

North America HB-LED Technical Committee Chapter Meeting Summary and Minutes

N.A. Standards Meetings at SEMICON West 2014
Thursday, July 10, 2014 14:00 – 17:00 PDT
San Francisco Marriott Marquis Hotel in San Francisco, California

Next N.A. HB-LED TC Chapter Meeting

The next N.A. HB-LED TC Chapter Meeting will be held in conjunction with the N.A. Standards Fall 2014 Meetings at SEMI Headquarters in San Jose, California. Please see §9 of these minutes for the tentative schedule for all HB-LED standards meetings and visit <http://www.semi.org/en/node/50511> for more information.

Table 1 Meeting Attendees

Co-Chairs: Iain Black (Philips Lumileds)
Mike Feng (Silian)
Bill Quinn (William Quinn Consulting)
Chris Moore (BayTech-Resor)

SEMI Staff: Michael Tran

| <i>Company</i> | <i>Last</i> | <i>First</i> | <i>Company</i> | <i>Last</i> | <i>First</i> |
|------------------|-------------|--------------|------------------|-------------|--------------|
| BayTech-Resor | Baylies | Winthrop | Self | Wagner | Peter |
| BayTech-Resor | Moore | Chris | SMS | Poduje | Noel |
| BW & Associates | Wu | Bevan | Sonoscan | Martell | Steve |
| Cimetrix | Rubow | Brian | SuperSight | Peroots | Len |
| Corning | Schmidt | Ilona | The Scatterworks | Stover | John |
| Microsense | Kallus | David | | | |
| Philips Lumileds | Kim | Andrew | 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 Test Methods TF | | Peter Wagner (Self) |

Table 3 Ballot Results

There were no ballots to be reviewed.

Table 4 Authorized Activities

| # | Type | SC/TF/WG | Details |
|------|-------|----------------------|--|
| --- | TFOF | NA HB-LED TC Chapter | Test Methods TF (<i>New Task Force</i>) |
| 5741 | SNARF | HB-LED Wafer TF | Line item revisions to SEMI HB1-XX14, Specifications for Sapphire Wafers Intended for Use for Manufacturing High Brightness-Light Emitting Diode Devices |
| 5747 | SNARF | Test Methods TF | New Standard: Test Method for Measurement of Saw Marks on Crystalline Sapphire Wafers Using Optical Probes |
| 5748 | SNARF | Test Methods TF | New Standard: Test Method for Measurement of Thickness and Shape of Crystalline Sapphire Wafers Using Optical Probes |
| 5749 | SNARF | Test Methods TF | New Standard: Test Method for Measurement of Waviness of Crystalline Sapphire Wafers Using Optical Probes |

Note: SNARFs and TFOFs are available for review on the SEMI Website at:

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

Table 5 Authorized Ballots

| # | When | SC/TF/WG | Details |
|------|---------------|-----------------|--|
| 5741 | Cycle 6, 2014 | HB-LED Wafer TF | Line item revisions to SEMI HB1-XX14, Specifications for Sapphire Wafers Intended for Use for Manufacturing High Brightness-Light Emitting Diode Devices |

Table 6 New Action Items

| Item # | Assigned to | Details |
|------------|--------------|---|
| 2014Jul#01 | Michael Tran | To follow up with the China HB-LED TC Chapter regarding the title of Document 5723 for clarification. |
| 2014Jul#02 | Michael Tran | To send David Kallus whenever the newest version SEMI HB1 is published. |
| 2014Jul#03 | Michael Tran | To contact Mark Takahashi of AGC Chemicals if interested to join the Sapphire Tablet Substrates Working Group. |
| 2014Jul#04 | Michael Tran | To contact members of the Sapphire Tablet Substrates Working Group to let them know they have joined the group. |
| 2014Jul#05 | Michael Tran | To send Peter Wagner the reviewed TFOF for HB-LED Test Methods TF and SNARFs #5747, #5748, and #5749. |

Table 7 Previous Meeting Actions Items

| Item # | Assigned to | Details | Status |
|------------|--|---|--------|
| 2014Feb#01 | Mike Feng | To work on the Double Sided Polished (DSP) Wafer table for SEMI HB1. | OPEN |
| 2014Feb#02 | Mike Feng & Len Peroots | Prepare a white paper on DSP wafers at the next NA HB-LED TC Chapter meeting. | CLOSED |
| 2014Feb#03 | Win Baylies, Oskar Amster, Lisa Maiocco, & Steve Martell | To form a working group and help with identifying and supplying sapphire wafer defect pictures. | OPEN |
| 2014Feb#04 | Iain Black | Contact Jule Flemish for work on a Patterned Sapphire Substrate (PSS) guide. | OPEN |
| 2014Feb#05 | Win Baylies | To follow up with Dr. Donggren Ko from Rubicon to resume PSS discussion. | OPEN |
| 2014Feb#06 | Noel Poduje | Report on a bow standard in the AWG TF applicable to Sapphire wafers at the next NA HB-LED TC Chapter | CLOSED |
| 2014Feb#07 | Peter Wagner | Prepare a TFOF to form a HB-LED Test Methods TF and SNARF for a new test method document. | CLOSED |
| 2013Oct#03 | Impurities and Defects TF | Collect images for area contamination, particles, and voids. | OPEN |
| 2013Oct#04 | Impurities and Defects TF | Include scale for all images. | OPEN |

| Item # | Assigned to | Details | Status |
|-------------|---------------------------|--|---|
| 2013Oct#05 | Impurities and Defects TF | Review Page 1 (Purpose, Scope, Limitations, Referenced Standards and Documents) in SEMI HB1. | OPEN |
| 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. | CLOSED |
| 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, Bevan to provide update by September 2014 |
| 2013Jul#05 | Peter Wagner | Share wafer flatness parameter presentation. | Has to be published in M1 first as RI to reference it. OPEN |
| 2013Apr#010 | Len Perroots | Prepare a report to the TC Chapter on the applicability of notchless wafers to HB-LED sapphire wafers. | CLOSED |
| 2012Oct#02 | Chris Moore | Review SNARF #5529 (HB-LED JMMM) for Aixtron only specifications. | CLOSED |
| 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 | CLOSED |

1 Welcome, Reminders, and Introductions

1.1 Win Baylies (BayTech-Resor) called the meeting to order. 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 TC Chapter reviewed the previous meeting minutes from the N.A. HB-LED TC Chapter meeting in February 2014.

Motion: To approve the previous meeting minutes from the N.A. HB-LED TC Chapter meeting in February 2014 as written.

By / 2nd: Chris Moore (BayTech-Resor) / Peter Wagner (Self)

Discussion: None.

Vote: 10-0 in favor. Motion passed.

Attachment: 02, N.A. HB-LED TC Chapter Meeting Minutes (February 2014)

3 Liaison Reports

3.1 China HB-LED TC Chapter

3.1.1 Michael Tran (SEMI N.A.) reported for the China HB-LED TC Chapter. Of note:

- China HB-LED TC Chapter Co-chairs
 - Yong Ji (Guizhou Haotian Optoelectronics Technology)
 - Weizhi Cai (San'an Optoelectronics)

- Meeting information
 - Last Meeting
 - China Standards Kick-off Meeting 2014 in Guiyang, Guizhou, China
 - Thursday, May 22th, 2014
 - Next Meeting
 - China Standards Second Meeting 2014 in Harbin, Heilongjiang, China
 - Friday, September 19th, 2014
- Single Crystal Sapphire Task Force
 - Currently working on Doc. 5723, New Standard: *Specification for Single Crystal Sapphire Intended for Use for Manufacturing HB- LED Wafers*

Discussion: The title of Document 5723 is ambiguous and not clear. What is the single crystal sapphire in the title? Is it an ingot, boule or both? The N.A. HB-LED Chapter suggested changing the title to “Specification for Single Crystal Sapphire **Ingots and Boules** Intended for Use for Manufacturing HB-LED Wafers.” Michael Tran will follow up with the China HB-LED TC Chapter regarding the title of Document 5723 for clarification.

Action Item: 2014Jul#01, Michael Tran to follow up with the China HB-LED TC Chapter regarding the title of Document 5723 for clarification.

Attachment: 03, China HB-LED TC Chapter Report (West 2014)

3.2 North America Standards Staff Report

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

- Upcoming SEMI Global Events in 2014
 - SEMICON Taiwan
 - September 3-5, 2014 in Taipei
 - Strategic Materials Conference
 - September 30 – October 1, 2014 in Santa Clara, California
 - SEMICON Europa Plastic Electronics
 - October 7-9, 2014 in Grenoble, France
 - SEMICON Japan
 - December 3-5, 2014 in Tokyo
- Standards Workshop at SEMICON West 2014
 - Wafer Geometry Control for Advanced Semiconductor Manufacturing
 - Important developments and future needs in wafer geometry for advanced semiconductor manufacturing.
 - Presenters from IBM, Intel as well as key equipment companies.
 - Proposals discussed during this workshop will be considered for standardization by the Advanced Wafer Geometry TF under the Silicon Wafer Committee.
- Standards Update at SEMICON West 2014
 - Semiconductor Technology Symposium (STS) Session
 - Metrics Standards Activities Update

- Topic: Challenges, Innovations and Drivers in Metrology
 - 3DS-IC Standards Activities Update
 - Topic: Embracing what's NEXT – Devices & Systems for Big Data, Cloud and IoT
 - TechXPOT Session
 - Facilities & Gases Standards Activities Update
 - Topic: Subcomponent Supply Chain Challenges for 10 nm and Beyond
 - Compound Semiconductor Materials Standards Activities Update
 - Topic: Disruptive Compound Semiconductor Technologies
 - SEMI standards Publications Stats
 - April 2014 – June 2014
 - New Standards: 6
 - Revised Standards: 20
 - Reapproved Standards: 4
 - Withdrawn Standards: 0
 - Total SEMI Standards in portfolio: 909
 - Includes 106 Inactive Standards
- Upcoming NA Standards Meetings
 - NA Standards Fall 2014 Meetings
 - November 3-6, 2014 in SEMI HQ in San Jose, California
 - NA Standards Spring 2015 Meetings
 - (Tentative) March 30 – April 2, 2015 SEMI HQ in San Jose, California
 - NA Standards Meetings at SEMICON West 2015
 - (Tentative) July 13-16, 2015 in San Francisco, California
- SEMI NA Standards staff contact: Michael Tran, mtran@semi.org

Discussion: None.

Attachment: 04, N.A. Standards Staff Report (West 2014)

3.3 Korea HB-LED Working Group

3.3.1 Michael Tran (SEMI N.A.) reported for the Korea HB-LED Working Group. Of note:

- Leadership
 - Hyungsu Park / SEMES
 - Jonghyup Baek/ KOPTI
- Meeting Information
 - Last meeting
 - February 13, 2014 at Coex, Seoul, Korea

- Next Meeting
 - Tentatively in May, August or November 2014
- Major Updates
 - MO (Molybdenum) Source team
 - The General MO Source specifications were submitted by WG members
 - The team listed intersection items and the list was reviewed by chemical companies
 - The SNARF draft will be submitted in the next meeting
 - SEMI HB1 Review team
 - As a result of 4 revision candidates, the team selected below 3 items. SNARF draft will be submitted in the next meeting in May.
 - Flat length
 - r plane direction
 - Flatted wafer flat zone spec
- SEMI Korea Standards staff contact: Natalie Shim, eshim@semi.org

Discussion: None.

Attachment: 05, Korea HB-LED Working Group Report (March 2014)

4 Ballot Review

4.1 There were no ballots to be reviewed.

5 Subcommittee & Task Force Reports

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

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

- *SEMI HB1 Discussion*
 - Reviewed Document # 5741, *Line Item Revisions to SEMI HB1-0113, Specifications for Sapphire Wafers Intended for Use for Manufacturing High Brightness-Light Emitting Diode Devices*
 - Discussed updating wrap and bow references in SEMI HB1.
 - Planning to add DSP Sapphire Wafer Specifications to SEMI HB1 among other revisions.
- *HB-LED Wafer Marking Experiment Project Discussion*
 - Background
 - Several mark fields, each containing a Data Matrix (SEMI T7) and Alpha-Numeric (SEMI M12) message, will be marked on these wafers with surface finish as specified for the back surface. Because the front- and back-surfaces of the starting wafers have identical surface conditions, after marking, the mark field locations distinguish front- from back-surfaces. This marking uses mark field characteristics that are widely deployed in silicon wafer production.
 - Participants

- Silian - Sapphire wafer maker
- InnoLas - Lasermark equipment maker
- HTT - Lasermark equipment reader maker
- Osram - HB-LED device maker
- Silian - Sliced and lasermarked both sides of wafer
- Completed steps
 - InnoLas has completed laser marking of the two wafers and will ship them to Silian for polishing.
- Next steps
 - Silian has received the laser marked wafers from InnoLas and the wafers are in polishing process.
 - Silian will send the polished wafers to HTT for Mark Characterization and then HTT will ship the wafers to Osram.
 - Osram will perform the epi growth and then read the markings post-epi.
 - The final wafer marking experiment report will be generated by Silian and Osram.
- *Impurities and Defects Discussion*
 - The Impurities and Defects TF reviewed the list of visual defects for Silicon Wafer surfaces in SEMI MF154-0305. They found the following Silicon Wafer defects (**in red**) to be applicable to Sapphire Surface defects:

| |
|---|
| Sleek (Groove) |
| Annealing spot (localized light scatter) |
| Edge Chip |
| Edge Crack |
| Pits |
| Skating Rink Defect |
| Slip (slip lines) |
| Bubbles |
| Residual pits (area contamination) |
| Orange Peel |

- The next step for the TF is gathering input on how to best define the defects.
- The TF still reviewing photographs of Sapphire surface defects captured from Silian and Altatech
- The definition of the Sapphire Surface defects and select photographs of the defects will be incorporated into Document 5629 (New Standard: Guide for Defect Identification on Bare Sapphire Wafers)
- *Double Sided Polished (DSP) Wafers Discussion*

- The TF reviewed proposed specifications for 2”, 4” and 6” DSP wafers by Silian.

- DSP Specifications Proposal #1:

| | |
|----------------------|--|
| Orientation: | C-plane (0001) 0° ± 2° (no orientation) |
| Diameter | 100.0 ± 0.5 mm |
| Flat Orientation: | A-plane (11-20) |
| Flat Length: | 32.5 ± 2.5 mm |
| Thickness: | 650 ± 25 µm |
| Frontside State: | Mirror Polished |
| Backside State: | Mirror Polished |
| Frontside Roughness: | 0.1 – 0.3 nm |
| Backside Lasermark: | Refer to custom drawing |
| TTV: | < 25 µm |
| Bow: | ≤ 30 µm |
| Warp: | < 30 µm |
| Bevel Dimensions: | Standard |

- DSP Specifications Proposal #2:

| | |
|----------------------|--|
| Orientation: | C-plane (0001) 0° ± 2° (no orientation) |
| Diameter | 50, 75, 100.0 ± 0.5 mm |
| Thickness: | 300, 400, 650 ± 25µm |
| Frontside State: | Mirror Polished |
| Backside State: | Mirror Polished |
| Frontside Roughness: | 0.1 – 0.3nm |
| Backside Lasermark: | Refer to custom drawing: |
| TTV: | < 25 µm |
| Bow: | ≤ 30 µm |
| Warp: | < 30 µm |
| Bevel Dimensions: | Standard |

- DSP wafers specifications will be added to SEMI HB1 (Specifications for Sapphire Wafers for Manufacturing HB-LED Devices) after further review of each proposal.

- *Patterned Sapphire Substrates (PSS) Specifications Discussion*

- The TF reviewed tools used for each PSS property:
 - AOI for Defect Terminology
 - SEM, 3D microscope, AFM for Geometry
 - AFM,3D microscope for Uniformity
 - SEM, AFM for Shape
 - The TF has not decided what tool to use for Edge Exclusion
- A SNARF for PSS Specifications will be drafted soon

- *Sapphire Tablet Substrates Discussion*

- Please see §7.1 of these minutes for Sapphire Tablet Substrates Discussion.

Action Item: 2014Jul#02, Michael Tran to send David Kallus whenever the newest version SEMI HB1 is published.

Attachment: 06, HB-LED Wafer TF/ Impurities and Defects TF Report (West 2014)

5.2 *Patterned Sapphire Substrates (PSS) Task Force*

5.2.1 Win Baylies (BayTech-Resor) reported for the TF. Please see § 5.1, HB-LED Wafer Task Force / Impurities and Defects Task Force for PSS discussion.

5.3 *HB-LED Equipment Communication Interfaces Task Force*

5.3.1 Brian Rubow (Cimetrix) reported for the HB-LED Equipment Communication Interfaces TF. The TF have put Document 5529 (HB-LED JMMM) on hold because of potential intellectual property issues from the Information & Control committee.

5.3.2 Brian said the only participants in the TF are factory communication experts. There are no HB-LED equipment suppliers or factory members participating. Proposal to disband the TF unless there are more members participating in the TF by the N.A. Standards Fall 2014 meetings. In this case, Document 5529 would remain unimplemented and incomplete.

Attachment: 07, HB-LED Equipment Communication Interfaces TF (West 2014)

6 Old Business

6.1 None.

7 New Business

7.1 *Sapphire Tablet Substrates Discussion*

7.1.1 Win Baylies (BayTech-Resor) gave a presentation for Sapphire Tablet Substrates. He said the reason Sapphire Tablet Substrates is proposed in the HB-LED committee is because this committee is the closest related in terms of Sapphire. There are at least some members in this committee who knows a thing or two about Sapphire. Of note:

- Sapphire Tablet Substrates are used in touch screens, camera lens cover, buttons, smart watches, etc.
- Sapphire Tablet Substrates Issues
 - Physical Dimensions
 - Optical Characteristics
 - Edge Properties

7.1.2 Bevan Wu (BW & Associates) said who would use the tablet substrates standards? Win said major smartphone device makers such as Apple, Samsung, LG, and material suppliers. Win asked if it was too early to look at Sapphire Tablet Substrates defects and everyone agreed it was. Ilona Schmidt (Corning) said they should first look at issues with Sapphire Tablet Substrates in terms of a working group. The N.A. HB-LED TC Chapter agreed to form a Sapphire Tablet Substrates Working Group to identify potential issues with the following members: Chris Moore (BayTech-Resor), Mike Feng (Silian), Ilona Schmidt (Corning), Len Peroots (SuperSight), and David Kallus (Microsense).

Action Item: 2014Jul#03, Michael Tran to contact Mark Takahashi of AGC Chemicals if interested to join the Sapphire Tablet Substrates Working Group.

Action Item: 2014Jul#04, Michael Tran to contact members of the Sapphire Tablet Substrates Working Group to let them know they have joined the group.

Attachment: 08, Sapphire Tablet Substrates (West 2014)

7.2 New TFOF and SNARF

7.2.1 The N.A. HB-LED TC Chapter reviewed the following TFOF and SNARFs for approval:

| # | Type | SC/TF/WG | Details |
|------|-------|----------------------|--|
| --- | TFOF | NA HB-LED TC Chapter | Test Methods TF (<i>New Task Force</i>) |
| 5741 | SNARF | HB-LED Wafer TF | Line item revisions to SEMI HB1-XX14, Specifications for Sapphire Wafers Intended for Use for Manufacturing High Brightness-Light Emitting Diode Devices |
| 5747 | SNARF | Test Methods TF | New Standard: Test Method for Measurement of Saw Marks on Crystalline Sapphire Wafers Using Optical Probes |
| 5748 | SNARF | Test Methods TF | New Standard: Test Method for Measurement of Thickness and Shape of Crystalline Sapphire Wafers Using Optical Probes |
| 5749 | SNARF | Test Methods TF | New Standard: Test Method for Measurement of Waviness of Crystalline Sapphire Wafers Using Optical Probes |

Note: SNARFs and TFOFs are available for review on the SEMI Website at:

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

Motion: To approve TFOF for the formation of a new TF: HB-LED Test Methods TF

By / 2nd: Peter Wagner (Self) / Win Baylies (BayTech-Resor)

Discussion: None.

Vote: 10-0 in favor. Motion passed.

Motion: To approve SNARF #5741

By / 2nd: Chris Moore (BayTech-Resor) / Len Peroots (SuperSight)

Discussion: None.

Vote: 9-0 in favor. Motion passed.

Motion: To approve SNARF #5747

By / 2nd: Peter Wagner (Self) / Chris Moore (BayTech-Resor)

Discussion: None.

Vote: 8-0 in favor. Motion passed.

Motion: To approve SNARF #5748

By / 2nd: Peter Wagner (Self) / Chris Moore (BayTech-Resor)

Discussion: None.

Vote: 5-0 in favor. Motion passed.

Motion: To approve SNARF #5749

By / 2nd: Peter Wagner (Self) / Chris Moore (BayTech-Resor)

Discussion: None.

Vote: 7-1 in favor. Motion passed.

Action Item: 2014Jul#05, Michael Tran to send Peter Wagner the reviewed TFOF for HB-LED Test Methods TF and SNARFs #5747, #5748, and #5749.

7.3 New Ballot Authorization

7.3.1 The N.A. HB-LED TC Chapter reviewed the following documents for letter ballot approval:

| # | When | SC/TF/WG | Details |
|------|---------------|-----------------|--|
| 5741 | Cycle 6, 2014 | HB-LED Wafer TF | Line item revisions to SEMI HB1-XX14, Specifications for Sapphire Wafers Intended for Use for Manufacturing High Brightness-Light Emitting Diode Devices |

Motion: To approve the letter balloting of Document #5741 in Cycle 6, 2014
By / 2nd: Chris Moore (BayTech-Resor) / David Kallus (Microsense)
Discussion: None.
Vote: 9-0 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. Standards HB-LED Meetings will be held on November 6, 2014 in conjunction with the N.A. Standards Fall 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/en/node/50511>

Thursday, November 06*

-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)

-N.A. HB-LED TC Chapter (2:00 PM - 5:00 PM)

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

9.2 Having no further business, the N.A. HB-LED TC Chapter meeting on Thursday, July 10 was adjourned 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 (BayTech-Resor), Co-chair | |
| Bill Quinn (William Quinn Consulting), Co-chair | September 17, 2014 |
| Mike Feng (Silian), Co-chair | September 12, 2014 |
| Iain Black (Philips Lumileds), Co-chair | September 11, 2014 |

Table 8 Index of Available Attachments ^{#1}

| # | Title | # | Title |
|----|--|----|---|
| 01 | SEMI Standards Required Meeting Elements | 05 | Korea HB-LED Working Group Report (March 2014) |
| 02 | N.A. HB-LED TC Chapter Meeting Minutes (February 2014) | 06 | HB-LED Wafer TF/ Impurities and Defects TF Report (West 2014) |

| | | | |
|----|--|----|--|
| 03 | China HB-LED TC Chapter Report (West 2014) | 07 | HB-LED Equipment Communication Interfaces TF (West 2014) |
| 04 | N.A. Standards Staff Report (West 2014) | 08 | Sapphire Tablet Substrates (West 2014) |

#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.