

1 Welcome, Reminders, and Introductions

Daniel Qi (SEMI) called the meeting to order at 13:30. Committee co-chair Yong Ji chaired the meeting and welcomed all attendees. Attendees introduced themselves. The meeting reminders on antitrust issues, intellectual property issues and holding meetings with international attendance were reviewed.

Agenda was reviewed.

**Attachment:** 1 Chinese SEMI Standard Meeting Reminders rev1,

2 Review of Previous Meeting Minutes

The TC Chapter reviewed the minutes of the previous meeting.

**Motion:** To approve the minutes of the previous meeting as written
**By / 2nd:** Aris Ma (AK Optics)/Jianzhe Liu (ECBO)

**Discussion:** None

**Vote:** 30 in favor and 0 opposed (Total 30 companies.) Motion Passed.

**Attachment:** 2 China HB-LED TC Meeting Minutes 20171228

3 Liaison Reports

3.1 **HB-LED Committee North America TC Chapter**

Sophia Huang (SEMI) reported for the HB-LED North America TC Chapter. Of note:

- Next meeting - SEMI Standards NA Summer Meetings 2018 in conjunction with SEMICON West- Monday, July 9, Marriot Marquis Hotel in San Francisco, CA
- The co-chairs of North America HB-LED TC are Andrew Kim (InnovationforX), Chris Moore (BayTech-Resor), Iain Black (Philips Lumileds), and Mike Feng (Silian).
- There are four active task forces and four inactive task forces under the TC.
- NA TC HB-LED Chapter
  - TC reviewed ballots results for Cycle 2-2018 submitted by China HB-LED TC
  - Detailed feedback for Doc 5723C, 5775C, R5776A will be provided from NA TC co-chairs to the regional Chapter TF leadership
- HB-LED Patterned Sapphire Substrate (PSS) TF
  - No activity update
  - Plan to combine this TF with HB-LED Wafer TF
- PSS and Wafer TF are looking for new members
- HB-LED Equipment Communication Interfaces TF <inactive>
  - No meeting during Spring 2018 Standards Meetings
  - TF leader provides ongoing technical support to regional Chapters upon request
  - TF plans to resume activities at SEMICON West to support HB-LED China TC activities focused on equipment communication interfaces.
- Five-Year Review
  - SEMI HB2-0613, Specification for 150 mm Open Plastic and Metal Wafer Cassettes Intended for Use for Manufacturing HB-LED Devices
    - Voting in cycle 4 or 5 - 2018
  - SEMI HB4-0913, Specification of Communication Interfaces for High Brightness LED Manufacturing Equipment (HB-LED ECI)
    - Action by 9/27/2018, to be discussed on July 9 Standards meeting

**Attachment:** 3 NA HB-LED Liaison Report April 2018 v1

### 3.2 HB-LED Committee Korea Working Group

Sophia Huang (SEMI) reported for the HB-LED Korea Working Group. Of note:

Next meeting – TBD

- The leader of the Korea HB-LED working group are HyeongSoo Park (SEMES) and Jong Hyeob Baek (KOPTI)
- 2 teams under the working group
  - Source Materials TF
    - 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.
      - 5984 (Guide for Biscyclopentadienylmagnesium (Cp2Mg) for HB-LED Manufacturing)
      - 5985 (Guide for Triethylgallium (TEGa) for HB-LED Manufacturing)
      - 5986 (Guide for Trimethylaluminum (TMAI) for HB-LED Manufacturing)
      - 5987 (Guide for Trimethylgallium (TMGa) for HB-LED Manufacturing)
      - 5988 (Guide for Triethylgallium (TEGa) for HB-LED Manufacturing)
  - HB-LED Wafer Team
    - As HB1 Revision activity is completed, the team decided to be disbanded.

**Attachment:** 4 KR_HB-LED_liaison_July,

### 3.3 SEMI Staff Report

Sophia Huang (SEMI) gave the SEMI Staff Report. Of note:

- SEMI Standards Overview
- SEMI Global 2018 Calendar of Events
- Global Standards Meeting Schedule
- 2018 Critical Dates for SEMI Standards Ballots
4 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.


Motion: Ratification Ballot don’t need motion
By / 2nd: Zhihao Wu (HC SEMITEK) reported R5776A ballot result, no motion needed.
Discussion: None
Vote: None. Ratification Ballot don’t need to vote

Attachment: 6 R5776A Ratification Ballot Report


Motion: Liuyun Qi (GHTOT) moved that this document passed with technical changes; Ratification Ballot to be issued in cycle 4 or 5-2018.
By / 2nd: Aris Ma (AK Optics)
Discussion: None
Vote: 28 in favor and 0 opposed (Total 30 companies.) Motion Passed.

Attachment: 7 5723C Ballot report


Motion: Zhehua Yan (AURORA) moved that this document failed and reballot in cycle 4 or 5-2018.
By / 2nd: Yang Gan (HIT)
Discussion:
1. Hongjian Chen (HBU): The hard force should be mentioned in the report of the crystal rod. The important defect in the crystal bar is the small angle grain boundary. Hard force is very important in backend epitaxy.
2. Kai Kang (Sinopatt): What do you mean by hard force material? Kai Kang (Sinopatt) asked Hongjian Chen (HBU)’s question. Hard force material is very important to the application of the product.
3. Xinhong Yang (AURORA): Can the content of hard force material be supplemented later?
4. Jianzhe Liu (ECBO): For extension, is there any way to see the vacuum coefficient of the film when we are most concerned about it? Questions to Aris Ma (AK Optics)

Vote: 22 in favor and 0 opposed (Total 30 companies.) Motion Passed.
5 Subcommittee and Task Force Reports

5.1 Single Crystal Sapphire Task Force
Liuyun Qi (GHTOT) reported for the Single Crystal Sapphire Task Force. This report contained information on:
- Introduced the task force’s leaders and members
- Working on
    Authorized to ballot in Cycle 4 or 5-2018
  - Doc 5946, New Standard: Test Method for Grain Boundary of Single Crystal Sapphire by Optical Homogeneity Technique (OHT)
    TC Chapter authorized
  - Doc 5629, New Standard: Guide for Identification Defects on Bare Surfaces of Sapphire Wafers
    TC Chapter authorized

5.2 Sapphire Single Crystal Ingot Task Force
Zhehua Yan (AURORA) reported for the Sapphire Single Crystal Ingot Task Force. This report contained information on:
- Introduced the task force’s leaders and members
- Working on
    Authorized to ballot in Cycle 4 or 5 - 2018
Attachment: 9 4.18 Sapphire Single Crystal Ingot TF Report

5.3 GaN based LED Epitaxial Wafer Task Force
Jiangbo Wang (HC SEMITEK) reported for GaN based LED Epitaxial Wafer Task Force. This report contained information on:
- Introduced the task force’s leaders and members
- Working on
    Pending A&R
Attachment: 10 GaN based LED Epitaxial Wafer Task Force-20180411

5.4 Sapphire Single Crystal Orientation Task Force
Ruting Zhen (DDXDF) reported for Sapphire Single Crystal Orientation Task Force. This report contained information on:
- Introduced the task force’s leaders and members
• Working on: None
• Published: SEMI HB8-0217 Test Method for Determining Orientation of a Sapphire Single Crystal
• Sapphire Single Crystal Orientation Task Force go to inactive status, motion by Ruting Zhen (DDXDF), Second by Yang Gan, No discussion, vote 25 (total voting interest 30), motion passed.

Attachment: 11 Sapphire Single Crystal Orientation TF Report

5.5 Pattern Sapphire Substrate Task Force
Jianzhe Liu (ECBO) reported for Pattern Sapphire Substrate Task Force. This report contained information on:
• Introduced the task force’s leaders and members
• Working on:
  ➢ Doc 6192, New Standard: Specification for Dry Etching Patterned Sapphire Substrate (DPSS)
    Authorized to ballot in Cycle 4 or 5 - 2018
  ➢ New Standard: Test Method for Determining Geometrical Parameters of Patterns on Patterned Sapphire Substrate
    TC Chapter authorized

Attachment: 12 SEMI HB-LED PSS Task Force Report 20180418

6 Old Business
6.1 Refer to Table 12 Previous Meeting Action Items

7 New Business
7.1 New SNARFs & TFOFs
• SNARF – New Standard: Specification of Susceptors for HB-LED MOCVD Equipment Communication Interface

Motion: Edward Lee move to approve the SNARF.
By / 2nd: Jianzhe Liu (ECBO)
Discussion:
2. Yang Gan (HIT): SEMI already has published SEMI HB4, which is a Equipment Communication Interface related standard. Please take this into consideration.
3. Jiangbo Wang (HC SEMITEK): SNARF title and scope hasn’t mentioned MOCVD. Please take this into consideration.

Vote: 25 in favor and 0 opposed (Total 30 companies.) Motion Passed.

• TFOF - HB-LED Equipment Communication Interface Task Force

Motion: Edward Lee move to approve the NEW TF
By / 2nd: Kai Kang (Sinopatt)/Phil Wu (SZMTC)
Discussion:
1. Edward Lee (AMEC): We need to consider the key processing method in MOCVD, aiming at Fab manufacturing of LED.
2. Jiangbo Wang (HC SEMITEK): The task force is not only limited to a MOCVD device, but we also need to consider other devices together.
3. Phil Wu (SZMTC): 1) For users, regardless of whether the standard is developed in SEMI, we hope that MOCVD device providers can open the device interface to users. In the future automation process, data access and retrieval need interface service. 2) Epitaxy and chip automation standards can be done separately.
4. Chunhui Yan (Invenlux): Instead of simply changing the standard of the epitaxial communication equipment, firstly, we need to develop and change standard. Secondly, the test equipment around the epitaxy equipment needs to be changed. The mono LED wafer will also move to 8 inches and 12 inches, though it will become more complicated, but this change is needed.

Vote: 22 in favor and 0 opposed (Total 30 companies.) **Motion Passed.**

SNARF - New Standard: Test Method for Determining Geometrical Parameters of Patterns on Patterned Sapphire Substrate

**Motion:** Jianzhe Liu (ECBO) move to approve the SNARF.
**By / 2nd:** Yang Gan (HIT)
**Discussion:**
1. Hongjian Chen (HBUT): Please pay attention to the wording of dislocation and defects in PPT Slides.
2. Kai Kang (Sinopatt): Regarding reflectivity, we should consider parameters to give room for technology in the future.
3. Aris Ma (AK Optics): 1) For my comments on reflectivity, unimap, which is represented by South Korea, they use sampling by sampling. The biggest problem here is standard division. The measuring point of Unimap is about 60-70 points. We are now measuring with pixels. 2) PSS itself has Pattern, so it needs to measure reflectivity. However, semiconductors industry rarely measure reflectivity.
4. Mingde Wei (GAPSSOE): I recommend to include above two test methods mentioned by Aris Ma (AK Optics).
5. Jianzhe Liu (ECBO): Now we use line scan or a point scan.

Vote: 22 in favor and 0 opposed (Total 30 companies.) **Motion Passed.**

7.2 Requests for ballots in cycle 4 or 5-2018


  **Motion:** To approve the Doc R5723C for ratification ballot in cycle 4 or 5-2018
  **By / 2nd:** Aris Ma (AK Optics)
  **Discussion:** None

  Vote: 21 in favor and 0 opposed (Total 30 companies.) **Motion Passed.**


  **Motion:** To approve the Doc 5775D for letter ballot in cycle 4 or 5-2018
  **By / 2nd:** Yang Gan (HIT)
  **Discussion:** None

  Vote: 22 in favor and 0 opposed (Total 30 companies.) **Motion Passed.**

- **Doc 6192, New Standard: Specification for Dry Etching Patterned Sapphire Substrate (DPSS)**

  **Motion:** To approve the Doc 6192 for letter ballot in cycle 4 or 5-2018
  **By / 2nd:** Jianzhe Liu (ECBO)
  **Discussion:**
  1. Kai Kang (Sinopatt): 1) 6.1 data pictures and the above units need to be noticed. The units in the picture are not the same. 2) Data is now based on mainstream data, but not all data. 3) The scope of the dry PSS is limited too small. 20% of the market may not be in that area. 4) The data range of 6.2 pattern height needs to be
considered. Will it reach 1.95? 2 in the future? There is a product usage of over 20% in the market, but the scope is not within your standard.

2. Jiangbo Wang (HC SEMITEK): The center value can be defined in this way, but tolerance needs to be modified. Define a range, but do not define specific values. The STD value can be defined with a limitation value. Tolerance and STD can be defined.

**Vote:** 21 in favor and 0 opposed (Total 30 companies.) **Motion Passed.**

### 8 Next Meeting and Adjournment

The next meeting is scheduled for Wednesday, October 24, 2018, Nanchang, Jiangxi, China. See [http://www.semi.org/en/events](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 17:30.

Respectfully submitted by:

Sophia

Standards Specialist

SEMI China

Phone: 86-21-60278553

Email: shuang@semi.org

Minutes tentatively approved by:

<table>
<thead>
<tr>
<th>Yong Ji (GHTOT), Co-chair</th>
<th>2018/4/23</th>
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<tbody>
<tr>
<td>Weizhi Cai (SANAN), Co-chair</td>
<td>&lt;Date approved&gt;</td>
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### Table 13 Index of Available Attachments

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<td>2 China HB-LED TC Meeting Minutes 20171228</td>
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<tr>
<td>3 NA HB-LED Liaison Report April 2018 v1</td>
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<td>4 KR HB-LED liaison July</td>
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<tr>
<td>5 SEMI Staff Report 20180418 v2</td>
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<td>6 R5776A Ratification Ballot Report</td>
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<td>7 5723C Ballot report</td>
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<td>8 SEMI HB-LED Single Crystal Sapphire Task Force Report-2018-4-18</td>
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<td>9 4.18 Sapphire Single Crystal Ingot TF Report</td>
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<td>10 GaN based LED Epitaxial Wafer Task Force-20180411</td>
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<td>12 SEMI HB-LED PSS Task Force Report 20180418</td>
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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 [SEMI Staff Name] at the contact information above.