

North America HB-LED Committee Meeting Summary and Minutes

N.A. Standards Fall 2013 Meetings
Thursday, October 31, 2013 15:00 – 17:00 PST
SEMI Headquarters in San Jose, California

Next Committee Meeting

The next N.A. HB-LED committee meeting is tentatively scheduled for April 3, 2014 in conjunction with the NA Standards Spring 2014 Meetings at SEMI Headquarters in San Jose, California.

For additional meeting details, the latest schedule, registration, and travel information, please visit <http://www.semi.org/node/47781>

Table 1 Meeting Attendees

Co-Chairs: Chris Moore (---), Iain Black (Philips Lumileds), Bill Quinn (William Quinn Consulting), David Reid (Silian)

SEMI Staff: Michael Tran

<i>Company</i>	<i>Last</i>	<i>First</i>	<i>Company</i>	<i>Last</i>	<i>First</i>
BayTech Group	Baylies	Winthrop	Sonoscan	Martell	Steve
<i>Braker Nano</i>	<i>Novak</i>	<i>Matt</i>	<i>Self</i>	<i>Wagner</i>	<i>Peter</i>
Rubicon Technology	Ko	Donggeun			
<i>Saint-Gobain</i>	<i>Maiocco</i>	<i>Lisa</i>	SEMI Korea	Shim	Natalie
Silian	Chao	Julie	SEMI N.A.	Tran	Michael

Italics indicates virtual participants

Table 2 Leadership Changes

None.

Table 3 Ballot Results

None.

Table 4 Authorized Activities

#	Type	SC/TF/WG	Details
5629	Revised SNARF	Impurities and Defects TF	New Standard, Guide for Identification Defects on Bare Surfaces of Sapphire Wafers

Note: 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

#	When	SC/TF/WG	Details
5684	Cycle 8, 2013	HB-LED Wafer TF	Line Item Revisions to SEMI HB1-0113, Specifications for Sapphire Wafers Intended for Use for Manufacturing High Brightness-Light Emitting Diode Devices
5629	Cycle 1, 2014	Impurities and Defects TF	New Standard, Guide for Identification Defects on Bare Surfaces of Sapphire Wafers

Table 6 New Action Items

<i>Item #</i>	<i>Assigned to</i>	<i>Details</i>
2013Oct#01	HB-LED Wafer TF	Meeting on November 13 to review ballot proposal of Document 5684 and send to SEMI.
2013Oct#02	HB-LED Wafer TF	Write supporting paragraph to explain changes to roughness description in SEMI HB1.
2013Oct#03	Impurities and Defects TF	Collect images for area contamination, particles, and voids.
2013Oct#04	Impurities and Defects TF	Include scale for all images.
2013Oct#05	Impurities and Defects TF	Review Page 1 (Purpose, Scope, Limitations, Referenced Standards and Documents) in SEMI HB1.
2013Oct#06	Impurities and Defects TF	Meet on November 12 to review updated document. Need to determine which Cycle in 2014 to ballot Document 5629.

Table 7 Previous Meeting Actions Items

<i>Item #</i>	<i>Assigned to</i>	<i>Details</i>	<i>Status</i>
2013Jul#01	Michael Tran	Forward Brian Rubow's ballot motion slides to David Reid (Silian).	Open
2013Jul#02	Michael Tran	Work with Natalie Shim (SEMI Korea) to align the Korea HB-LED Working Group charter with the Global HB-LED charter.	Open
2013Jul#03	Michael Tran	Transfer existing SNARFs under the Equipment TF	Open
2013Jul#04	Bevan Wu	Re-instigate communication with ITRI on 2" PSS feedback.	Open
2013Jul#05	Peter Wagner	Share wafer flatness parameter presentation.	Has to be published in M1 first as RI to reference it.
2013Jul#06	Peter Wagner, Julie Chao, and Win Baylies	Propose 4" and 6" wafer geometry specs for PSS.	DONE based on round 1 of survey after we understand the def. better. but want more feedback.
2013Jul#07	Peter Wagner, Julie Chao, Win Baylies, Jhon Stover, Steve Martell, and Christopher Jones	To work on the first draft of Document # 5630, (Guide for Measuring Surface Roughness of Sapphire Wafers for HB-LED Applications) by October 2013.	Examine at Strategies in Light in Santa Clara Look into contacting NIST about getting involved in this work.
2013Jul#08	Frank, Andrew Kim, Julie Chao, Peter Wagner	To work on DSP specification and survey.	DONE.
2013Apr#02	David Joyce	Work on the defect definitions as a Related Information addition to SEMI HB1.	In progress.

<i>Item #</i>	<i>Assigned to</i>	<i>Details</i>	<i>Status</i>
2013Apr#06	Win Baylies, Julie Chao, Francis Nguyen	Review SEMI M38 and work on adding reclaimed wafer specifications to SEMI HB1.	In progress.
2013Apr#010	Len Perroots	Prepare a report to the committee on the applicability of notchless wafers to HB-LED sapphire wafers.	Follow up with Len.
2012Oct#02	Chris Moore	Review SNARF #5529 (HB-LED JMMM) for Aixtron only specifications.	OPEN
2012Oct#03	Chris Moore	Send an email to the European Silicon Wafer committee regarding the HB-LED committee revisions to their SNARF for Gallium Nitride on Silicon Wafer	OPEN

1 Welcome, Reminders, and Introductions

1.1 Win Baylies (BayTech Group) called the meeting to order at 3:00 PM PST. The meeting reminders on antitrust issues, intellectual property issues and holding meetings with international attendance were reviewed. Attendees introduced themselves.

Attachment: 01, SEMI Standards Required Meeting Elements

2 Review of Previous Meeting Minutes

2.1 The committee reviewed the minutes of the previous meeting.

Motion: To approve the previous meeting minutes as written.

By / 2nd: Steve Martell (Sonoscan) / Julie Chao (Silian)

Discussion: None.

Vote: 3-0 in favor. Motion passed.

Attachment: 02, HB-LED Meeting Minutes (West 2013)

3 Liaison Reports

3.1 N.A. SEMI Staff Report

3.1.1 Michael Tran (SEMI N.A.) gave the N.A. Staff Report. The key items were as follows:

- SEMI Major Events in 2013
 - Completed:
 - SEMICON Europa in conjunction with Plastic Electronics Exhibition 2013
 - October 8-10, 2013 in Dresden, Germany
 - Strategic Materials Conference
 - October 16-17, 2013 in Santa Clara, California
 - PV Taiwan 2013
 - October 30-November 1, 2013 in Taipei
 - SEMICON Japan
 - December 4-6, 2013 in Chiba
- SEMI Major Events in 2014

- European 3D TSV Summit
 - January 21-22, 2014 in Grenoble, France
- SEMICON Korea / LED Korea
 - February 12-14, 2014 in Seoul
- SEMICON China
 - March 18-20, 2014 in Shanghai
- SEMICON Singapore
 - April 23-25, 2014 in Marina Bay Sands
- SEMICON West
 - July 8-10, 2014 in San Francisco, California
- SEMI Standards Publications
 - Standards published from July 2013 to September 2013:
 - New Standards: 5
 - Revised Standards: 19
 - Reapproved Standards: 9
 - Withdrawn Standards: 0
 - There are a total of 892 SEMI Standards in portfolio and that includes 98 Inactive standards
- New Cycle 8 Voting Period (tentative)
 - Cycle 8, 2013
 - Ballot Submission Date: Nov 15, 2013
 - Voting Period Starts: Nov 29, 2013
 - Voting Period Ends: Dec 31, 2013
- Upcoming North America Standards Meetings in 2014
 - NA Liquid Chemicals Fall 2013 Meetings
 - November 5, 2013, SEMI HQ in San Jose
 - NA Compounds Semiconductor Materials Committee Fall 2013 Meeting
 - November 15, 2013 - Teleconference & Web Meeting Only
 - NA Standards Spring 2014 Meetings
 - March 31 – April 3, 2014 at SEMI HQ in San Jose, California
- Standards Usage Interview
 - Looking for details on how standards are actually used:
 - Development/Engineering
 - Procurement
 - Manufacturing
 - Interview should take less than 30 minutes – contact James Amano (jamano@semi.org)
- Official SEMI Standards Groups
 - LinkedIn

- <http://www.linkedin.com/groups/Official-SEMI-Standards-Group-1774298/about>
- Twitter
 - @SEMI_standard
- SEMI N.A. Standards staff contact: Michael Tran, mtran@semi.org

Attachment: 03, SEMI NA Standards Staff Report (Fall 2013)

3.2 Korea HB-LED Working Group

3.2.1 Michael Tran (SEMI NA) reported for the HB-LED Working Group. Some key items of note:

- Leadership
 - Hyungsu Park / SEMES
 - Jonghyup Baek/ KOPTI
- Meeting Information
 - Last meeting
 - October 11, 2013 at SEMI Korea Office
 - Next Meeting
 - December 13, 2013 at SEMI Korea Office
- Major Updates
- The working group tentatively formed two sub teams; MO Source and SEMI HB1 Review.
 - MO (Molybdenum) Source team
 - The team collected from three major chemical companies the common specs of MO Source.
 - The data will be reviewed in the next meeting.
 - SEMI HB1 Review team
 - Chip makers reviewed SEMI HB1 and listed up revision items.
 - The revision items were discussed with wafer company.
 - The team will invite more wafer companies in the next meeting and get their input.
- SEMI Korea Standards staff contact: Natalie Shim, eshim@semi.org

Discussion: Natalie Shim of SEMI Korea went into details of the MO Source team and SEMI HB1 Review. Of note:

- MO Source Team:
 - The team wanted more feedback on general specifications.
 - They also need standardization on containers so they can be replaced easily.
- SEMI HB1 Review Team:
 - The team thought the flat length is pretty wide to fit industry requirements
 - They prefer to reduce the size and they will need more study on the three lower sizes proposed by the users.

- Donggeun Ko said the current orientation flat length is too large. The device makers will lose real estate of the wafer and so they try to reduce the flat size to get more chips. It is general trend of the device companies. Win Baylies added that a notch is another way as it uses less area than a flat.
- More on the team's thoughts on the flat of the wafers:
 - They will need to study the specs for each side of the wafer for alignment. The corner flat is rounded and it can be difficult to align.
 - Natalie shim asked one member and they also had a problem with the flat length in the production line
 - The TF sees this as more of an equipment issue than with the wafers itself. They propose perhaps the HB-LED Equipment automation TF can look into this.
- The Korea companies think the specs in SEMI HB1 are too general for them
 - Julie Chao said the HB-LED Wafer TF is willing to listen. The SEMI HB1 specs are loose so it can meet all customers' requirements.
 - The Korea HB-LED WG is still trying to determine what "standards" is as it is a new concept to them.
- The team thought that their crystal plane direction is not matching with SEMI HB1
 - This could lead to the wafer cracking as a result and they need matching directions.
 - Donggeun Ko said matching the directions is very critical as it can impact a lot of different processes.
- Bow Tolerance
 - The chipmakers think is not addressed or well defined.
 - Donggeun Ko said it is a complicated issue. There is no clear consensus between chip makers and the industry is moving towards negative bow. Natalie Shim said there were questions about the tolerance. Zero is to be the starting point, but zero doesn't mean flat so it is not clear. The chipmakers never use a positive bow.
 - Julie Chao said the TF could not agree on a target. As long as target is within the range then it's ok. Steve Martell added, if it is in a certain range then negative and positive should not matter.
- The team is also interested in the PSS TF
 - The PSS TF is considering rolling out the PSS survey until the end of December for SEMI HB1 Review team's feedback.

Attachment: 04, Korea HB-LED Working Group Report Fall 2013

4 Ballot Review

4.1 None.

5 Subcommittee & Task Force Reports

5.1 HB-LED Wafer Task Force / Impurities and Defects Task Force

5.1.1 Julie Chao (Silian) and Winthrop Baylies (BayTech Group) reported for the HB-LED Wafer Task Force / Impurities and Defects Task Force. The TF discussed the following topics:

- Near Edge Properties:

- The HB-LED Wafer TF will join the Advanced Wafer Geometry (AWG) TF to support near edge properties applicable to sapphire wafers.
- Double Sided Polished (DSP) Wafer Specs:
 - The TF reviewed proposed specs for 2”, 4” and 6” DSP wafers.
- Lasermarking Activities
 - Reviewed updates for Round 3 lasermarking.
 - Rubicon Technology wants to join the next lasermarking teleconference call.
- HB-1 Revision:
 - Reviewed SNARF for changing lasermark to include front and/or back side
 - Finalized roughness description
 - Rubicon wants to know if transmittance target and transmittance variation should be in the specification table. To be discussed later

Action Item: 2013Oct#01, The HB-LED Wafer TF meeting on November 13 to review ballot proposal of Document 5684 and send to SEMI by November 15 for Cycle 8.

Action Item: 2013Oct#02, The HB-LED Wafer TF to write supporting paragraph to explain changes to roughness description in SEMI HB1.

- Impurities and Defects:
 - The TF updated list of defects.
 - Reviewed Saint Gobain’s changes in captions. Changes to be merged.
 - Modified SNARF and changed “Specular surfaces” to “bare surfaces” (see §7.1 of these minutes).

Action Item: 2013Oct#03, The Impurities and Defects TF to collect images for area contamination, particles, and voids.

Action Item: 2013Oct#04, The Impurities and Defects TF to include scale for all images.

Action Item: 2013Oct#05, The Impurities and Defects TF to review Page 1 (Purpose, Scope, Limitations, Referenced Standards and Documents) in SEMI HB1.

Action Item: 2013Oct#06, The Impurities and Defects TF to meet on November 12 to review updated document. Need to determine which Cycle in 2014 to ballot Document 5629.

Attachment: 05, HB-LED Wafer TF Report Fall 2013

5.2 Patterned Sapphire Substrates (PSS) Task Force

5.2.1 Matt Novak (Bruker-Nano) and Win Baylies (BayTech Group) reported for the TF. The TF reviewed the PSS survey results and Julie Chao proposed to add more questions to it:

1. What type of shape is most important: cone, pyramid or dome?
2. Is the alignment of the hexagonal shape important in reference to the fiducial (flat or notch)?
3. What are the tolerances for parameters “A”, “B” and “C”?

5.2.2 The TF would like Donggeun Ko (Rubicon Technology) to complete the survey for his company's feedback. The TF drafted a summary table with the survey results and they are open to implementing additional survey questions as Julie Chao suggested. The TF reviewed the PSS Wafer Specs (Flatness Requirements) for 2", 4" and 6" PSS wafers and decided to wait for the SEMI M1 diagrams to be published, re-do survey after task force is more familiar with each definition. The survey only yielded 20% of replies despite having 20 members in the TF so the TF would like to release an updated PSS survey sometime in November 2013.

Attachment: 06, PSS Survey Results

5.3 HB-LED Equipment Communication Interfaces TF

5.3.1 Michael Tran reported on behalf of Brian Rubow (Cimetrix) for the TF. The TF plans to have document 5529, New Standard: Specification of Job Management and Material Management for High Brightness LED Manufacturing Equipment (HB-LED JMMM) completed by the end of 2014. The TF is also working with the NA Information & Control committee on document 5508, *Revisions to: SEMI E5, SEMI Equipment Communications Standard 2 Message Content (SECS-II), SEMI E90, Specification for Substrate Tracking, SEMI E90.1, Specification for SECS-II Protocol Substrate Tracking.*

Attachment: 07, HB-LED Equipment Communication Interfaces TF Report (Fall 2013)

6 Old Business

6.1 None.

7 New Business

7.1 New SNARFs and TFOFs

#	Type	SC/TF/WG	Details
5629	Revised SNARF	Impurities and Defects TF	New Standard, Guide for Identification Defects on Bare Surfaces of Sapphire Wafers

Motion: To approve revised SNARF #5629.

By / 2nd: Steve Martell (Sonoscan) / Julie Chao (Silian)

Discussion: None.

Vote: 3-0 in favor. Motion passed.

7.2 Ballot Authorizations

#	Type	SC/TF/WG	Details
5684	Cycle 8, 2013	HB-LED Wafer TF	Line Item Revisions to SEMI HB1-0113, Specifications for Sapphire Wafers Intended for Use for Manufacturing High Brightness-Light Emitting Diode Devices
5629	Cycle 1, 2014	Impurities and Defects TF	New Standard, Guide for Identification Defects on Bare Surfaces of Sapphire Wafers

Motion: To approve the letter ballot of document 5684 in Cycle 8, 2013.

By / 2nd: Julie Chao (Silian) / Steve Martell (Sonoscan)

Discussion: None.

Vote: 3-0 in favor. Motion passed.

Motion: To approve the letter ballot of document 5629 in Cycle 1, 2014.
By / 2nd: Julie Chao (Silian) / Steve Martell (Sonoscan)
Discussion: None.
Vote: 3-0 in favor. Motion passed.

8 Action Item Review

8.1 Open Action Items

8.1.1 Michael Tran (SEMI N.A.) reviewed the open action items. These can be found in the Open Action Items table at the beginning of these minutes.

8.2 New Action Items

8.2.1 Michael Tran (SEMI N.A.) reviewed the new action items. These can be found in the New Action Items table at the beginning of these minutes.

9 Next Meeting and Adjournment

9.1 The next NA Standards HB-LED Task Force meetings will be in conjunction with Strategies in Light in Santa Clara, California from February 25 to 27, 2014. Exact meeting dates and details as they become available will be posted to the SEMI Standards Calendar of Events at <http://www.semi.org/en/Standards/CalendarEvents>.

After Strategies in Light, The NA Standards HB-LED Meetings will be held in conjunction with the NA Standards Spring 2014 Meetings at SEMI Headquarters, in San Jose California. Exact meeting dates and details as they become available will be posted here: <http://www.semi.org/node/47781>

Tentative Schedule

Wednesday, April 2*

- Patterned Sapphire Substrate (PSS) TF (08:30 AM - 12:00 PM Noon)

Thursday, April 3*

- HB-LED Equipment Communication Interfaces TF (09:00 AM - 2:30 PM)
- HB-LED Wafer TF / Impurities & Defects TF (08:00 AM - 3:00 PM)
- HB-LED Technical Committee (3:00 PM - 5:00 PM)

9.2 Having no further business, a motion was made to adjourn the N.A. HB-LED committee meeting on July 11, 2013 in conjunction with the N.A. Standards SEMICON West 2013 Meetings at the San Francisco Marriott Marquis Hotel in San Francisco, California.

Respectfully submitted by:
Michael Tran
Senior Standards Engineer
SEMI North America
Phone: 1-408-943-7019
Email: mtran@semi.org

Minutes approved by:

Chris Moore (---), Co-chair	
Bill Quinn (William Quinn Consulting), Co-chair	
David Reid (Silian), Co-chair	
Iain Black (Philips Lumileds), Co-chair	

Table 8 Index of Available Attachments #1

#	<i>Title</i>	#	<i>Title</i>
01	SEMI Standards Required Meeting Elements	05	HB-LED Wafer TF Report Fall 2013
02	NA HB-LED Meeting Minutes (West 2013)	06	PSS Survey Results
03	SEMI NA Staff Report Fall 2013	07	HB-LED Equipment Communication Interfaces TF Report (Fall 2013)
04	Korea HB-LED Working Group Report Fall 2013		

#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 Michael Tran at the contact information above.