North America Compound Semiconductor Materials Committee Virtual Meeting Summary and Minutes

Web Meeting and Teleconference
Thursday, October 25, 2012
1:00 PM to 3:00 PM (Eastern Time)
10:00 AM to 12:00 PM (Pacific Time)

Next Committee Meeting

The next NA Compound Semiconductor Materials meeting is scheduled for May 15, 2013 at 7:00 CDT in conjunction with CS MANTECH 2013 at the Hilton New Orleans Riverside, Melrose Room, in New Orleans, Louisiana, USA.

More information will be updated at http://www.semi.org/en/Standards/CalendarEvents

Table 1 Meeting Attendees

Italics indicate virtual participants

Co-Chairs: James Oliver (Northrop Grumann), Russ Kremer (Freiberger)
SEMI Staff: Paul Trio, Michael Tran

Company	*Last*	*First*	*Company*	*Last*	*First*
Evergreen Enhancement	*Kerr*	*Bill*	*Northrop Grumman*	*King*	*Matt*
Freiberger	*Kremer*	*Russ*	*Northrop Grumman*	*Oliver*	*Jim*
Lehighton Electronics	*Nguyen*	*Danh*			
Lehighton Electronics	*Blew*	*Austin*	*SEMI N.A.*	*Trio*	*Paul*
NOVASiC	*Kronwasser*	*Judy*	*SEMI N.A.*	*Tran*	*Michael*

Table 2 Leadership Changes

There were no leadership changes.

Table 3 Ballot Results

There were no ballot results.

Table 4 Authorized Activities

There were no authorized activities.

Table 5 Authorized Ballots

There were no authorized ballots.

Table 6 New Action Items

Item #	*Assigned to*	*Details*
2012Oct#01	Michael Tran	Check with SEMI international staff to see if companies in their regions would be interested in the GaN HEMT Mobility Round Robin
2012Oct#02	Jim Oliver	Contact Hani Badawi whether to disband the Ge for PV Applications TF.
2012Oct#03	Jim Oliver, Judy Kronwasser, and Arnd Weber	Will discuss in a three-way call about the IP issues and plans going forward for M55.
2012Oct#04	Michael Tran	Send Russ Kremer SEMI M9.7-0708 — *Specification for Round 150 mm Diameter Polished Monocrystalline Gallium Arsenide Wafers (Notched)* for the five-year review.

Table 6 New Action Items

Item #	*Assigned to*	*Details*
2012Oct#05	Michael Tran	Revise the Purpose and Scope of SEMI M9.1, M9.2, M9.5, M9.6 and send them to the committee leaders for review and GCS approval for Cycle 1 or 2 balloting.

Table 7 Previous Meeting Actions Items

Item #	*Assigned to*	*Details*	*Status*
2012Apr #01	Michael Tran	Ask Arnd Weber whether he will be able to perform 5-Year Review on M55.	CLOSED
2012Apr #02	Michael Tran	Ask Arnd Weber to add Andy Souzis and Judy Kronwasser to the Europe SiC TF.	CLOSED
2012Apr #03	Michael Tran	Generate list of document needing five year review for Russ Kremer.	CLOSED
2012Apr #04	Jim Oliver	Determine the location and venue of the next NA CSM committee meeting in Fall 2012.	CLOSED
2011Sep #02	Paul Trio and Kevin Nguyen	Look into the mobility standard developed by the Japan CSM committee.	Still open.
2011Sep #03	Jim Oliver	Help find volunteers, possibly from Cree or II-VI, to lead the SiC Task Force.	In progress.

1 Welcome, Reminders, and Introductions

1.1 Jim Oliver, committee co-chair, called the meeting to order at 10:16 AM PST. The meeting reminders on antitrust issues, intellectual property issues and holding meetings with international attendance were reviewed. Attendees introduced themselves.

Attachment: 01, Required Meeting Elements

2 Review of Previous Meeting Minutes

2.1 The committee reviewed the minutes of the previous meeting in conjunction with CS MANTECH 2012. However, due to SEMI Regulations, virtual participants could not vote on the motion to approve the minutes from the previous meeting. The minutes from the previous meeting will be approved at the next committee meeting in conjunction with CS MANTECH 2013.

3 Liaison Reports

3.1 *ASTM F1.15 Subcommittee*

3.1.1 *F1.15 GaN Epitaxial Wafer Reference Material Task Force*

3.1.1.1 Matt King (Northrop Grumman) reported for the F1.15 GaN Epitaxial Wafer Reference Material Task Force. Matt has been working with Albert Davydov from NIST in analyzing the standards GaN reference samples with respect to electrical properties. They are trying to identify people to deliver the GaN epitaxy so they could do some testing. They will begin to do some testing for the GaN on Sapphire and GaN on Silicon samples they already have on hand.

3.1.1.2 Matt could use some help with the computational analysis and Secondary Ion Mass Spectrometry (SIMS) testing if there are volunteers or companies out there willing to help with the measurements or donate some funding. The SIMS testing might be done on a consulting basis or as a round robin. Matt could always use more donations of GaN epi substrates. Thickness can range from 400 microns to mid-600 microns.

Attachment: 02, ASTM F1.15 - GaN Epi Standard

3.1.2 *GaN HEMT Mobility Round Robin*

3.1.2.1 Danh Nguyen (Lehighton Electronics) reported for the GaN HEMT Mobility Round Robin. Danh said II-VI Incorporated sent five samples of their 3” Silicon Carbide substrates. Other companies such as IQE-RF, Cree, and Veeco are willing to supply sample substrates, but with restrictions, constraints, and non-disclosure agreements (NDAs). The round robin needs volunteers to help grow the GaN epi out of these sample substrates.

3.1.2.2 Austin Blew said he was in Albert Davydov’s lab recently and NIST has an in-house reactor to grow the GaN. He wondered if the sample substrates Albert will supply to Danh will have the GaN epi on it from the reactor. Matt said it will just be the sample substrates that Albert has already on hand. He doesn’t think Albert is using the capability he has in house to grow the GaN epi for the samples. For Northrop Grumman, growing the GaN epi will be on a case by case basis. The problem will be the buffer layers and even with a non-propriety structure, they are a protected part of the epi stacks which are propriety. It is best to avoid getting into the buffer layers. Northrop Grumann does have capabilities for growth, but Matt would have to discuss the details with the company’s law department to see how far they could go with the epi structures.

3.1.2.3 Austin said the substrates from II-VI have no buffer layer. Some sort of buffer layer would be needed to put the epi on. The problem is a generic buffer layer doesn’t exist and existing buffer layers are propriety materials from companies. He suggested SEMI check with other companies such as in China to see if they would be interested in the round robin, do measurements, and donate their substrates without the propriety materials or NDAs. Jim said there are regulations and rules for importing and exporting GaN and SiC wafers. Danh also mentioned China will not be able to receive any sample substrates for their measurements because of the NDAs from other companies and wondered how that would benefit the round robin.

Action Item: 2012Oct#01, Michael Tran to check with SEMI international staff to see if companies in their regions would be interested in the GaN HEMT Mobility Round Robin

Attachment: 03, GaN HEMT Mobility Round Robin Update

3.2 *Europe Compound Semiconductor Materials Committee*

3.2.1 Michael Tran (SEMI N.A.) gave the Europe Compound Semiconductor Materials Report. The key items were as follows:

- The committee chair is Arnd Weber (SiCrystal)
- Meetings
    - Last meeting was October 19, 2012, at SEMICON Europa
    - Next meeting is to be determined – possibilities include:
        - March 2013, in conjunction with CS Europe
        - October 2013, in conjunction with SEMICON Europa
- Global SiC TF
    - Currently drafting Document 5370, Specification for 150 mm Silicon Carbide Single-crystalline Substrate
- GaSb Wafer Specification Global TF
    - Document 4809, Line Item Revisions to SEMI M75-0309, Specifications for Polished Monocrystalline Gallium Antimonide Wafers
        - Was published as SEMI M75-0812
    - The TF might disband at the next committee meeting if there are no new activities
- Carbon in GaAs TF

- Document 4618, Test Method for the Carbon Acceptor Concentration in Semi-Insulating Gallium Arsenide Single Crystals by Infrared Absorption Spectroscopy
        - Was published as SEMI M82-0712
        - New SNARF #5498, Revision to SEMI M82-0712, to take care of some issues

- EPD Measurement in GaAs TF
    - Balloted Document 4810, Test Method for Determination of Dislocation Etch Pit Density in Monocrystals of III-V Compound Semiconductors
        - Is going to be published as SEMI M83
        - New SNARF #5499, Revision to SEMI M83 to take care of some issues right after SEMI M83 is published

- SEMI EU Contact, Yann Guillou (yguillou@semi.org)

Attachment: 04, EU CSM Report

3.3 *Japan Compound Semiconductor Materials Committee*

3.3.1 There was no report received.

3.4 *SEMI Staff Report*

3.4.1 Paul Trio (SEMI N.A.) gave the SEMI Staff Report. The key items were as follows:

- Upcoming SEMI Standards Major Events
    - SEMICON Japan in conjunction with PV Japan
        - December 5-7, 2012, in Chiba, Japan
    - SEMICON Korea in conjunction with LED Korea
        - January 30-Febrauary 1, 2013 in Seoul, Korea
    - SEMICON China in conjunction with FPD china and SOLARCON China
        - March 19-21, 2013 in Shanghai, China
    - NA Standards Spring 2013 Meetings
        - April 1-4, 2013 in San Jose, California, U.S.A.
    - SEMICON West 2013 Standards meetings
        - July 8-11, 2013 in San Francisco, California, U.S.A.
- Cycle 1, 2, and 3-2013 Critical Dates for SEMI Standards Ballots
    - Cycle 1, 2013
        - Ballot Submission Date: January 3, 2013
        - Voting Period Starts: January 16, 2013
        - Voting Period Ends: February 15, 2013
    - Cycle 2, 2013
        - Ballot Submission Date: February 4, 2013
        - Voting Period Starts: February 18, 2013
        - Voting Period Ends: March 20, 2013

  - Cycle 3, 2013
    - Ballot Submission Date: April 17, 2013
    - Voting Period Starts: May 1, 2013
    - Voting Period Ends: May 31, 2013
- Upcoming North America Standards Meetings
  - NA Standards Fall 2012 Meetings, October 29–November 1, 2012 at SEMI Headquarters in San Jose, California
  - NA Standards Spring 2013 Meetings, April 1–4, 2013 at SEMI Headquarters in San Jose, California
    - SEMI is inviting local companies to host some meetings so the NA Standards Spring 2013 Meetings could maintain a one week format.
  - Compound Semiconductor Materials committee meeting in conjunction with CS MANTECH 2013
    - May 15, 2013, in New Orleans, Louisiana
  - NA Standards Meetings at SEMICON West 2013
    - July 8-11, 2013 in San Francisco, California
- New Standards Ballot and Memberships Systems
  - Key changes
    - User interface
    - Log-in
      - One-time log-in per session to vote on ballots
      - Same log-in for SEMI Members
  - Functionality
    - Retrieve and edit submitted votes for current cycle
    - Text field and attachment option for each ballot or line item
  - Integration
    - Linked to new membership application / profile management
    - Access to other SEMI products & services
  - Target deployment: Cycle 1, 2013
- SEMI N.A. contact: Michael Tran, mtran@semi.org

Attachment: 05, SEMI North America Standards Staff Report

4 Ballot Review

4.1 There were no ballots to review.

5 Subcommittee & Task Force Reports

5.1 *Gallium Nitride Task Force*

5.1.1 Judy Kronwasser reported for the GaN Task Force. Mr. Motoyuki Shigeiwa from Mitsubishi Chemical Corporation joined the TF. He provided his feedback for the GaN diameters survey on behalf of his company making it the fifth company to provide results so far. Matt King (Northrop Grumman) agreed to review Document 4979, (Polished Monocrystalline GaN Wafers). The document will also be sent out to the global committee for additional feedback and then for ballot in Cycle 3-2013.

Attachment: 06, GaN Survey Results (updated)

5.2 *Electrical Properties Task Force*

5.2.1 See § 3.1, ASTM F1.15 Subcommittee.

5.3 *Ge for PV Applications Task Force*

5.3.1 There have been no activities. Jim Oliver will contact Hani Badawi (AXT Inc.) to determine whether to disband the TF.

Action Item: 2012Oct#02, Jim to contact Hani Badawi whether to disband the Ge for PV Applications TF.

5.4 *M55 Task Force*

5.4.1 The TF is reviewing Intellectual Properties (IPs) received from SEMI M55, *Specification for Polished Monocrystalline Silicon Carbide Wafers*. The TF is considering consolidating all the M55 subdocuments into one new document as SEMI M55 and removing all the IP material.

Attachment: 07, M55 review Arnd Weber

Action Item: 2012Oct#03, Jim Oliver, Judy Kronwasser, and Arnd Weber will discuss in a three-way call about the IP issues and plans going forward for M55.

5.5 *Silicon Carbide Task Force*

5.5.1 The TF is still looking for a TF leader. The TF deferred to the EU Silicon Carbide TF where most of the SiC activities have been occurring. Topics included 150 mm Silicon Carbide flats, flat lengths and T5 lasermarking. The committee was concerned with the lasermarking being on the carbon face. (Typically wafer backside)

Attachment: 08, EU SiC TF Report

6 Old Business

6.1 *Five-Year Review*

6.1.1 The committee reviewed documents due for their five year reviews:

#	*Title*	*Status*
SEMI M9.1-96E (Reapproved 0308)	Standard for Round 50.8 mm Polished Monocrystalline Gallium Arsenide Wafers for Electronic Device Applications	Reapproval ballot of this document will be submitted for Cycle 1 or 2-2013 pending GCS approval
SEMI M9.2-96E (Reapproved 0308)	Standard for Round 76.2 mm Polished Monocrystalline Gallium Arsenide Wafers for Electronic Device Applications	Reapproval ballot of this document will be submitted for Cycle 1 or 2-2013 pending GCS approval

#	*Title*	*Status*
SEMI M9.5-96E (Reapproved 0308)	Standard for Round 100 mm Polished Monocrystalline Gallium Arsenide Wafers for Electronic Device Applications	Reapproval ballot of this document will be submitted for Cycle 1 or 2-2013 pending GCS approval
SEMI M9.6-95E (Reapproved 0308)	Standard for Round 125 mm Diameter Polished Monocrystalline Gallium Arsenide Wafers	Reapproval ballot of this document will be submitted for Cycle 1 or 2-2013 pending GCS approval
SEMI M9.7-0708	Specification for Round 150 mm Polished Monocrystalline Gallium Arsenide Wafers (Notched)	Will be reviewed by Russ Kremer

Action Item: 2012Oct #04, Michael Tran to Send Russ Kremer SEMI M9.7-0708 — Specification for Round 150 mm Diameter Polished Monocrystalline Gallium Arsenide Wafers (Notched) for the five-year review.

Action Item: 2012Oct #05, Michael Tran to revise the Purpose and Scope of SEMI M9.1, M9.2, M9.5, M9.6 and send them to the committee leaders for review and GCS approval for Cycle 1 or 2 balloting.

7 New Business

7.1 *Upcoming Ballots*

#	*When*	*SC/TF/WG*	*Details*
4979	Cycle 3-2013	Gallium Nitride (GaN) TF	New Standard: Specification for Polished Monocrystalline Gallium Nitride Wafers *(Note: Pending GCS approval for Cycle 3-2013 balloting)*
---	Cycle 1 or 2-2013	NA CSM committee	Revision of SEMI M9.1-96E (Reapproved 0308), with title change to: Specification for Round 50.8 mm Polished Monocrystalline Gallium Arsenide Wafers for Electronic Device Applications *(Will be submitted for Cycle 1 or 2-2013 for GCS approval.)*
---	Cycle 1 or 2-2013	NA CSM committee	Revision of SEMI M9.2-96E (Reapproved 0308), with title change to: Specification for Round 76.2 mm Polished Monocrystalline Gallium Arsenide Wafers for Electronic Device Applications *(Will be submitted for Cycle 1 or 2-2013 for GCS approval.)*
---	Cycle 1 or 2-2013	NA CSM committee	Revision of SEMI M9.5-96E (Reapproved 0308), with title change to: Specification for Round 100 mm Polished Monocrystalline Gallium Arsenide Wafers for Electronic Device Applications *(Will be submitted for Cycle 1 or 2-2013 for GCS approval.)*
---	Cycle 1 or 2-2013	NA CSM committee	Revision of SEMI M9.6-95E (Reapproved 0308), title change to: Specification for Round 125 mm Diameter Polished Monocrystalline Gallium Arsenide Wafers *(Will be submitted for Cycle 1 or 2-2013 for GCS approval.)*

8 Action Item Review

8.1 *Open Action Items*

8.1.1 Paul Trio and Michael Tran (SEMI) 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 Paul Trio and Michael Tran (SEMI) 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 Compound Semiconductor Materials meeting is scheduled for May 15, 2013 at 7:00 CDT in conjunction with CS MANTECH 2013 at the Hilton New Orleans Riverside, Melrose Room, in New Orleans, Louisiana, USA.

More information will be updated at http://www.semi.org/en/Standards/CalendarEvents

9.2 Having no further business, the virtual meeting participants mutually agreed to adjourn the NA Compound Semiconductor Materials virtual committee meeting on October 25, 2012.

Respectfully submitted by:

Michael Tran
Senior Standards Engineer
SEMI North America
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Minutes approved by:

Jim Oliver (Northrop Grumman), Co-chair	April 18, 2013
Russ Kremer (Freiberger), Co-chair	

Table 8 Index of Available Attachments [#1]

#	*Title*	#	*Title*
01	Required Meeting Elements	05	SEMI North America Standards Staff Report
02	ASTM F1.15 - GaN Epi Standard	06	GaN Survey Results (updated)
03	GaN HEMT Mobility Round Robin Update	07	M55 review Arnd Weber
04	EU CSM Report	08	EU SiC TF Report

#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.