



PV Materials NA TC Chapter Meeting Summary and Minutes

SEMICON West

Wednesday, July 11, 2018

2:00 PM – 3:00 PM

San Francisco Marriott Marquis, San Francisco, California

TC Chapter Announcements

Next TC Chapter Meeting

Wednesday, July 10, 2019 San Francisco, CA in conjunction with the SEMICON West Standards Meeting 2019.

Check www.semi.org/en/standards for the latest update.

Table 1 Meeting Attendees

Co-Chairs: Hugh Gotts (Air Liquide)

SEMI Staff: Kevin Nguyen (SEMI HQ), Mizue Iwamura (SEMI Japan)

<i>Company</i>	<i>Last</i>	<i>First</i>	<i>Company</i>	<i>Last</i>	<i>First</i>
Air Liquide	Li	Fuhe	Self	Wagner	Peter
Covalent Metrology	Moore	Chris			

Italic indicates remote participant

Table 2 Leadership Changes

<i>WG/TF/SC/TC Name</i>	<i>Previous Leader</i>	<i>New Leader</i>
None		

Table 3 Committee Structure Changes

<i>Previous WG/TF/SC Name</i>	<i>New WG/TF/SC Name or Status Change</i>
None	

Table 4 Ballot Results

<i>Document #</i>	<i>Document Title</i>	<i>Committee Action</i>
6367	Reapproval of SEMI PV49-0613, Test Method for the Measurement of Elemental Impurity Concentrations in Silicon Feedstock for Silicon Solar Cells by Bulk Digestion, Inductively Coupled-Plasma Mass Spectrometry	Passed as balloted
6368	Reapproval of SEMI 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	Passed as balloted
6369	Reapproval of SEMI PV37-0912, Guide for Fluorine (F2), Used in Photovoltaic Applications	Passed as balloted

#1 **Passed** ballots and line items will be submitted to the ISC Audit & Review Subcommittee for procedural review.

#2 **Failed** ballots and line items were returned to the originating task forces for re-work and re-balloting or abandoning.

Table 5 Activities Approved by the GCS between meetings of the TC Chapter

#	Type	SC/TF/WG	Details
None			

Table 6 Authorized Activities

#	Type	SC/TF/WG	Details
TBD	SNARF	PV Si Materials TF	Reapproval of PV32-0312, Specification for Marking of PV Silicon Brick Face and PV Wafer Edge
TBD	SNARF	PV Si Materials TF	Reapproval of PV34-0213, Practice for Assigning Identification Numbers to PV Si Brick, Wafer and Solar Cell Manufacturers
TBD	SNARF	PV Si Materials TF	Reapproval of PV39-0513, Test Method for In-Line Measurement of Cracks in PV Silicon Wafers by Dark Field Infrared Imaging
TBD	SNARF	PV Si Materials TF	Reapproval of PV40-0513, Test Method for In-Line Measurement of Saw Marks on PV Silicon Wafers by a Light Sectioning Technique Using Multiple Line Segments
TBD	SNARF	PV Si Materials TF	Reapproval of PV41-0912, Test Method for In-Line, Noncontact Measurement of Thickness and Thickness Variation of Silicon Wafers for PV Applications Using Capacitive Probes
TBD	SNARF	PV Si Materials TF	Reapproval of PV46-0613, Test Method for In-Line Measurement of Lateral Dimensional Characteristics of Square and Pseudo-Square PV Silicon Wafers
TBD	SNARF	PV Si Materials TF	Reapproval of PV48-0613, Specification for Orientation Fiducial Marks for PV Silicon Wafers

NOTE 1: SNARFs and TFOFs are available for review on the SEMI Web site at: <http://downloads.semi.org/web/wstdsbal.nsf/TFOFSNARF>

Table 7 Authorized Ballots

#	When	SC/TF/WG	Details
TBD	Cycle 6-18	PV Si Materials TF	Reapproval of PV17-1012, Specification for Virgin Silicon Feedstock Materials for Photovoltaic Applications
TBD	Cycle 6-18	PV Si Materials TF	Reapproval of PV32-0312, Specification for Marking of PV Silicon Brick Face and PV Wafer Edge
TBD	Cycle 6-18	PV Si Materials TF	Reapproval of PV34-0213, Practice for Assigning Identification Numbers to PV Si Brick, Wafer and Solar Cell Manufacturers
TBD	Cycle 6-18	PV Si Materials TF	Reapproval of PV39-0513, Test Method for In-Line Measurement of Cracks in PV Silicon Wafers by Dark Field Infrared Imaging
TBD	Cycle 6-18	PV Si Materials TF	Reapproval of PV40-0513, Test Method for In-Line Measurement of Saw Marks on PV Silicon Wafers by a Light Sectioning Technique Using Multiple Line Segments
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TBD	Cycle 6-18	PV Si Materials TF	Reapproval of PV48-0613, Specification for Orientation Fiducial Marks for PV Silicon Wafers



Table 8 SNARF(s) Granted a One-Year Extension

#	TF	Title	Expiration Date
None			

Table 9 SNARF(s) Abolished

#	TF	Title
5801	International PV Analytical Test Methods, Metrology, and Inspection TF	New Standard: Guide for the Planning, Implementing and Analyzing data from a Round Robin used to verify a Test Method

Table 10 Standard(s) to receive Inactive Status

Standard Designation	Title
None	

Table 11 New Action Items

Item #	Assigned to	Details
None		

Table 12 Previous Meeting Action Items

Item #	Assigned to	Details
None		

1 Welcome, Reminders, and Introductions

Hugh Gotts called the meeting to order at 2:00 PM. The meeting reminders on antitrust issues, intellectual property issues and holding meetings with international attendance were reviewed. Attendees introduced themselves.

2 Review of Previous Meeting Minutes

2.1 The TC Chapter reviewed the minutes of the previous meeting.

Motion: Accept the minutes as written

By / 2nd: Peter Wagner/Chris Moore

Discussion: None

Vote: 3-0

3 Liaison Reports

3.1 *PV Materials Europe TC Chapter*

3.1.1 Peter Wagner reported for the Europe TC Chapter. Of note:

- Last meeting
 - June 12, 2018
 - Intersolar Europe, Munich, Germany

- Next meeting
 - November 2018
 - SEMICON Europe, Munich, Germany
- PV Silicon Materials TF
 - New SNARF approved: Reapproval of PV17: Specification for Virgin Silicon Feedstock Materials for Photovoltaic Applications
 - Several standards are coming up for 5 year review: PV29, 32, 34, 39, 40, 41, 46, 48
- PV Materials Degradation TF
 - Status of draft: Test Method for Silicon PV Materials for light-induced degradation (LID)
 - 90% ready, undergoing final discussions
 - To be authorized for ballot at next TC meeting, SEMICON Europa, November 2018

Attachment: 01, EU PV Materials Liaison Report July 2018 v1

3.2 PV and PV Materials Joint Japan TC Chapters

3.2.1 Mizue reported for the Japan TC Chapter. Of note:

- Last meeting
 - April 6, 2018, 13:30-16:00 at the Japan Spring Meetings 2018
 - SEMI Japan Office, Tokyo, Japan
- Next meeting
 - November 9, 2018, 13:30-16:00 at the Japan Fall Meetings 2018
 - SEMI Japan Office, Tokyo, Japan
- Ballot development
 - Doc. 6286, Line Items Revision to SEMI PV79-0817: Test Method for Exposure Durability of PV Cells to Acetic Acid Vapor
 - Passed as balloted.

Attachment: 02, 180621_LiaisonReport_JA_PV&PVM_v1.1

3.3 PV Taiwan TC Chapter

3.3.1 Kevin Nguyen reported for the Taiwan TC Chapter. Of note:

- Last meeting
 - Wednesday, May 16, 2018 at the Taiwan Spring 2018 Meetings
 - Meeting Room 223, 16th Building, No. 321 Sec. 2 Kuang Fu Rd., Hsinchu, Taiwan
- Next meeting
 - Sept 12, 2018, ITRI
 - Meeting Room 223, 16th Building, No. 321 Sec. 2 Kuang Fu Rd., Hsinchu, Taiwan
- Organic and Dye Sensitized Solar Cell and Perovskite solar cell TF
 - Doc. 5980 “New Standard: Test method of current-voltage (I-V) measurement in indoor lighting for DSC and OPV” will be ballot for Cycle 6-18.
 - Continue to draft Doc. 6297 “New Standard: Test Method for Current-Voltage (I-V) Performance Measurement of Perovskite Solar Cell (PSC), Part 1: Standard Testing Condition (STC)”
- PV Reliability Test TF
 - Continue to draft Doc. 6298 “New Standard: Test Method for Non-Uniform Dynamic Mechanical Loads Test for PV Module”

Attachment: 03, PV TW Liaison Report_20180516v1

3.4 PV China TC Chapter

3.4.1 Kevin Nguyen reported for the China TC Chapter. Of note:

- Last meeting
 - PV&PV Materials China Spring Standards Joint Meeting 2018
 - Shanghai, China
 - May 26, 2018
- Next meeting
 - PV&PV Materials China Fall Standards Joint Meeting 2017
 - Wuxi, Jiangsu
 - November 2, 2018
- New Task Force:
 - BIPV (Building Integrated Photovoltaic) Task Force
 - Charter: BIPV has unique advantage of saving land resources, electric energy production agreed with building electric consumption, lower pollution and lower noise.
 - Scopes:
 - A. Module manufacturing standards
 - B. Module designing and installation standards
 - C. Operation and maintenance standards
 - D. Delivery-receiving acceptance
 - E. Relevant testing standards
 - F. Recycle and reusing standards
- Ballot results

<i>Document #</i>	<i>Document Title</i>	<i>Committee Action</i>
5725A	New standard: Practice for Metal Wrap Through (MWT) Back Contact PV Module Assembly	Passed with editorial changes
5842B	New Standard: Test Method for Metal-Wrap-Through Solar Cell Via Resistance	Failed and return to TF for re-work and rebalot in Cycle 6-2018
5982A	New Standard: Specification for Crystalline Silicon Photovoltaic Module Dimensions	Passed as balloted
5983	New Standard: Test Method for In-line Sheet Resistance Inspection	Failed and return to TF for re-work and rebalot in Cycle 6-2018
6294	Reapproval of SEMI PV47-0513, Specification for Anti-Reflective Coated Glass, Used in Crystalline Silicon Photovoltaic Modules	Passed as balloted
6070B	New Standard: Test Method for Cell Defects in Crystalline Silicon PV Modules by Electroluminescence (EL) Imaging	Failed and return to TF for re-work and rebalot in Cycle 6-2018
5661B	New Standard: Test Method for Electrical Parameters of Bifacial Solar Module	Failed and return to TF for re-work and rebalot in Cycle 6-2018
6074A	New Standard: Test Method for Peeling Force between Electrode and Ribbon/Back Sheet	Passed with editorial changes
5767B	New Standard: Guide for Material Requirements of Internal Feeders Used in Mono-crystal Silicon Growers	Passed with technical changes and editorial changes, Ratification Ballot To Be Issued
6072	Revision of SEMI PV29-0212, Specification for Front Surface Marking of PV Silicon Wafers with Two-Dimensional Matrix Symbols	Passed as balloted
6194	New Standard: Test Method for Determination of Hydrogen in PV Polysilicon by Inert Gas Fusion Infrared Absorption Method	Passed as balloted
5767B	New Standard: Guide for Material Requirements of Internal Feeders Used in Mono-crystal Silicon Growers	Passed with technical changes and editorial changes, Ratification Ballot To Be Issued

6072	Revision of SEMI PV29-0212, Specification for Front Surface Marking of PV Silicon Wafers with Two-Dimensional Matrix Symbols	Passed as balloted
6194	New Standard: Test Method for Determination of Hydrogen in PV Polysilicon by Inert Gas Fusion Infrared Absorption Method	Passed as balloted

- Authorized Activities

#	Type	SC/TF/WG	Details
6401	SNARF	Thin Film PV Module Task Force	New Standard: Test Method for Indentation Force of Flexible Thin Film PV Modules
6402	SNARF	Thin Film PV Module Task Force	New Standard: Test Method for Vibration Durability of Flexible Thin Film PV Module
6404	SNARF	PV Module Task Force	Reapproval of SEMI PV44-0513, Specification for Package protection technology for PV Modules
6403	SNARF	PV Module Task Force	Reapproval of SEMI PV45-0513, Test Method for Vinyl Acetate (VA) Content for Ethylene-Vinyl Acetate (EVA) applied in photovoltaic modules—Thermal Gravimetric Analysis (TGA)

- Authorized Ballots

#	When	TF	Details
Photovoltaic			
5842C	Cycle 6-2018	Crystalline Silicon Solar Cell Task Force	New Standard: Test Method for Metal-Wrap-Through Solar Cell Via Resistance
5983A	Cycle 6-2018	PV Diffusion Furnace Test Methods Task Force	New Standard: Test Method for In-line Sheet Resistance Inspection
6070C	Cycle 6-2018	PV Module Task Force	New Standard: Test Method for Cell Defects in Crystalline Silicon PV Modules by Electroluminescence (EL) Imaging
5661C	Cycle 6-2018	PV Module Task Force	New Standard: Test Method for Electrical Parameters of Bifacial Solar Module
R5767B	Cycle 6-2018	PV Silicon Wafer Task Force	New Standard: Guide for Material Requirements of Internal Feeders Used in Monocrystal Silicon Growers
6404	Cycle 6-2018	PV Module Task Force	Reapproval of SEMI PV44-0513, Specification for Package protection technology for PV Modules
6403	Cycle 6-2018	PV Module Task Force	Reapproval of SEMI PV45-0513, Test Method for Vinyl Acetate (VA) Content for Ethylene-Vinyl Acetate (EVA) applied in photovoltaic modules—Thermal Gravimetric Analysis (TGA)
Photovoltaic Materials			
6193	Cycle 6-2018	PV Silicon Raw Materials Task Force	New Standard: Specification for Trichlorosilane Used in Polysilicon Production

Attachment: 04, China PV&PVM Committee Chapter Liaison Report June 2018 v2

3.5 SEMI Staff Report

3.5.1 Kevin Nguyen (SEMI) gave the SEMI Staff Report. Of note:

- Next meetings
 - November 5-8, 2018
 - SEMI HQ in Milpitas, California
- 2018 Critical Dates for SEMI Standards Ballots
 - Cycle 6, 2018
 - Ballot Submission Date: July 20
 - Voting Period Starts: August 1
 - Voting Period Ends: August 31
 - Cycle 7, 2018
 - Ballot Submission Date: August 22
 - Voting Period Starts: September 5
 - Voting Period Ends: October 5
- SEMI Standards Publications
 - Total SEMI Standards in portfolio: 987
 - Includes 236 Inactive Standards
- New Forms, Regulations & Procedure Manual
 - New version of Regulations (June 8, 2018)
 - Improvements on Rules for Handling of Patented Technology (Regulations § § 16.1-16.3)
 - Patented Technology that might be material to the Standard is disclosed at the end stage of document development
 - Disclosed after the ballot is issued
 - Assessment for potential materiality and technical justifiability for inclusion shall be postponed to the next scheduled meeting.
 - A TF sometimes decides to use patented technology after it has started the document development project.
 - To require subsequent update of SNARF regarding use of Patented Technology and subsequent LOI process to ensure that TC Chapter agrees to the course of action recommended by the TF.
 - Additional Official Virtual TC Chapter Meeting Related Rules (Regulations ¶¶ 7.4.2 and § 9.5)
 - Loss of necessary infrastructure at the meeting location described in the Background Statement of the Letter Ballot
 - The necessary infrastructure (e.g., electrical power, internet connection, required software applications)
 - New version of Procedure Manual (June 8, 2018)
 - New TFOF & SNARF
 - New Ballot Review Templates
 - www.semi.org/standards
 - Bottom left, under Resources!

Attachment: 05, Staff Report July 2018_SA rev1

4 Ballot Review

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.

NOTE 2: TC Chapter adjudication on ballots reviewed is detailed in the Audits & Review (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.

4.1 *Doc. 6367, Reapproval of SEMI PV49-0613, Test Method for the Measurement of Elemental Impurity Concentrations in Silicon Feedstock for Silicon Solar Cells by Bulk Digestion, Inductively Coupled-Plasma Mass Spectrometry*

4.1.1 It passed as balloted

4.2 *Doc. 6368, Reapproval of SEMI 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*

4.2.1 It passed as balloted

4.3 *Doc. 6369, Reapproval o of SEMI PV37-0912, Guide for Fluorine (F2), Used in Photovoltaic Applications*

4.3.1 It passed as balloted

Attachment: 06, 6367 Procedural Review

Attachment: 07, 6368 Procedural Review

Attachment: 08, 6369 Procedural Review

5 Subcommittee and Task Force Reports

5.1 Int'l PV Analytical Test Methods, Metrology, and Inspection TF

5.1.1 Hugh Gotts reported that the TF met and review ballot results. All passed.

6 Old Business

6.1 Doc. 5801, New Standard: Guide for the Planning, Implementing and Analyzing data from a Round Robin used to verify a Test Method, is reaching 3 year maximum project period. Kevin asked if the TF plans to request for a 1 year extension if more time is needed. Chris Moore said he is interested, but he wants support from others to work with him. Since there is no other interest, Chris would like to abandon this effort.

Motion: To abolish SNARF 5801

By / 2nd: Peter Wagner/Chris Moore

Discussion: None

Vote: 3-0

7 New Business

7.1 Peter Wagner reported there are several standards due for 5 year. Peter would like to issue for reapproval ballot.

Motion: To authorize the following documents below for reapproval ballot for review at SEMICON Europa

By / 2nd: Peter Wagner/Chris Moore

Discussion: None

Vote: 3-0



<i>When</i>	<i>Details</i>
Cycle 6-18	Reapproval of PV17-1012, Specification for Virgin Silicon Feedstock Materials for Photovoltaic Applications
Cycle 6-18	Reapproval of PV34-0213, Practice for Assigning Identification Numbers to PV Si Brick, Wafer and Solar Cell Manufacturers
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Cycle 6-18	Reapproval of PV46-0613, Test Method for In-Line Measurement of Lateral Dimensional Characteristics of Square and Pseudo-Square PV Silicon Wafers
Cycle 6-18	Reapproval of PV48-0613, Specification for Orientation Fiducial Marks for PV Silicon Wafers

8 Next Meeting and Adjournment

8.1 The next meeting is scheduled for Wednesday, July 10, 2019 in San Francisco, CA. See <http://www.semi.org/en/events> for the current list of meeting schedules.

Having no further business, a motion was made to adjourn. Adjournment was at 3:00 PM.

Respectfully submitted by:

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

Minutes approved by:

Hugh Gotts (Air Liquide)	<Date approved>
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Table 13 Index of Available Attachments^{#1}

<i>Title</i>	<i>Title</i>
EU PV Materials Liaison Report July 2018 v1	Staff Report July 2018_SA rev1
180621_LiaisonReport_JA_PV&PVM_v1.1	6367 Procedural Review
PV TW Liaison Report_20180516v1	6368 Procedural Review
China PV&PVM Committee Chapter Liaison Report June 2018 v2	6369 Procedural Review

^{#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 [SEMI Staff Name] at the contact information above.