

## NA PV/PV Materials Committees Meeting Minutes

Intersolar North America 2013

Wednesday, 10 July, 2013, 1:00 PM - 4:00 PM

San Francisco Marriott Marquis, San Francisco, CA

### Next Committee Meeting

October 30, 2013, SEMI HQ, San Jose, CA in conjunction with the NA Fall Standards Meetings. Check [www.semi.org/standards](http://www.semi.org/standards) for latest update.

### Attendees:

#### SEMI Staff

Kevin Nguyen – SEMI HQ

**Co-chairs** – Lori Nye (Brewer Science) and John Valley (Sun Edison)

**Table 1 – Meeting Attendees**

<i>Last Name</i>	<i>First Name</i>	<i>Company</i>
Baylies	Win	BayTech Group
Chen	Yanli	Ultra Clean Technology
Fukuda	Tetsuo	AIST
Gotts	Hugh	Balazs/Air Liquide
Moore	Chris	Semilab
Nye	Lori	Brewer Science
Sinton	Ron	Sinton Instruments
Valley	John	Sun Edison
Wagner	Peter	Self

**Table 2 – Organization/Task Force Changes**

None

**Table 3 – Ballot Summary**

**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 Title</i>	<i>Committee Action</i>
None		

**Table 4 – Authorized Ballots**

#	<i>When</i>	<i>SC/TF/WG</i>	<i>Details</i>
None			

**Table 5 – Authorized Activities**

Listing of all new TFOFs, SNARFs, and other activities approved by the committee.

#	<i>Type</i>	<i>SC/TF/WG</i>	<i>Details</i>
5608	SNARF	PV Electrical & Optical Measurement TF	Line-item Revision to SEMI PV13-1111, Test Method for Contactless Excess-Charge-Carrier Recombination Lifetime Measurement in Silicon Wafers, Ingots, and Bricks Using an Eddy-Current Sensor (to add literature citations for methods to determine Fe concentrations based on PV13 measurement results)

**Note:** 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>
None			

**Table 7 – New Actions Items**

<i>Item #</i>	<i>Assigned to</i>	<i>Details</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
0713-2	Peter Wagner	To email the author of ballot 5382A, New Standard: Specification for Quasi-monocrystalline Silicon Wafers used in Photovoltaic Solar Cells, for the latest draft
0713-3	Kevin Nguyen (SEMI Staff)	To ask SEMI China staff to contact the leader of PV Power Station Equipment Integrated Performance TF and remind him/her that the charter of this TF is out of SEMI PV Standards' Scope
0713-4	Kevin, Chris Moore (Semilab), and Danh Nguyen (LEI)	To work on the call for participation letter for the round robin of PV28-0212 Test Methods for Measuring Resistivity or Sheet Resistance with a Single-Sided Noncontact Eddy-Current Gauge
0713-5	Kevin Nguyen (SEMI Staff)	To ask Paul Trio (SEMI Staff) to add patent discussion on the next NARSC agenda
0713-6	Kevin Nguyen (SEMI Staff)	To inform Paul Trio (SEMI Staff) on the recommended changes to the PV Materials charter. The charter will be then sent to the GCS for further discussion.

**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](http://www.semi.org/standardsmembership). The agenda was reviewed and approved.

**2.0 Review and Approval of Meeting Minutes from NA Fall Standards Meeting in San Jose, CA, October 31, 2012.**

Minutes were reviewed. No change was made.

**Motion:** To accept the minutes as written.

**By / 2<sup>nd</sup>:** Chris Moore (Semilab)/Hugh Gotts (Air Liquide)

**Discussion:** None

**Vote:** 6/0. Motion passed

[Attachment – 1, NAPVMaterialsMeetingMinutes20130403](#)

### 3.0 Staff Report

Report was given by Kevin Nguyen. Highlights.

- 2013 & 2014 Event

<i>Event Name</i>	<i>Event Details</i>
<b>SOLARCON India</b>	<b>August 1-3, 2013 Bangalore</b>
<b>SEMICON Taiwan LED Taiwan</b>	<b>September 4-6, 2013 Taipei</b>
<b>SEMICON Europa</b>	<b>October 8-10, 2013 Dresden, Germany</b>
<b>PE2013 – Plastic Electronics Exhibition and Conference</b>	<b>October 8-10, 2013 Dresden, Germany</b>
<b>PV Taiwan</b>	<b>October 30 – November 1, 2013 Taipei</b>
<b>SEMICON Japan</b>	<b>December 4-6, 2013 Chiba</b>
<b>SEMICON Korea</b>	<b>February 12-14, 2014 Seoul</b>
<b>LED Korea</b>	<b>February 12-14, 2014 Seoul</b>

- Silicon Wafers – Future Standardization to Enable the Transition (2:30 PM to 6:00 PM)
  - Agenda:
    - Towards 450 mm Silicon Wafers, Mike Goldstein (Intel)
    - Notchless Wafer, Pinyen Lin (G450C)
    - New Edge Exclusion Proposal, Kwangwook Lee (G450C)
    - Wafer Geometry for Advanced Nodes, Gerd Pfeiffer (IBM)
    - Challenges during 450 mm Silicon Processing, Hisashi Furuya (SUMCO)
    - 450 mm Facilities Planning, Allen Ware (F450C)
    - G450C Component Lift Program Update, Les Marshall (G450C)
  - Proceedings are available at <https://sites.google.com/a/semi.org/siwaferfuturestandardstransition/>
- NA Standards Fall 2013 Meetings
  - October 28-31
  - SEMI Headquarters in San Jose, California
  - Inviting local companies willing and able to host some of the meetings to maintain one-week format.
- Technical Ballot Critical Dates
  - Cycle 5, 2013
    - Ballot Submission Date: July 18
    - Voting Period Starts: July 29
    - Voting Period Ends: August 29
  - Cycle 6, 2013
    - Ballot Submission Date: August 15
    - Voting Period Starts: August 29
    - Voting Period Ends: September 30

- June 2013 Cycle Publication Cycle
  - New Standards: 10
  - Revised Standards: 2
  - Reapproved Standards: 4
  - Withdrawn Standards: 0
- Total SEMI Standards in portfolio: 887
  - Includes 94 Inactive Standards

[Attachment – 2, SEMI Staff Report \(West 2013\)](#)

#### 4.0 Liaison Report

##### 4.1 European PV Committee

Report was given by Peter Wagner. Highlights.

- Last meeting
  - June 20, 2013
  - Intersolar Europe
  - Munich, Germany
- Next meeting
  - Oct 7, 2013
  - SEMICON Europa
  - Dresden, Germany
  - Check [www.semi.org/standards](http://www.semi.org/standards) for latest update
- Ballots approved for cycle 5-2013
  - 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
  - 5433, New Standard, Test Method for In-line Characterization of PV Silicon Wafers regarding Grain Size
  - 5432, New Standard, Test Method for In-line Characterization of PV Silicon Wafers by Using Photoluminescence
- 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:
    - PV18-0912 Guide for Specifying a Photovoltaic Connector Ribbon
    - PV19-0712 Guide for Testing Photovoltaic Connector Ribbon Characteristics
- SEMI Europe Staff
  - Yann Guillou , SEMI Europe [yguillou@semi.org](mailto:yguillou@semi.org)

[Attachment – 3, EU PV Materials Liaison Report 20130704](#)

#### 4.2 Japan PV/PV Materials Committee

Report was given by Kevin Nguyen. Highlights

- Last Meeting
  - April 12, 2013 at SEMI Japan Office, Tokyo, Japan
- Next Meeting
  - July 23, 2013 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”
  - No standardized methods for EL ( and IR\* ) measurements
  - EL: difficult to identify cracks in multi-crystalline silicon cells - need another method
    - The SNARF of Doc. #5532, “New Standard: Test Method for Measurement of Cracks in PV Silicon Wafers in PV Modules by Laser Scanning”
- SEMI Japan Staff (Hiro’fumi Kanno, [hkanno@semi.org](mailto:hkanno@semi.org))

[Attachment – 4, JA\\_PVM\\_NA\\_SW\\_R0.1](#)

#### 4.3 Taiwan PV Committee

Kevin highlighted the report.

- Last meeting
  - May 23, 2013
  - SEMI Office, Hsinchu
- Next meeting
  - July 25, 2013
  - SEMI Office, Hsinchu
- Organic and Dye Sensitized Solar Cell TF <New>
  - 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 Wafer Measurement Method TF
  - Develop Standards for PV Si Wafer Metrology such as Geometry (Dimensions, TTV, Warp/Sori) Electrical Characteristics (Resistivity, Carrier Lifetime), Visible and Non-Visible Defects, Saw-Mark, and Stain on Wafer Surface for c-Si (both Mono- and Multi-) wafer manufacturing.
    - It was discussed that the charter of this task force is very similar to what the NA Analytical Test Methods TF and PV Electrical & Optical Properties Measurement TF. Action Item 1 - Kevin Nguyen was advised to inform the Taiwan TF leader to roll these activities into the NA region due to overlapping.
- Regional Staff Contact Information
  - Cher Wu ([cwu@semi.org](mailto:cwu@semi.org))

[Attachment – 5, Taiwan PV\\_Liaison\\_20130619](#)

#### 4.4 China PV Committee

Kevin Nguyen reported. Highlights

- Last meeting
  - China Summer Standards Meeting 2013
  - Yangzhou, China
  - Friday, June 28, 2013
- Next meeting
  - China Autumn Standards Meeting 2013
  - Hohhot, China
  - Monday, August 12, 2013
  - Check [www.semi.org/standards](http://www.semi.org/standards) for latest update
- Published Standards
  - 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—Thermal Gravimetric Analysis (TGA)
  - SEMI PV47-0513, Specification for Anti-reflective-coated Glass, Used In Crystalline Silicon Photovoltaic Modules
- Ballot for Cycle 5–2013
  - Doc. 5428, New Standard: Specification for Impurities in Polyethylene Packaging Materials for Polysilicon Feedstock
  - Doc. 5564, New Standard: Test Method for the Measurement of Chlorine in Silicon by Ion Chromatography
  - Doc. 5382A, New Standard: Specification for Quasi-monocrystalline Silicon Wafers used in Photovoltaic Solar Cells
    - Peter Wagner expressed his concerns that the China Task Force did not incorporate his rejects on the previous version 5382. Instead of writing a new document, Peter recommended that ballot 5382A should be combined with PV22-1011 Specification for Silicon Wafers for Use in Photovoltaic Solar Cells.
    - Action Item 2 - Peter was asked to contact the author of ballot 5382A for a preview prior to submission of cycle 5.
- New TFOF
  - PV Power Station Equipment Integrated Performance Task Force
    - Charter: Develop specifications for equipment and components to be used in PV power stations.
    - Scope: Test methods for measuring the integrated performance of equipment, and components to be used in PV power stations, and associated specifications.
    - No SNARF
  - Chris Moore said the charter of the task force is way out of SEMI PV's scope. According to the existing SEMI PV Committee charter, it was tasked to write standards for PV manufacturing equipment, materials and services. Kevin Nguyen reported that SEMI Standards staff is aware of activity and acknowledged that it is out of current PV Standards' scope. Since there is no proposed SNARF, SEMI staff is paying extra attention and will monitor this task force closely. Action Item 3 – Kevin to send an email to the China TF leader to remind its potential out of scope
- Metal Paste for Crystalline Silicon Solar Cells TF
  - Working on draft 5426, Specification for Aluminum Paste, Used in Back Surface Field of Crystalline Silicon Solar Cells
  - Working on draft 5427, Specification for Front Surface Silver Paste, Used in P-Type Crystalline Silicon Solar Cells
- PV Diffusion Furnace Test Methods TF
  - Working on draft 5429: Test Method for In-line Monitoring of Flat Temperature Zone in Horizontal Diffusion Furnaces
- PV Silicon Raw Materials Task Force

- Working on Doc.5477, New Standard: Test Method for Determining B, P, Fe, Al, Ca Contents in Silicon Powder for PV Applications by Inductively-Coupled-Plasma Optical Emission Spectrometry
- Working on Doc.5476, New Standard: Test Method for Determination of Total Carbon Content in Silicon Powder by Infrared Absorption after Combustion in an Induction Furnace
- Silicon Thin Film PV Module Task Force
  - Working on Doc.5478, New Standard: Test method for Thin-film Silicon PV modules Light Soaking
- SEMI China Standards Contact : Kris Shen ([kshen@semi.org](mailto:kshen@semi.org))

[Attachment – 6, China Photovoltaic Committee Liaison Report20130701](#)

## 5.0 Ballots Review

- 5.1 There was no ballot to review.

## 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 Ballot 5501, Round Robin Update - Method for the Measurement of Oxygen Concentration in Silicon Feedstock for Silicon Solar Cells by Inert Gas Fusion Infrared Detection Method (Patrick Schnabel).
    - 6.1.1.1.1 Samples sent to 10 laboratories. Results expected within 4 weeks, preliminary report to be reviewed at SEMI NA Fall meeting.
  - 6.1.1.2 Ballot 5435, Round Robin Update - Method for the Measurement of Carbon Concentration in Silicon Feedstock for Silicon Solar Cells by SIMS Method (Patrick Schnabel).
    - 6.1.1.2.1 Samples sent to 6 laboratories. Results expected by August 31, 2013, preliminary report to be reviewed at SEMI NA Fall meeting.
  - 6.1.1.3 Ballot 5567, Round Robin Update - SEMI PV49-0613 Method for the Measurement of Elemental Impurity Concentrations in Silicon Feedstock for Silicon Solar Cells by Bulk Digestion, Inductively Coupled-Plasma Mass Spectroscopy (Hugh Gotts).
    - 6.1.1.3.1 Samples are being collected and laboratories (from ballot responses) are being solicited to participate in study (4 laboratories signed up for study).

[Attachment – 7, Analytical TF 2013 NA PV Standards agenda Final](#)

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

- 6.2.1 Chris Moore presented the meeting summary. Meeting attendance is poor. Lack of participation in the task force was emphasized.
  - Pilot Study and Round Robin for Eddy Current Standard PV28-0212 Test Methods for Measuring Resistivity or Sheet Resistance with a Single-Sided Noncontact Eddy-Current Gauge – Austin Blew/Danh Nguyen
    - Presentation prepared by Austin Blew/Danh Nguyen – not given due to insufficient attendance to the TF meeting.

- A call for participation for the round robin is being sought. Chris was given permission by the NA PV Materials Committee for sending invitation to larger groups.
- Action Item 4 - Kevin Nguyen, Chris Moore, and Danh Nguyen will work drafting a letter be sent to the PV Materials committee for a call of participation. The invitation will also be posted on the SEMI Standards web page.
- Tentative Teleconference is proposed some times in September, 2013.
- 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
  - This round robin is progress.
- Doc. 5394, New Standard: Test Method for QSS Microwave PCD measurements of Carrier Decay and Lifetime
  - There is a pending patent application from Semilab. According to Chris, the Letter of Intent (LOI) will not be issued by Semilab until the patent is published.
  - Peter Wagner said the SEMI IP process imposes a burden on the technical committee, which it has no experience in dealing with legals. Also, he mentioned sometimes the IP is not legal in China but it is in the US. The patent process is still not entirely clear. Action Item 5 - Lori Nye asks Kevin Nguyen to add this issue on the next NARSC agenda for clarification.
- Doc. 4825, New Standard: Test Methods for Hg Probe Measurements of Crystalline Silicon PV Materials and Devices
  - Some works were done, but data is not repeatable and cannot be released yet
- SNARF for Line-item Revision to SEMI PV13-1111, Test Method for Contactless Excess-Charge-Carrier Recombination Lifetime Measurement in Silicon Wafers, Ingots, and Bricks Using an Eddy-Current Sensor (to add literature citations for methods to determine Fe concentrations based on PV13 measurement results) was proposed.
  - Rationale: In adding PV13 to M1 in the silicon wafer committee, some members brought up the desirability of having specific literature citations for measuring Fe using the reported results from PV13.

**Motion:** To approve PV13 Line Item SNARF

**By / 2<sup>nd</sup>:** Chris Moore (Semilab)/Ron Sinton (Sinton Instruments)

**Discussion:** None

**Vote:** 8/0. Motion passed

[Attachment – 8, PV ElOpt TF Agenda July 2013 rev1](#)

[Attachment - 9, FeMeasurementPV13SNARF](#)

## 7.0 Old Business

- 7.1 No old business was reported.

## 8.0 New Business

- 8.1 *Laser Scanning Technique to Detect Cracks Presentation Presentation – Tetsuo Fukuda (AIST)*  
Fukuda-san gave an outstanding presentation of Laser Scanning and Electroluminescence techniques for detecting cracks on modules.

The following topics were covered. See attachment below for the presentation.

- Strong demands of crack inspection for as-received modules
- Difficulty inspecting multi-crystalline silicon cells by Electroluminescence(EL)
- Proposal of alternative method, Laser Scanning, capable to measure cracks both in multi- and mono-crystalline silicon cells
- Summary and projected timetable for standardization



Chris and others had strong recommendation to Japan PV committee to use the standard naming of the test technique employed by the technique. What is novel about the technique is not the laser scanning technique but the whole panel testing capability. The opinion of Chris, Peter, and others was that the title of the talk should have been “Testing PV modules/panels using XYZ laser scanning technique to detect cracked cells” The committee also felt the SNARF was going in the wrong direction in terms of title because the technique is well known.

[Attachment - 10, 13-0710 Laser Scanning \(handout\)](#)

#### 8.2 *PV Materials Reference Materials Questionnaire Results – Peter Wagner*

Peter gave a detailed presentation of PV Materials reference survey results. The preliminary report was presented at the meeting of PV Materials in Berlin on March 13. The finding was positive. Unfortunately only a few responses were obtained in spite of several reminders. The survey is now reopened in an effort to obtain additional feedback. The survey can be taken at <http://www.keysurvey.com/votingmodule/s180/f/487948/8b40/>

See attachment below for detailed report.

[Attachment – 11, results RM quest](#)

#### 8.3 *Review of Current PV Materials Charter*

The PV Materials committee charter was reviewed. The following highlighted changes are suggested to better align with PV current PV status on of the industry.

**Charter:** Explore, evaluate, discuss, and create consensus-based standard measurement methods, specifications, guidelines, and practices that, through voluntary compliance, will promote mutual understanding and improved communication between users and suppliers of photovoltaic materials and related metrology equipment to enhance the quality, manufacturing efficiency and capability ~~so as to reduce manufacturing cost~~ of the photovoltaic (PV) industry.

#### **Scope:**

- To include liaisons and synergies with other SEMI technical committees for the development of PV-related standards.
- The PV standards committee scope is limited to exploring and developing standards that pertain to common criteria, guidelines, methods for control and comparison of PV-related materials. Tentatively, Gas & Chemicals may be included until relevant Committee is formed. It will seek to support the international need for increasing PV product / process yield and reducing related PV costs per Watt peak.
- ~~In anticipation of ANSI accreditation, this committee will investigate opportunities towards ISO/IEC harmonization of efforts.~~
- In addition to the above, the committee will also facilitate any industry initiatives towards product standardization needs.

**Motion:** To approve recommended changes to the charter of PV Materials Committee

**By / 2<sup>nd</sup>:** Chris Moore (Semilab)/Ron Sinton (Sinton Instruments)

**Discussion:** The revised charter will be sent to the GCS.

**Vote:** 5/0. Motion passed

[Attachment – 12, SEMI PV Materials Standards Committee Charter](#)

### 9.0 Next Meetings

- 9.1 The NA PV Materials committee is scheduled for Wednesday, October 30, 2013 at SEMI HQ in San Jose, CA. Check [www.semi.org/standards](http://www.semi.org/standards) for the 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 3:45 PM

These minutes are respectfully submitted by:

Kevin Nguyen,  
SEMI NA Standards Committee Manager  
Phone: 408-943-7997  
Email: [knguyen@semi.org](mailto:knguyen@semi.org)

Approved by:

Lori Nye (Brewer Science)  
John Valley (Sun Edison)

Date: August 1<sup>st</sup>, 2013

Date: August 1<sup>st</sup>, 2013

**Table 8 – Index of Attachment Summary**

#	<i>Title</i>		<i>Title</i>
1	<a href="#">NAPVMaterialsMeetingMinutes20130403</a>	7	<a href="#">Analytical TF 2013 NA PV Standards agenda Final</a>
2	<a href="#">SEMI Staff Report (West 2013)</a>	8	<a href="#">PV ElOpt TF Agenda July 2013 rev1</a>
3	<a href="#">EU PV Materials Liaison Report 20130704</a>	9	<a href="#">FeMeasurementPV13SNARF</a>
4	<a href="#">JA_PVM_NA_SW_R0.1</a>	10	<a href="#">13-0710 Laser Scanning (handout)</a>
5	<a href="#">Taiwan PV_Liaison_20130619</a>	11	<a href="#">results RM quest</a>
6	<a href="#">China Photovoltaic Committee Liaison Report20130701</a>	12	<a href="#">SEMI PV Materials Standards Committee Charter</a>

#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](http://www.semi.org). For additional information or to obtain individual attachments, please contact Kevin Nguyen at the contact information above