

NA PV/PV Materials TC Chapters Meeting Minutes

NA Spring Standards Meetings 2014
 Wednesday, 2 April, 2014, 1:00 PM - 4:00 PM
 SEMI HQ, San Jose, CA

Next Committee Meeting

Wednesday, July 9, 2014, Marriott Marquis, San Francisco, CA in conjunction with the Intersolar North America. Check www.semi.org/standards for latest update.

Attendees:

SEMI Staff

Kevin Nguyen – SEMI HQ
 Kris Shen – SEMI China

Co-chair – Lori Nye (Brewer Science)

Table 1 – Meeting Attendees

<i>Last Name</i>	<i>First Name</i>	<i>Company</i>
Gotts	Hugh	Air Liquide Electronics US
Nye	Lori	Brewer Science
Sinton	Ron	Sinton Instruments*
Wu	Stone	GDSOLAR

* Attended via teleconference

Table 2 – Organization/Task Force Changes

<i>Group</i>	<i>Previous Leader</i>	<i>New Leader</i>
PV Electrical & Optical Properties Measurement Task Force	TF was disbanded.	
NA PV Materials TC Chapter		Hugh Gotts (Air Liquide) - Co-chair

Table 3 – Ballot Summary

<i>Document #</i>	<i>Document Title</i>	<i>Committee Action</i>
5608	Line Item Revision to SEMI PV13-0813, Test Method for Contactless Excess-Charge-Carrier Recombination Lifetime Measurement in Silicon Wafers, Ingots, and Bricks Using an Eddy-Current Sensor Line Item 1 - Add sections A2-3 and A2-3.1 and associated footnotes (26, 27 and 28).	Passed with editorial changes.

Table 4 – Authorized Ballot

None

Table 5 – Authorized Activities

None. **Note:** existing SNARFs and TFOFs are available for review on the SEMI Web site at: <http://downloads.semi.org/web/wstdsbal.nsf/TFOFSNARF>

Table 6 – Previous Meeting Actions Items

<i>Item #</i>	<i>Assigned to</i>	<i>Details</i>	<i>Status</i>
0713-1	Kevin Nguyen (SEMI Staff)	To ask SEMI Taiwan staff to contact the leader of the PV Wafer Measurement TF to roll all their activities into NA Task Forces since the scope is almost identical to that of the NA PV Electrical & Optical Measurement TF and International PV Analytical Test Methods TF. <ul style="list-style-type: none"> To follow up with Taiwan group to ensure these activities are folded into the NA TFs and ensure that there is no potential duplication 	Completed. Lori asked Kevin to provide the name and email contact of the new leader to Hugh Gotts so they can start liaison
1013-1	Hugh Gotts (Air Liquide)	To ask Patrick Schnabel (Evans Analytical) to consider revising <i>SEMI PV25-1011 Test Method for Simultaneously Measuring Oxygen, Carbon, Boron and Phosphorus in Solar Silicon Wafers and Feedstock by Secondary Ion Mass Spectrometry</i> to include Aluminum in the test method as requested by Til Bartel (Calisolar)	Completed
1013-2	Hugh Gotts (Air Liquide)	To examine new statistical methods (short run) to address a method round robin studies where a limited number of analysis facilities are available and report at the next meeting.	Ongoing investigation. A minimum of 6 labs is still ideal.

Table 7 – New Actions Items

<i>Item #</i>	<i>Assigned to</i>	<i>Details</i>
0414-1	Hugh Gotts and Kris Shen	To exchange contact and send appropriate requirement to appropriate Chinese TF leaders for PV49 ICPMS round robin for potential participation
0414-2	Kris Shen	To recommend the author of Doc. 5699: Test Method for Interstitial Atomic Oxygen Content of Crystalline Silicon by Multiple Transmission-reflection Infrared Absorption, for deleting the word “ ATOMIC ” from the title
0414-3	Kevin Nguyen	To request Austin Blew and Chris Moore to consider being TF leaders of the Int’l PV Analytical Test Methods TF
0414-4	Kevin Nguyen	To inform Paul Trio on Hugh Gotts, the 3 rd NA PV Materials TC co-chair, for official confirmation at the NARSC meeting. Paul to add on the July 2014 agenda

1.0 Call to Order

Lori Nye called the meeting to order and welcomed everyone who attended. A round of self-introduction was made. All SEMI standards meetings are subjected to SEMI Anti-Trust Reminder and Guidelines concerning Patentable Technology. SEMI Regulations now require all attendees to be members of SEMI standards. Membership enrollment is at www.semi.org/standardsmembership. The agenda was reviewed and approved.

2.0 Review and Approval of Meeting Minutes from NA Fall Meeting , San Jose, CA, Oct 31, 2013

Minutes were reviewed. No change was made.

Motion: To accept the minutes as written.

By / 2nd: Ron Sinton (Sinton Instruments)/Hugh Gotts (Air Liquide)

Discussion: None

Vote: 2/0. Motion passed

[Attachment – 1, NAPVMaterialsMeetingMinutes20131030](#)

3.0 Staff Report

Report was given by Kevin Nguyen. Highlights.

- 2014 Event

<i>Event Name</i>	<i>Event Details</i>
SEMICON Singapore	April 23-25, 2014 Marina Bay Sands
SEMICON Russia	May 14-15, 2014 Moscow
SEMI Advanced Semiconductor Manufacturing Conference	May 19-21, 2014 Saratoga Springs, New York
SEMICON West	July 8-10, 2014 San Francisco, California
SEMICON Taiwan	September 3-5, 2014 Taipei
SEMICON Europa Plastic Electronics	October 7-9, 2014 Grenoble, France
SEMICON Japan	December 3-5, 2014 Tokyo

- NA Standards 2014 Meetings
 - NA Compound Semiconductor Materials TC Meeting 2014
 - May 21, 2014 [Sheraton Denver Downtown Hotel, Denver, Colorado]
 - NA Standards Meetings at SEMICON West 2014
 - July 7-10, 2014 [San Francisco, California]
 - NA Standards Fall 2014 Meetings
 - November 3-6, 2014 [SEMI HQ in San Jose, California]
 - SEMICON West 2014 Visitor Registration (Register Today!)
 - <http://www.semiconwest.org/Participate/RegisterNow>
 - Complimentary [March 18 – May 9]
 - \$50 [May 10 – June 6], \$100 [June 7 – July 4], \$150 [July 5 – July 10]
 - Technical Ballot Critical Dates
 - Cycle 3, 2014
 - Ballot Submission Date: April 11, 2014
 - Voting Period Starts: April 22, 2014
 - Voting Period Ends: May 22, 2014
 - Cycle 4, 2014
 - Ballot Submission Date: May 9, 2014
 - Voting Period Starts: May 23, 2014
 - Voting Period Ends: June 23, 2014
 - Publication cycle - February 2014 Cycle
 - New Standards: 4
 - Revised Standards: 5
 - Reapproved Standards: 0
 - Withdrawn Standards: 1
 - Total SEMI Standards in portfolio: 901. Includes 99 Inactive Standards
- [Attachment – 2, SEMI Staff Report \(Spring 2014\) revE](#)

4.0 Liaison Report

4.1 European PV Materials Committee

Report was given by Kevin Nguyen. Highlights.

- Last meeting
 - Oct 7, 2013
 - SEMICON Europa
 - Dresden, Germany
- Next meeting
 - June 2014
 - Intersolar Europe
 - Munich, Germany
- Ballot Results Summary from October meeting
 - Doc 5565, Line Item Revision to PV42, Test Method for In-Line Measurement of Waviness on PV Silicon Wafers by a Light Sectioning Technique Using Multiple Line Segments – PASSED
 - Doc 5433, New Standard, Test Method for In-line Characterization of PV Silicon Wafers regarding Grain Size – PASSED and PUBLISHED as **PV52-0214**
 - Doc 5432, New Standard, Test Method for In-line Characterization of PV Silicon Wafers by Using Photoluminescence – PASSED and PUBLISHED as **PV51-0214**
- PV Silicon Materials TF
 - Published Standards
 - PV17-1012 Specification for Virgin Silicon Feedstock Materials for Photovoltaic Applications
 - PV39-0912 Test Method for In-Line Measurement of Cracks in PV Silicon Wafers by Dark Field Infrared Imaging
 - PV40-0912 Test Method for In-Line Measurement of Saw Marks on PV Silicon Wafers by a Light Sectioning Technique Using Multiple Line Segments
 - PV41-0912 Test Method for In-Line, Noncontact Measurement of Thickness and Thickness Variation of Silicon Wafers for PV Applications Using Capacitive Probes
 - PV42-0113 Test Method for In-Line Measurement of Waviness of PV Silicon Wafers by a Light Sectioning Technique Using Multiple Line Segments
- PV Ribbon TF
 - Published Standards:
 - PV18-0912 Guide for Specifying a Photovoltaic Connector Ribbon
 - PV19-0712 Guide for Testing Photovoltaic Connector Ribbon Characteristics
 - TF was disbanded.
- SEMI Europe Staff
 - Andrea Busch (abusch@semi.org)

[Attachment – 3, EU PV Materials Liaison Report 20131022](#)

4.2 Japan PV/PV Materials Committee

Report was given by Kevin Nguyen. Highlights

- Last Meeting
 - March 7, 2014 at SEMI Japan Office, Tokyo, Japan
- Next Meeting
 - July 4, 2014 at SEMI Japan Office, Tokyo, Japan
- Japan PV Materials TF
 - Drafting Doc. #5417 “New Standard: Test Method for Measurement of Defects in PV Silicon Wafers in PV Modules by Electroluminescence (EL) Imaging”

- Drafting Doc. #5532, “New Standard: Test Method for Measurement of Cracks in PV Silicon Wafers in PV Modules by Laser Scanning”
 - Will be issued for cycle 3-2014
- SEMI Japan Staff (Chie Yanagisawa, cyanagisawa@semi.org)

[Attachment – 4, JA_PV&PVM_NA-Spring_2014_R0.1](#)

4.3 Taiwan PV Committee

Highlights.

- Last meeting
 - Oct 25, 2013
 - SEMI Office, Hsinchu
- Next meeting
 - April 25, 2014
 - ITRI
- Organic and Dye Sensitized Solar Cell TF
 - Charter
 - The objective is to develop technical Standards related to organic photovoltaic (OPV) and dye sensitized solar cell (DSSC), including new test methods, standardization and evaluation of OPV/DSSC products and components.
 - Drafting:
 - Doc. 5597, New Standard: Test Method for Current-Voltage (I-V) Performance Measurement of Dye Sensitized Solar Cell (DSSC)
 - Doc. 5598, New Standard: Durability Test Method of Dye Sensitized Solar Cell (DSSC) in Subtropical Climates
 - Doc. 5599, New Standard: Test Method for Spectrum Response (SR) Measurement of Dye Sensitized Solar Cell (DSSC)
- PV Package TF
 - Drafting Document 5431: New Standard : Test Method for Performance Criteria of Photovoltaic (PV) Wafer, Cell, and Module Package in process
 - Survey Horizontal Impact, Rotational Flat Drop Test specification and Equipment, Arrange test with Real and Dummy cells, Define Experimental Project and Running schedule.
- PV BIPV TF
 - Drafting Document 5560 : New Standard: Classification of Building Integrated Photovoltaic (BIPV) in progress
- Wafer Measurement Method TF
 - Leader Changed to Dr. Saumine Chen/ITRI, CMS would like to take the new leader role.
- Regional Staff Contact Information
 - Cher Wu (cwu@semi.org)

[Attachment – 5, Taiwan PV_Liaison_20130619](#)

4.4 China PV Committee

Kris Shen reported. Highlights

- Last meeting
 - China Spring Standards Meeting 2014
 - Shanghai, China
 - Thursday, March 20th, 2014
 - Check www.semi.org/standards for latest update
- Next Meeting

- Hebei, Baoding, China
- Friday, June 13th, 2014

- *PV Silicon Wafer Task Force*
 - Drafting
 - Doc. 5382B, Specification for Quasi-monocrystalline Silicon Wafers Used in Photovoltaic Solar Cells

- *PV Module Task Force*
 - Published
 - SEMI PV44-0513, Specification for Package Protection Technology for PV Modules
 - SEMI PV45-0513, Test Method for the Content of Vinyl Acetate (VA) in Ethylene-Vinyl Acetate (EVA) Applied in PV Modules Using Thermal Gravimetric Analysis (TGA)
 - Drafting
 - Doc. 5563, Specification for Framing Tape for PV Modules
 - Failed ballot review and returned to TF for re-work
 - Doc. 5660, Specification for Ultra-thin Glasses Used for Photovoltaic Modules
 - Doc. 5661, Test Method for Electrical Parameters Testing of Bifacial Solar Module
 - Doc. 5644, Terminology for Back Contact PV Cell and Module

- *PV Diffusion Furnace Test Methods Task Force*
 - Doc. 5429: Test Method for In-line Monitoring of Flat Temperature Zone in Horizontal Diffusion Furnaces
 - Passed by TC, to be submitted to A&R Subc for procedural review

- *PV Silicon Raw Materials Task Force*
 - Published
 - SEMI PV50-0114 Specification for Impurities in Polyethylene Packaging Materials for Polysilicon Feedstock
 - Activity:
 - Doc. 5476A, Test Method for Determination of Total Carbon Content in Silicon Powder by Infrared Absorption after Combustion in an Induction Furnace
 - Passed by TC, to be submitted to A&R Subc for procedural review
 - Doc. 5477A, Test Method for Determining B, P, Fe, Al, Ca Contents in Silicon Powder for PV Applications by Inductively-Coupled-Plasma Optical Emission Spectrometry
 - Failed ballot review and was authorized for rebalot in Cycle 3-2014
 - Hugh Gotts asked Kris Shen if this task force leader, who is authoring doc. 5477A, would be interest in joining his round robin 5567, Auxiliary Document: Interlaboratory Study for PV49, Test Method for the Measurement of Elemental Impurity Concentrations in Silicon Feedstock for Silicon Solar Cells By Bulk Digestion, Inductively Coupled-Plasma Mass Spectrometry. **Action Item 1 – Hugh Gotts and Kris Shen to get in touch via email and send appropriate requirement to the Chinese TF leader for potential round robin participation**
 - Doc. 5564A: Test Method for the Measurement of Chlorine in Silicon by Ion Chromatography
 - Failed ballot review and returned to TF for re-work
 - Doc. 5699: Test Method for Interstitial Atomic Oxygen Content of Crystalline Silicon by Multiple Transmission-reflection Infrared Absorption

- New SNARF
 - Hugh Gotts recommended deleting the word “Atomic” from the title since present title is technically incorrect. Action Item 2 – Kris Shen will take this message back to the author, so modification can be made.
 - Doc. 5670: Test Method for Substituted Carbon Content of Crystalline Silicon by Multiple Transmission-reflection Infrared Absorption
 - New SNARF
- *PV Thin Film Task Force*
 - Drafting:
 - Doc. 5478: Test Method for Thin-film Silicon PV modules Light Soaking
- *PV Power Station Equipment Integrated Performance Task Force*
 - Drafting:
 - Doc. 5648: Test Method for the Integrated Efficiency of Installed PV Components
 - Kris also mentioned there was a petition at the NARSC meeting on Sunday, March 30 for the China PV Systems Power Station TC Chapter. The petition generated lively discussion and ultimately was endorsed by the NARSC. The next official approval body will be at the ISC meeting on Thursday, July 10, 2014 in San Francisco, CA.
 - Stone Wu also commented there is little or no standards in PV Power systems. He was pleased with the support among the NARSC members and asked for support for speedy formation and approval of the TC Chapter, so standards can be created.
- *Crystalline Silicon Solar Cell Task Force*
 - Doc. 5426, Specification for Aluminum Paste, Used in Back Surface Field of Crystalline Silicon Solar Cells
 - Passed by TC, to be submitted to A&R Subc for procedural review
 - Doc. 5427, Specification for front Surface Silver Paste, Used in P-Type crystalline Silicon Solar Cells
 - Passed by TC, to be submitted to A&R Subc for procedural review
 - Doc. 5659, Test Method Based on RGB for C-Si Solar Cell Color
 - To be issued for ballot in Cycle 3-2014
- SEMI China Standards Contact : Kris Shen (kshen@semi.org)

[Attachment – 6, China Photovoltaic Committee Liaison Report20131029](#)

5.0 Ballots Review

- 5.1 Doc. 5608, Line Item Revision to SEMI PV13-0813, Test Method for Contactless Excess-Charge-Carrier Recombination Lifetime Measurement in Silicon Wafers, Ingots, and Bricks Using an Eddy-Current Sensor
 - 5.1.1 Document also passed technical review with editorial changes and was forwarded to the ISC Audits and Reviews Subcommittee for procedural review. See attachment below for detail of ballot adjudication.

[Attachment – 7, 5665ProceduralReview](#)

6.0 Current NA Activities

6.1 *Int'l PV Analytical Test Methods TF/Hugh Gotts(Air Liquide)*

- 6.1.1 Hugh Gotts reported meeting summary. Highlights.

- 6.1.1.1 Status of doc. 5435, Auxiliary Information to include interlaboratory study for SEMI PV25-1011, Test Method for Simultaneously Measuring Oxygen, Carbon, Boron and Phosphorus in Solar Silicon Wafers and Feedstock by Secondary Ion Mass Spectrometry
 - Still in progress.
- 6.1.1.2 Status of doc. 5437, Line item revision of SEMI PV25-1011, Test Method for Simultaneously Measuring Oxygen, Carbon, Boron and Phosphorus in Solar Silicon Wafers and Feedstock by Secondary Ion Mass Spectrometry
 - Line item ballot will not initiate until the round robin is completed.
- 6.1.1.3 Status of doc. 5501, Auxiliary Document: Interlaboratory Study for PV43-0113 - Test Method For The Measurement Of Oxygen Concentration In PV Silicon Materials For Silicon Solar Cells By Inert Gas Fusion Infrared Detection Method
 - Ongoing. Data from various labs have been collected except for one lab. Next report will be given in San Francisco meeting.
- 6.1.1.4 Status of Doc. 5567, Auxiliary Document: Interlaboratory Study for PV49-1110, Test Method for the Measurement of Elemental Impurity Concentrations in Silicon Feedstock for Silicon Solar Cells By Bulk Digestion, Inductively Coupled-Plasma Mass Spectrometry
 - The TF is still looking for participating labs from Asia.

[Attachment – 8, 2014 Spring NA PV Standards Analytical TF agenda](#)

6.2 PV Electrical and Optical Properties Measurement TF/Chris Moore, Austin Blew (LEI)

- 6.2.1 Ron Sinton reported the meeting summary.
 - 6.2.1.1 Status of doc. 5394, New Standard: Test Method for QSS Microwave PCD measurements of Carrier Decay and Lifetime.
 - Ron contacted Jacek Lagowski, the founder of Semilab, for an update. Jacek emailed and reported that Semilab has no interest in pursuing this standard activity.
- Motion:** To abandon SNARF 5394
By / 2nd: Ron Sinton (Sinton Instruments)/Hugh Gotts (Air Liquide)
Discussion: None
Vote: 2/0. Motion passed
- 6.2.1.2 Status of doc. 4825, New Standard: Test Methods for Hg Probe Measurements of Crystalline Silicon PV Materials and Devices.
 - No progress. The decision was to leave open until volunteers can be found to pursue.
 - 6.2.1.3 Status of doc. 5093, Auxiliary Document: Round Robin (Multi-laboratory Test) of SEMI PV9-1110 Test Method for Excess Charge Carrier Decay in PV Silicon Materials by Non-Contact Measurement of Microwave Reflectance After a Short Illumination Pulse
 - No progress. The decision was to leave open until volunteers can be found to pursue.
 - 6.2.1.4 A round robin on single sided Eddy-Current for SEMI PV28-0212 - Test Methods for Measuring Resistivity or Sheet Resistance with a Single-Sided Noncontact Eddy-Current Gauge is being pursued by Austin Blew (LEI). However, there is a lack of participant from the PV industry.

7.0 Old Business

Lori Nye revisited old action items captured from the previous meetings. See table 6 above for updates.

8.0 New Business

- 8.1 Consolidation of PV Electrical & Optical Properties Measurement TF with Int'l PV Analytical Test Methods TF.

8.1.1 Lack of leadership and attendees being present at the meeting, it was the best interest to consolidate the PV Electrical & Optical Properties Measurement TF with the Int'l PV Analytical Test Methods TF. A motion was made to disband the task force and transfer all its activities to the Int'l PV Analytical Test Methods TF.

Motion: To disband PV Electrical & Optical Properties Measurement TF

By / 2nd: Ron Sinton (Sinton Instruments)/Hugh Gotts (Air Liquide)

Discussion: All activities under this task force will be transferred to the Int'l Analytical Test Methods Task Force.

Vote: 2/0. Motion passed

Action Item 3 - Kevin Nguyen to request Austin Blew and Chris Moore, who are leaders of the disbanded TF, to consider being the co-leaders of the Int'l PV Analytical Test Methods TF.

- 8.2 To consider nomination and recommendation of Hugh Gotts (Air Liquide) for the 3rd co-chair of the NA PV Materials TC Chapter.

8.2.1 Having three co-chairs in a committee is a good idea when travelling is an issue. Hugh is living in the bay area and can be at all three SEMI Standards meetings (Spring, Summer, and Fall). Hugh was delighted to be nominated and is glad to help.

Motion: Pending NARSC's vote, to nominate Hugh Gotts as the 3rd NA PV Materials TC Chapter co-chair

By / 2nd: Ron Sinton (Sinton Instruments)/Hugh Gotts (Air Liquide)

Discussion: The official confirmation will be held in San Francisco NARSC meeting in July

Vote: 2/0. Motion passed

Action Item 4 – Kevin Nguyen to inform Paul Trio on the new co-chair for official confirmation at the NARSC meeting in July 2014. Paul will add on the agenda.

9.0 Next Meetings

The next NA PV Materials TC Chapter is scheduled for Wednesday, July 9, 2014 at the San Francisco Marriott Marquis, San Francisco, CA. Check www.semi.org/standards for latest update.

10.0 Action Item Review

Summary of action was reviewed by Kevin Nguyen. If any, these can be found in the New Action Items table 7 at the beginning of these minutes.

11.0 Adjourn

Adjournment of the meeting was held at 2:00 PM

These minutes are respectfully submitted by:

Kevin Nguyen,
SEMI Standards Operations Manager
Phone: 408-943-7997
Email: knguyen@semi.org

Approved by:
Lori Nye (Brewer Science)

April 8, 2014

Table 8 – Index of Attachment Summary

#	<i>Title</i>		<i>Title</i>
1	NAPVMaterialsMeetingMinutes20131030	5	Taiwan PV_Liaison_20130619
2	SEMI Staff Report (Spring 2014) revE	6	China Photovoltaic Committee Liaison Report20131029
3	EU PV Materials Liaison Report 20131022	7	5665ProceduralReview
4	JA_PV&PVM_NA-Spring_2014_R0.1	8	2014 Spring NA PV Standards Analytical TF agenda

#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 Kevin Nguyen at the contact information above