

North America HB-LED Committee Meeting Summary and Minutes

N.A. Standards SEMICON West 2013 Meetings
Thursday July 11, 2013 15:00 – 17:00 PST
San Francisco Marriott Marquis Hotel in San Francisco, California

Next Committee Meeting

The next N.A. HB-LED committee meeting is scheduled for October 31, 2013 in conjunction with the NA Standards Fall 2013 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/en/node/46221>

Table 1 Meeting Attendees

Co-Chairs: Chris Moore (Semilab), 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	Self	Wagner	Peter
<i>Brooks Automation</i>	<i>Babbs</i>	<i>Daniel</i>	Silian	Chao	Julie
Cimetrix, Inc.	Rubow	Brian	Silian	Reid	David
Eminess Technologies	Andersen	Jeff			
Entegris	Felipe	Jeff			
GT Advanced Technologies	Joyce	David	SEMI Taiwan	Wu	Cher
Saint- Gobain	Jones	Christopher	SEMI N.A.	Tran	Michael

Italics indicates virtual participants

Table 2 Leadership Changes

<i>Group</i>	<i>Previous Leader</i>	<i>New Leader</i>
HB-LED Impurities and Defects TF		David Joyce (GT Advanced Technologies) <i>(co-leader)</i> Julie Chao (Silian) <i>(co-leader)</i>
HB-LED Equipment Communication Interfaces TF <i>(New TF)</i>	<i>(Formerly HB-LED Software WG under the Equipment Automation TF)</i>	Brian Rubow (Cimetrix)
Patterned Sapphire Substrate (PSS) TF <i>(New TF)</i>		Matt Novak (Bruker) Nigel Mason (Laytec)

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.

<i>Document #</i>	<i>Document Title</i>	<i>Committee Action</i>
5468	New Standard: Mechanical Interface Specification for 150 mm HB-LED Load Port	Passed as balloted. Superclean.
5469	New Standard: Specification of Communication Interfaces for High Brightness LED Manufacturing Equipment (HB-LED ECI)	Passed as balloted.

Table 4 Authorized Activities

#	Type	SC/TF/WG	Details
5629	SNARF	Impurities and Defects TF	New Standard, Guide for Identification of Features on the Specular Surface of Sapphire Wafers
5630	SNARF	HB-LED Wafer TF	New Standard, Guide for Measuring Surface Roughness of Sapphire Wafers for HB-LED Applications
---	TFOF	New Task Force	HB-LED Equipment Communication Interfaces TF
---	TFOF	New Task Force	Patterned Sapphire Substrate (PSS) TF

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

There were no authorized ballots.

Table 6 New Action Items

Item #	Assigned to	Details
2013Jul#01	Michael Tran	Forward Brian Rubow's ballot motion slides to David Reid (Silian).
2013Jul#02	Michael Tran	Work with SEMI Korea staff to align the Korea HB-LED Working Group charter with the Global HB-LED charter.
2013Jul#03	Michael Tran	Transfer existing SNARFs under the Equipment TF
2013Jul#04	Bevan Wu	Re-instigate communication with ITRI on 2" PSS feedback.
2013Jul#05	Peter Wagner	Share wafer flatness parameter presentation.
2013Jul#06	Peter Wagner, Julie Chao, and Win Baylies	Propose 4" and 6" wafer geometry specs for PSS.
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.
2013Jul#08	Frank, Andrew Kim, Julie Chao, Peter Wagner	To work on DSP specification and survey.

Table 7 Previous Meeting Actions Items

Item #	Assigned to	Details	Status
2013Apr#01	Julie Chao	Work on adding Lasermarking to SEMI HB1.	DONE.
2013Apr#02	David Joyce	Work on the defect definitions as a Related Information addition to SEMI HB1.	In progress.
2013Apr#03	HB-LED Wafer TF	Review SEMI MF154 on adding <i>Glossary of Structures and Contaminants Seen on Specular Sapphire Wafer Surfaces</i> to SEMI HB1.	New document now as new SNARF. DONE.
2013Apr#04	Julie Chao, Win Baylies, Matt Novak, David Joyce and Steve Martell	Analyze the Double Sided Polishing survey results and send out the summary for review at the next HBLED Wafer TF teleconference.	DONE.

<i>Item #</i>	<i>Assigned to</i>	<i>Details</i>	<i>Status</i>
2013Apr#05	Julie Chao, Win Baylies, David Joyce and Steve Martell	Analyze the Patterned Sapphire Substrate survey results and send out the summary for review at the next HBLED Wafer TF teleconference.	DONE.
2013Apr#06	Win Baylies, Julie Chao, Francis Nguyen	Review SEMI M38 and work on adding reclaimed wafer specifications to SEMI HB1.	In progress.
2013Apr#07	John Stover	Review and update the Purchase Order in SEMI HB1.	DONE.
2013Apr#08	David Joyce	Ask Luke Glinski for an Impurities and Defects TF co-leader.	DONE.
2013Apr#09	Win Baylies	Send the TFOF for the Patterned Sapphire Substrate (PSS) TF to the committee for review.	DONE.
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 David Reid (Silian) called the meeting to order at 3:12 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 (Spring 2013) as written.

By / 2nd: David Joyce (GT Advanced Technologies) / Julie Chao (Silian)

Discussion: None.

Vote: 8-0 in favor. Motion passed.

Attachment: 02, HB-LED Meeting Minutes (Spring 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:

- Michael Tran (SEMI N.A.) gave the SEMI Staff Report. The key items were as follows:
 - Some Upcoming SEMI Major Events
 - SEMICON Taiwan 2013 / LED Taiwan 2013
 - September 4-6, 2013 in Taipei
 - SEMICON Europa 2013 / Plastic Electronics Exhibition and Conference

- October 8-10, 2013 Dresden, Germany
- SEMICON Japan 2013
 - December 4-6, 2013 in Chiba
- Upcoming North America Standards Meeting
 - NA Standards Fall 2013 Meetings
 - October 28-31, 2013 in San Jose and Santa Clara, California
 - Inviting local companies willing and able to host some of the meetings to maintain one-week format
- Cycle 6-2013 Critical Dates for SEMI Standards Ballots
 - Cycle 6, 2013
 - Ballot Submission Date: August 15, 2013
 - Voting Period Starts: August 29, 2013
 - Voting Period Ends: September 30, 2013
- SEMI Standards Publications
 - Standards published from April 2013 to June 2013:
 - New Standards: 16
 - Revised Standards: 11
 - Reapproved Standards: 15
 - Withdrawn Standards: 0
 - There are a total of 887 SEMI Standards in portfolio and that includes 94 Inactive standards
- SEMI N.A. Standards staff contact: Michael Tran, mtran@semi.org

Attachment: 03, SEMI NA Staff Report West 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
 - June 7, 2013 at SEMI Korea Office
 - Next Meeting
 - August 23, 2013 at SEMI Korea Office
- Major Updates
 - Charter
 - To develop and/or modify Specifications and Guidelines for the raw materials using in HB-LED manufacturing

- Scope
 - To develop and/or modify Specifications and Guidelines for MO Sources and Sapphire wafer
- Major Companies Participating
 - Aixtron, Il-jin display, KOPTI, LG Siltron, Samsung Electronics, SEMES, STNA, Top Engineering, Veeco Korea, and Wonk ips

Discussion: The committee is concerned with the charter of the Korea HB-LED Workgroup. They feel it should align more with the current HB-LED global committee charter.

- SEMI Korea Standards staff contact: Natalie Shim, eshim@semi.org

Attachment: 04, Korea HB-LED Working Group Report

4 Ballot Review

NOTE 1: Committee 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. The attachment number for each balloted document is provided under each ballot review section below.

Document #	Document Title	Committee Action
5468	New Standard: Mechanical Interface Specification for 150 mm HB-LED Load Port	Passed as balloted. Superclean.
5469	New Standard: Specification of Communication Interfaces for High Brightness LED Manufacturing Equipment (HB-LED ECI)	Passed as balloted.

Motion: Document 5468 passed committee review as balloted and will be forwarded to the A&R for procedural review.

By / 2nd: Win Baylies (BayTech Group) / Jeff Felipe (Entegris)

Discussion: None.

Vote: 8-0 in favor. Motion passed.

Attachment: 05, A&R Procedural Review of Document #5468

Motion: Document 5469 passed committee review as balloted and will be forwarded to the A&R for procedural review.

By / 2nd: David Joyce (GT Advanced Technologies) / Jeff Felipe (Entegris)

Discussion: None.

Vote: 7-0 in favor. Motion passed.

Attachment: 06, A&R Procedural Review of Document #5469

5 Subcommittee & Task Force Reports

5.1 HB-LED Wafer Task Force

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

- Patterned Sapphire Substrates (PSS)
- Measuring Surface Roughness in Sapphire Wafers
- Double Sided Polishing (DSP) Wafers

5.1.2 *Patterned Sapphire Substrates (PSS)*

5.1.2.1 The TF reviewed the PSS survey results as well as the drawings explaining the flatness parameters. However, there was a lack of response and feedback for 2 inch wafers. The TF will focus on site-specific measurements (SFQR, SFQD, and SBIS, and etc). The PSS defects will be worked in parallel with the Impurities and Defects TF. The TF submitted the TFOF to form the PSS TF (see §7.1 of these minutes) and it was approved by the committee.

5.1.3 *Measuring Surface Roughness in Sapphire Wafers*

5.1.3.1 The TF reviewed the proposal to add “over agreed spatial bandwidth” and discussed the difference between roughness parameters Ra (arithmetic mean value) and Rq (quadratic mean). Sapphire currently only references Ra as there is no Rq reference yet. The TF discussed the advantages of using Rq over Ra such as in silicon wafers. The TF submitted SNARF #5630 (see §7.1 of these minutes) and it was approved by the committee.

5.1.4 *Double Sided Polishing (DSP) Wafers*

5.1.4.1 The TF reviewed the survey results and discussed the priority of working on the DSP specifications as there were additional advantages such as:

- Cost savings and processing times reduced
- Yield improvement
- Higher quality leading to flatter parts

5.1.4.2 The TF will work jointly with the Impurities and Defects TF on the DSP defects. The TF plan to submit a second DSP survey on DSP specifications and proposal for specifications with values and get approval feedback.

Attachment: 07, HB-LED Wafer TF Report West 2013

5.2 *Impurities and Defects Task Force*

5.2.1 David Joyce (GT Advanced Technologies) and Julie Chao (Silian) reported for the Impurities and Defects TF. The TF reviewed the following:

- SEMI M81 (Defects in SiC Substrates)
- Intego’s bulk sapphire presentation
- Altatech’s presentation
- The TF reviewed sapphire defect photos from Saint-Gobain and Silian

5.2.2 The TF submitted SNARF #5629 (ID Features on the Surface of Sapphire Wafers) and it was approved by the committee. The TF will work on the first draft for Document 5629 before the next NA Fall 2013 Standards Meetings.

5.2.3 The TF reported Luke Glinski (GT Advanced Technologies) have not been active in the TF. Therefore, Julie Chao and David Joyce were approved by the committee to be co-leaders of the TF.

Motion: To approve Julie Chao (Silian) and David Joyce (GT Advanced Technologies) as the TF co-leaders

By / 2nd: Jeff Felipe (Entegris) / Win Baylies (BayTech Group)

Discussion: None.

Vote: 6-0 in favor. Motion passed.

5.3 HB-LED Equipment Automation TF

5.3.1 Equipment Automation TF – Hardware WG

5.3.1.1 Jeff Felipe (Entegris) reported for the Equipment Automation TF – Hardware WG. The WG said document 5420A, *New Standard: Specification for 150mm Open Plastic and Metal Wafer Cassettes Intended for Use for Manufacturing HB-LED Devices* was published as SEMI HB2 in June 2013. The WG discussed the possibility of having open cassette standards for new wafers sizes, but there were some issues such as:

- 4 inch wafers are already in high volume production so it is too late in establishing standards for it.
- It is too early for 8 inch wafers and cassettes standards.

5.3.1.2 The WG reviewed the superclean ballot results of Document 5468 (Specification for 150 mm HB-LED Loadport) and it was approved by the committee.

5.3.1.3 Due to a lack of participation from key members of the TF such as AIXTRON, the WG decided to make the TF inactive and it will not hold any future meetings until needed. The TF also recommend the software portion of the TF be disbanded so it would not be under the umbrella of the HB-LED Equipment Automation TF anymore.

Motion: To change the status of the Equipment Automation TF to inactive.
By / 2nd: Jeff Felipe (Entegris) / David Joyce (GT Advanced Technologies)
Discussion: None.
Vote: 7-0 in favor. Motion passed.

5.3.2 Equipment Automation TF – Software Working Group

5.3.2.1 Brian Rubow (Cimetrix) reported for the Equipment Automation TF – Software WG. The WG reviewed the ballot results of Document 5469, *New Standard: Specification of Communication Interfaces for High Brightness LED Manufacturing Equipment (HB-LED ECI)* and found the negatives of the rejects votes to be related, but not technically persuasive. The document was approved by the committee as balloted.

5.3.2.2 The WG plans to ballot Document 5529, (HB-LED JMMM) in Cycle 4, 2014. It is a new standard for the application of SEMI E87, E40, E94 and E90 for automated material deliver, job setup and material tracking.

Motion: To disband the Equipment Automation TF – Software Working Group.
By / 2nd: Jeff Felipe (Entegris) / David Joyce (GT Advanced Technologies)
Discussion: None.
Vote: 7-0 in favor. Motion passed.

Attachment: 08, HB-LED Equipment Automation TF Report – Hardware WG

Attachment: 09, HB-LED Equipment Automation TF Report – Software WG

6 Old Business

6.1 Review of the Patterned Sapphire Substrate (PSS) TF

6.1.1 The committee reviewed the TFOF for the Patterned Sapphire Substrate TF submitted by Win Baylies (BayTech Group).

Motion: To approve the TFOF of the Patterned Sapphire Substrate (PSS) TF.
By / 2nd: Christopher Jones (Saint-Gobain) / Julie Chao (Silian)
Discussion: None.
Vote: 7-0 in favor. Motion passed.

7 New Business

7.1 New SNARFs and TFOFs

#	Type	SC/TF/WG	Details
5629	SNARF	Impurities and Defects TF	New Standard, Guide for Identification of Features on the Specular Surface of Sapphire Wafers
5630	SNARF	HB-LED Wafer TF	New Standard, Guide for Measuring Surface Roughness of Sapphire Wafers for HB-LED Applications
---	TFOF	New Task Force	HB-LED Equipment Communication Interfaces TF

Motion: To approve SNARF #5629.
By / 2nd: Christopher Jones (Saint-Gobain) / Julie Chao (Silian)
Discussion: None.
Vote: 7-0 in favor. Motion passed.

Motion: To approve SNARF #5630.
By / 2nd: Peter Wagner (Self) / Win Baylies (BayTech Group)
Discussion: None.
Vote: 6-0 in favor. Motion passed.

Motion: To approve the TFOF for the HB-LED Equipment Communication Interfaces TF.
By / 2nd: David Joyce (GT Advanced Technologies) / Jeff Felipe (Entegris)
Discussion: None.
Vote: 8-0 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 N.A. HB-LED standards meetings are tentatively scheduled for October 30-31, 2013 at SEMI Headquarters in San Jose, California in conjunction with the NA Standards Fall 2013 meetings. Exact meeting date and details will be announced when finalized and available at <http://www.semi.org/en/node/46221>

Tentative Schedule

Wednesday, October 30*

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

Thursday, October 31*

- HB-LED Equipment Automation Software WG 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)

*All times are in PST. Times and dates are subject to change without notice.

For meeting details, registration, the latest schedule, and travel information please visit

<http://www.semi.org/en/node/46221>

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

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Minutes approved by:

Chris Moore (Semilab), Co-chair	
Bill Quinn (William Quinn Consulting), Co-chair	September 11, 2013
David Reid (Silian), Co-chair	September 10, 2013
Iain Black (Philips Lumileds), Co-chair	

Table 8 Index of Available Attachments #1

#	Title	#	Title
01	SEMI Standards Required Meeting Elements	06	A&R Procedural Review of Document #5469
02	NA HB-LED Meeting Minutes (Spring 2013)	07	HB-LED Wafer TF Report West 2013
03	SEMI NA Staff Report West 2013	08	HB-LED Equipment Automation TF Report – Hardware WG
04	Korea HB-LED Working Group Report	09	HB-LED Equipment Automation TF Report – Software WG
05	A&R Procedural Review of Document #5468		

#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.