



HB-LED North America TC Chapter Meeting Summary and Minutes

NA Standards Fall 2016 Meetings
Thursday, November 10, 2016, 10:30 – 12:00
SEMI Headquarters in San Jose, California

TC Chapter Announcements

Next TC Chapter Meeting

NA Standards Spring 2017 Meetings
Thursday, April 6, 2017, 10:30 – 12:00
SEMI Headquarters in Milpitas, California

Table 1 Meeting Attendees

Italics indicate virtual participants

Co-Chairs: Andrew Kim (InnovationforX), Chris Moore (BayTech-Resor), Iain Black (Philips), Mike Feng (Silian)

SEMI Staff: Laura Nguyen

<i>Company</i>	<i>Last</i>	<i>First</i>	<i>Company</i>	<i>Last</i>	<i>First</i>
<i>BayTech-Resor</i>	<i>Baylies</i>	<i>Winthrop</i>	Sonoscan	Martell	Steve
BW & Associates	Wu	Bevan	UOC Co., Ltd.	Park	Seung-Chang
InnovationforX	Kim	Andrew			
<i>Pacific Light Tech</i>	<i>Kurtin</i>	<i>Juanita</i>	SEMI	Amano	James
<i>Peter Wagner Consulting</i>	<i>Wagner</i>	<i>Peter</i>	SEMI	Nguyen	Laura

Table 2 Leadership Changes

<i>WG/TF/SC/TC Name</i>	<i>Previous Leader</i>	<i>New Leader</i>
None.		

Table 3 Committee Structure Changes

<i>Previous WG/TF/SC Name</i>	<i>New WG/TF/SC Name or Status Change</i>
HB-LED Equipment Automation Interfaces Task Force	The Committee has moved this Task Force to Inactive Status.
HB-LED Equipment Communication Interfaces Task Force	The Committee has moved this Task Force to Inactive Status.
Test Methods Task Force	The Committee has moved this Task Force to Inactive Status.

Table 4 Ballot Results

<i>Document #</i>	<i>Document Title</i>	<i>Committee Action</i>
None.		

#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 5 Activities Approved by the GCS prior to the Originating TC Chapter meeting

#	Type	SC/TF/WG	Details
None.			

Table 6 Authorized Activities

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

#	SC/TF/WG	Details
None.		

#1 SNARFs and TFOFs are available for review on the SEMI Web site at:

<http://downloads.semi.org/web/wstdsbal.nsf/TFOFSNARE>

Table 7 Authorized Ballots

#	When	TF	Details
None.			

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

#	TF	Title	Expiration Date
None.			

Table 9 SNARF(s) Abolished

#	TF	Title
None.		

Table 10 Standard(s) to receive Inactive Status

Standard Designation	Title
None.	

Table 11 New Action Items

Item #	Assigned to	Details
2016Nov#01	Laura Nguyen	To contact Assembly Task Force leaders if there is any on going activity.
2016Nov#02	Win Baylies	To contact John Ciraldo (Rubicon) regarding PSS activity.
2016Nov#03	Andrew Kim	To send Laura contacts of possible participants for the Wafer Task Force to join.
2016Nov#04	Laura Nguyen	To contact Natalie (SEMI Korea) to find out what support they need to continue their activities. Copy Andrew Kim.
2016Nov#05	Win Baylies	Send files to Peter and Andrew of past Wafer TF activities. Peter to confirm what size wafers.
2016Nov#06	Peter Wagner	To contact Osram regarding the ID marks to the wafers.
2016Nov#07	Steve, Andrew	Following up from New Business discussion, Steve and Andrew to connect to get in contact with equipment makers and R&D teams of various LED companies.
2016Nov#08	Andrew Kim	To contact Lumileds and other phosphor companies.
2016Nov#09	Peter Wagner	To contact Osram and Silicone manufactures.
2016Nov#10	Andrew Kim	To draft email to send out to companies for input. Copy Peter and Laura.
2016Nov#11	Laura Nguyen	To contact Sophia to ask her leaders about possible silicone and phosphor makers. Andrew to send Laura introduction email.

Table 12 Previous Meeting Action Items

<i>Item #</i>	<i>Assigned to</i>	<i>Details</i>
2016July#01	Win Baylies	Talk to someone in China about the Sapphire Wafer Marking experiment. The marked wafers are in Germany, awaiting epi-deposition at Osram. Peter Wagner is in touch with them.
2016July#02	Win Baylies	Review TF goals, results, and figure out next steps for update at Fall meetings. Review at these meetings.
2016July#03	Win Baylies	Provide a summary of where we are with the experiment and send to Laura in the next few weeks. See #05.
2016July#04	Win Baylies	Email Robert (Osram) to see if he will execute the Sapphire Wafer experiment. See #05.
2016July#05	Peter Wagner	Contact Robert (Osram) as well for support. Update: Osram informed me that they have the 5 sapphire wafers of the marking experiment in house. Unfortunately, they do not have any documentation about these wafers and they think now, that it would not be very reasonable to spend more efforts with these wafers. Instead Osram suggests, that they would approach their suppliers and encourage them to work with the HB-LED TC regarding generating a standard for the marking of sapphire wafers.
2016July#06	Andrew, Win, Laura	Contact Julie about PSS/DSP Wafers images/scales to see where she is; let her know where we are and to see if she has any information on where to go from here. TBD: Julie has moved out of the industry. Need to find replacement during Fall meetings.
2016July#07	Win Baylies	Send Andrew any documents and images related to these TFs. Open – will forward Silian images of selected surface characteristics prior to Fall meeting.
2016July#08	Win, Peter	Collect public info/descriptions to create a summary for DSP/PSS Open – discuss at Fall meetings. Wait for response from Rubicon. On going.
2016July#09	Andrew Kim	Produce a slide for a request at event in China for feedback; send to Laura to transfer to SEMI Template and proofing CLOSED.

1 Welcome, Reminders, and Introductions

Andrew Kim called the meeting to order at 10:30. The meeting reminders on antitrust issues, intellectual property issues and holding meetings with international attendance were reviewed. Attendees introduced themselves.

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: Steve Martell (Sonoscan) / Bevan Wu (BW & Associates)

Discussion: None.

Vote: 3-0 in favor. Motion passed.

Attachment: [2016West] NA HB-LED Minutes FINAL

3 Liaison Reports

3.1 China TC Chapter

Laura Nguyen (SEMI) reported for the HB-LED China TC Chapter. The key items were as follows:

- Cochairs: Yong Ji (GHOT), Weizhi Cai (SANAN)
- Org Chart {See attachment for Figure}
- Meeting Information
 - Last meeting: October 14, 2016 – China Standards Fall Meeting 2016 in Dandong, Liaoning, China
 - Next meeting: April 20, 2017 – China Standards Spring Meeting 2016 in Wuhu, Anhui, China
- Single Crystal Sapphire Task Force



- Charter: Draft the standards on specifications for single crystal sapphire intended for use for manufacturing HB-LED wafers.
- Working on:
 - Doc. 5723A, New Standard: Specification for Single Crystal Sapphire Intended for Use for Manufacturing HB- LED Wafers
 - Approved ballot with editorial changes and authorized for A&R Process
 - Doc. 5946, New Standard: Test Method for Grain Boundary of Single Crystal Sapphire by Optical Homogeneity Technique (OHT)
- Sapphire Single Crystal Ingot Task Force
 - 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.
 - Working on:
 - Doc. 5775A, New Standard: Specification for Sapphire Single Crystal Ingot Intended for Use for Manufacturing HB-LED Wafers
 - Approved ballot with editorial changes and authorized for A&R Process
- 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:
 - Doc. 5776, New Standard: Test Method for Detecting Surface Defects of GaN based LED Epitaxial Wafer Used for Manufacturing HB-LED
 - Authorized for ballot in cycle 8-2016
- 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:
 - Doc. 5945, New Standard: Test Method for Determining Orientation of A Sapphire Single Crystal
 - Approved ballot as submitted and authorized for A&R Process
- Staff Contact: Sophia Huang (shuang@semi.org), Daniel Qi (fqi@semi.org)

Attachment: [2016Fall] Liaison HB-LED China

3.2 SEMI Staff Report

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

- SEMI Global 2016 & 2017 Calendar of Events
 - SEMICON Japan (December 14-16, 2016; Tokyo, Japan)
 - SEMICON Korea (February 8-10, 2017; Seoul, Korea)
 - SEMICON China (March 14-16, 2017; Shanghai, China)
 - LED Taiwan (April 12-15, 2017; Taipei Taiwan)
 - SEMICON Southeast Asia (April 25-27, 2017; Penang, Malaysia)
 - Intersolar Europe (May 31-June 2, 2017; Munich, Germany)
 - SEMICON West (July 11-13, 2017, San Francisco, California)



- SEMICON Taiwan (September 13-15, 2017; Taipei, Taiwan)
- PV Taiwan (October 12-14, 2017; Taipei, Taiwan)
- SEMICON Europa (November 14-17, 2017; Munich, Germany)
- SEMICON Japan (December 13-15, 2017; Tokyo, Japan)
- Upcoming North America Standards Meetings
 - NA Standards Spring 2017 Meetings (April 3-6, SEMI HQ in Milpitas, California)
 - SEMICON West 2016 (July 10-13, 2017, San Francisco, California)
 - NA Standards Fall 2017 Meetings (November 6-9 [tentative], SEMI HQ in Milpitas, California)
- Letter Ballot Critical Dates for 2016
 - Spring 2017 adjudication
 - Cycle 8: ballot submission due: Oct 17/Voting Period: Oct 24 – Nov 23
 - Cycle 9: ballot submission due: Nov 16/Voting Period: Nov 30 – Dec 30
 - Critical Dates 2017; <http://www.semi.org/en/Standards/Ballots>
- Standards Publications Report

<i>Cycle</i>	<i>New</i>	<i>Revised</i>	<i>Reapproved</i>	<i>Withdrawn</i>
July 2016	0	2	0	0
August 2016	0	7	3	0
September 2016	0	1	0	0
October 2016	1	12	1	0

- Total in portfolio – 965 (includes 158 Inactive Standards)
- Nonconforming Titles
 - None for HB-LED NA TC Chapter
- HB-LED Standards needing Five-Year Review
 - None for HB-LED NA TC Chapter
- SNARF 3 Year Status, TC Chapter may grant a one-year extension
 - None for HB-LED NA TC Chapter
- Staff Contact: Laura Nguyen (lnguyen@semi.org)

Attachment: [2016Fall] Staff Report HB-LED

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.

None.

5 Subcommittee and Task Force Reports

5.1 Impurities and Defects in Sapphire Wafers Task Force (Inactive)

5.2 Assembly Task Force

There is no report at this time. Steve Martell informed the committee that the Assembly Task Force has not met for a while. An action item was taken to contact the leaders of the task force if they want to continue their activities.



Action Item: 2016Nov#01, Laura to contact Assembly Task Force leaders.

5.3 Patterned Sapphire Substrate (PSS) Task Force

There is currently no new activity at this time.

Win Baylies (Bay-Tech Resor) reported for the PSS Task Force. He informed the committee the task force at the time were trying to figure out what to do because of the conflict that has been discussed in the past. Some of the issues that came up is defining what the defects look like, what their sizes are and their effects. This once was a hot topic and one of the members that represented Rubicon presented information at a previous meeting. It might help if he were to present the information to the committee again and work from there. Steve Martell suggested we contact the gentlemen from Rubicon, John Ciraldo, to see if he is still interested in taking on this activity. Otherwise, it would make sense to move the task force to inactive status until further notice.

Action Item: 2016Nov#02, Win to contact John Ciraldo (Rubicon) if he wants to go forward with this activity and if not, then to make this task force inactive.

5.4 Wafer Task Force

There is currently no new activity at this time.

Win Baylies (Bay-Tech Resor) reported for the Wafer Task Force. He informed the committee there are a number of topics that still relate to this task force, but not sure what action to take at this time. Peter suggested this task force be kept active. Since China has activities within their committee, in cases where the NA committee would have to respond, keeping the Wafer Task Force active will allow a platform open for discussion. Win suggested the NA committee examine China's activity and see how we can support them. Andrew informed the committee that some companies he was in contact with had expressed interest in having their local teams join the NA HB-LED meetings and it'll be worth it to reach out to them. Andrew took down an action item to do so.

Action Item: 2016Nov#03, Andrew to send Laura contacts of possible participants for the Wafer Task Force

5.5 Equipment Communication Interfaces Task Force

This task force has not met for some time. They have a five-year review document coming up so the committee has decided to move this task force to inactive status until then.

Motion: To move HB-LED Equipment Communication Interfaces Task Force to inactive status.

By / 2nd: Steve Martell (Sonoscan) / Bevan Wu (BW & Associates)

Discussion: None.

Vote: 3-0 in favor. Motion passed.

5.6 Equipment Automation Interfaces Task Force

This task force has not met for some time. They have a five-year review document coming up so the committee has decided to move this task force to inactive status until then.

Motion: To move HB-LED Equipment Automation Interfaces Task Force to inactive status.

By / 2nd: Steve Martell (Sonoscan) / Bevan Wu (BW & Associates)

Discussion: None.

Vote: 3-0 in favor. Motion passed.

5.7 Test Methods Task Force

Peter Wagner (Self) reported for the Test Methods Task Force. There is no new activity and Peter would like to ask the committee to move this task force to inactive status.

Motion: To move Test Method Task Force to inactive status.

By / 2nd: Peter Wager (Self) / Steve Martell (Sonoscan)



Discussion: None.

Vote: 3-0 in favor. Motion passed.

5.8 Source Materials Task Force (Korea Chapter Formation Group)

This task force has no new activity.

Action Item: 2016Nov#04, Laura to contact Natalie (SEMI Korea) to follow up on any activities they may want to continue. Copy Andrew Kim.

6 Old Business

Previous action items are updated in Table 12 in 'red'. There is no further old business.

Regarding Action Item 2016July#05, Andrew asked if Win knew what size wafers they were. Some additional action items were taken to attempt to restart this activity or find another company that will be willing to go on with the experiment.

Action Item: 2016Nov#05, Win to send files out to Peter and Andrew of past Wafer TF activities. Peter to follow up and to confirm what size wafers.

Action Item: 2016Nov#06, Peter to contact Osram regarding the ID marks to the wafers.

7 New Business

7.1 Discussion

During the task force meeting, Juanita Kurtain (CTO, Pacific Light Technologies) joined the call to raise a topic regarding phosphorus.

Andrew wanted to know whether packaging material of silicone and if phosphors fit into the scope of the HB-LED Committee, and it did not. Reporting on phosphors, Andrew introduced Juanita Kurtain, the CTO of an excellent quantum dot phosphor company here in the US. He was able to reach out to a couple of other phosphor companies in the US and Japan to find there was interest in having specifications. Of course, there were questions that arose, but it seem like there was some agreement that a standard way of measuring these things would be useful.

The committee had an open discussion and the key items were as followed:

- Juanita, CTO of a company that makes quantum dots, presented that the idea is that they will be a replacement for the conventional phosphors that people use today when they package the white LED.
 - By targeting lightening companies, with a product that should be on the market within the next month or two, with a LED manufacturing intended for lightening hopefully will spread out into a wider array of products that also include backlight units for displays
 - To her knowledge, they are the only quantum dot company that makes quantum dots that directly replaces phosphors so they go in the led package rather than in some kind of external optic
- Andrew raised the idea of generating a SNARF
- Steve suggested targeting the key players, those who are the experts, survey and find out what type of things do they want to measure. Find out what are the hot topics to standardize, pick one or a couple of those topics as a starting point, and the committee can help put the document together logistically. For example, what type of things do you normally measure, is it some type of output of the LED? How you actually measure those outputs might be a good place to start as a standardization.
- Next steps would be to find the drivers and to generate a SNARF and bring it to the committee.
- Juanita also suggested that it might be helpful to hear from the R&D teams of various LED companies since they are the ones that evaluate the new phosphors and would have some kind of standard protocol that they use. Another place to start would be silicone manufactures since they probably have a lot of this evaluative



capability in-house and might have some good input on standards for phosphors because they have to work with them.

- The committee discussed companies to contact and took down some action items.

Action Item: 2016Nov#07, Steve and Andrew to connect to get in contact with equipment makers and R&D teams of various LED companies.

Action Item: 2016Nov#08, Andrew to contact Lumileds and other phosphor companies.

Action Item: 2016Nov#09, Peter to contact Osram and Silicone manufactures.

Action Item: 2016Nov#10, Andrew to draft email to send out to companies for input. Copy Peter.

Action Item: 2016Nov#11, Laura to contact Sophia to ask her leaders about possible silicone and phosphor makers. Andrew to send Laura introduction email.

8 Next Meeting and Adjournment

The next meeting is scheduled for Thursday, April 6, 2017 at the NA Standards Spring 2017 Meetings at SEMI Headquarters. See <http://www.semi.org/en/standards-events> for the current list of meeting schedules.

The tentative schedule is provided below:

Thursday, April 6

09:00-10:30 Joint HB-LED (TFs)

10:30-12:00 HB-LED (C)

Having no further business, a motion was made to adjourn. Adjournment was at 11:53.

Respectfully submitted by:

Laura Nguyen
International Standards Coordinator
SEMI Headquarters
Phone: 1.408.943.7019
Email: lnguyen@semi.org

Minutes tentatively approved by:

Andrew Kim (InnovationforX), Co-chair	April 6, 2017
Chris Moore (BayTech-Resor), Co-chair	<Date approved>
Iain Black (Philips), Co-chair	<Date approved>
Mike Feng (Silian), Co-chair	<Date approved>

Table 13 Index of Available Attachments#1

<i>Title</i>	<i>Title</i>
SEMI Standards Required Elements	[2016Fall] Liaison HB-LED China
[2016West] NA HB-LED Minutes FINAL	[2016Fall] Staff Report HB-LED

#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.