PV Materials EU TC Chapter

Meeting Summary and Minutes

SEMICON Europe
ICM Munich, Room 12a
Tuesday, November 14, 2017
12:30 – 14:00 CEST

Table 1 Meeting Attendees

Co-Chairs: Christian Hagendorf (Fraunhofer CSP), Peter Wagner (Peter Wagner Consulting)
SEMI Staff: John Doe

<table>
<thead>
<tr>
<th>Company</th>
<th>Last</th>
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<th>Company</th>
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<th>First</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASML</td>
<td>Planting</td>
<td>Bert</td>
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<tr>
<td>Elkem</td>
<td>Haakedal</td>
<td>John</td>
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<tr>
<td>Fraunhofer CSP</td>
<td>Hagendorf</td>
<td>Christian</td>
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<tr>
<td>Jacobs University</td>
<td>Bergholz</td>
<td>Werner</td>
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<tr>
<td>Peter Wagner Consulting</td>
<td>Wagner</td>
<td>Peter</td>
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</table>

Table 2 Leadership Changes
None

Table 3 Committee Structure Changes
None

Table 4 Ballot Results
None

Table 5 Activities Approved by the GCS between meetings of the TC Chapter
None

Table 6 Authorized Activities
Listing of all revised or new SNARF(s) approved by the Originating TC Chapter.

<table>
<thead>
<tr>
<th>#</th>
<th>Type</th>
<th>SC/TF/WG</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>6373</td>
<td>SNARF</td>
<td>PV Materials Degradation TF</td>
<td>New Standard: Test Method for Silicon PV Materials for Light-Induced Degradation (LID)</td>
</tr>
</tbody>
</table>

#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
None
1 Welcome, Reminders, and Introductions

Peter Wagner called the meeting to order at 12:40. The meeting reminders on antitrust issues, intellectual property issues and holding meetings with international attendance were reviewed. Attendees introduced themselves.

Attachment: SEMI Standards Required Elements_June2016.ppt

2 Review of Previous Meeting Minutes

The TC Chapter reviewed the minutes of the previous meeting, held June 23, 2016, at Intersolar in Munich.

Motion: To approve the minutes as written.
By / 2nd: Werner Bergholz/Christian Hagendorf
Discussion: None
Vote: 4-0

Attachment: PV TC Materials Meeting Minutes 20160610 v1.pdf

3 Liaison Reports

3.1 PV Materials North America TC Chapter

James Amano reported for the PV Materials NA TC Chapter. Of note:

- Recently approved ballots

- Three documents Authorized for ballot in cycle 7-2017
  - 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
  - Reapproval of SEMI PV37-0912, Guide for Fluorine (F2), Used in Photovoltaic Applications

Attachment: PVMaterials NA TC Chapter Liaison Report July 2017.ppt

3.2 Photovoltaic and Photovoltaic Materials Japan Joint TC Chapter

James Amano reported. Of note:

- Recently approved ballots
  - 6016, Test Method for Exposure Durability of PV Cells to Acetic Acid Vapor

- Recently authorized ballots

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<table>
<thead>
<tr>
<th>Item #</th>
<th>Assigned to</th>
<th>Details</th>
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<tbody>
<tr>
<td>EUPVM-Nov2017-1</td>
<td>Werner Bergholz, SEMI Staff</td>
<td>Werner Bergholz to assist SEMI Staff is acquiring Letter of Intent for LID SNARF</td>
</tr>
<tr>
<td>UPVM-Nov2017-2</td>
<td>Peter Wagner</td>
<td>Peter Wagner to review PV17 and PV32 and prepare SNARFs as necessary for approval at the next PV Materials Europe Chapter meeting.</td>
</tr>
</tbody>
</table>
# TBD, Test Method for Exposure Durability of PV Cells to Acetic Acid Vapor

**Attachment:** 170922_LiaisonReport_JA_PV&PVM_r1.ppt

### 3.3 Photovoltaic Taiwan TC Chapter

James Amano reported. Of note:

- Recently Approved Ballots
  - Doc 5979 New Standard: Specification of indoor lighting simulator requirements for emerging PV

- Documents Recently Authorized for Balloting
  - Doc 6071, PV Reliability Test TF, New Standard: Test Method For Polymer Foil Dependent Discoloration of Silver Fingers on PV Modules
  - Doc 6296, PV Reliability Test TF, New Standard: Test Method for Non-Uniform Dynamic Mechanical Loads Test for PV Module
  - Doc 6299, PV Reliability Test TF, New Standard: Test Method for Mechanical Vibration of c-Si PV cells in Shipping Environment

**Attachment:** PV TW Chapter TC Liaison Report_Oct 20171023.ppt

### 3.4 Photovoltaic China TC Chapter

James Amano reported. Of note:

- New SNARFs:
  - Doc 6295, New Standard: Test Method for Extension of Flexible Thin Film PV Modules
  - Doc 6294, Reapproval of SEMI PV47-0513, Specification for Anti-Reflective Coated Glass, Used in Crystalline Silicon Photovoltaic Modules

- Ballot Review
  - New Standard: Guide for Material Requirements of Internal Feeders Used in Mono-crystal Silicon Growers **FAILED**
  - 6070A, New Standard: Test Method for Cell Defects in Crystalline Silicon PV Modules by Electroluminescence (EL) Imaging **PASSED WITH TECHNICAL CHANGES, RATIFICATION BALLOT TO BE ISSUED**
  - Doc 5725, New standard: Practice for Metal Wrap Through (MWT) Back Contact PV Module Assembly **FAILED**

- Documents Authorized for Ballot
  - PV Module Task Force: Doc 5725A, New standard: Practice for Metal Wrap Through (MWT) Back Contact PV Module Assembly
PV Module Task Force: Doc 6294, Reapproval of SEMI PV47-0513, Specification for Anti-Reflective Coated Glass, Used in Crystalline Silicon Photovoltaic Modules


- PV Silicon Wafer Task Force: Doc 6072, Revision of SEMI PV29-0212, Specification for Front Surface Marking of PV Silicon Wafers with Two-Dimensional Matrix Symbols


Attachment: China PV&PVM Committee Chapter Liaison Report20171020.ppt

3.5 SEMI Staff Report

James Amano (SEMI) gave the SEMI Staff Report. Of note:
  - Critical Dates for Upcoming Ballots

<table>
<thead>
<tr>
<th>Year</th>
<th>Ballot Submission Deadline</th>
<th>Voting Opens</th>
<th>Voting Closes</th>
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<tbody>
<tr>
<td>2017</td>
<td></td>
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<tr>
<td>Cycle 8</td>
<td>Oct 13</td>
<td>Oct 27</td>
<td>Nov 27</td>
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<tr>
<td>Cycle 9</td>
<td>Nov 16</td>
<td>Nov 29</td>
<td>Dec 29</td>
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<tr>
<td>Cycle 1</td>
<td>Jan 3</td>
<td>Jan 16</td>
<td>Feb 15</td>
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<tr>
<td>Cycle 2</td>
<td>Feb 7</td>
<td>Feb 20</td>
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<td>Cycle 3</td>
<td>Mar 9</td>
<td>Mar 23</td>
<td>Apr 23</td>
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<tr>
<td>Cycle 4</td>
<td>Apr 20</td>
<td>Apr 30</td>
<td>May 30</td>
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<td>Cycle 5-9</td>
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Attachment: Staff Report for Europa Nov 2017 v1.ppt

4 Ballot Review

None

5 Subcommittee and Task Force Reports

5.1 PV Materials Degradation TF

Werner Bergholz reported.
  - New SNARF: Test Method for Light Induced Degradation
    - Current major LID test issues are the accuracy/precision, reproducibility and long duration of LID tests
    - In Industry there exist several approaches for LID tests up to using the window bench for 24 h
    - The LID effect is ultimately caused by excess charge carriers, hence electrical carrier injections is the “kings highway” to test for LID, since it is easy controllable, highly accurate, reproducible, long duration and independent from major environmental influences
o It is obvious that in addition to technical improvements a standard is needed for a clear communication between two or more partners in connection with professional procurement of silicon materials for PV.

o Werner Bergholz remarked that patented technology is intended to be included in the proposed Standard. James Amano commented that at the time of the meeting, no Letter of Intent (LOI) had been received.

**Motion:** To approve the new SNARF  
**By / 2nd:** Werner Bergholz/Christian Hagendorf  
**Discussion:** During the two-week SNARF review period, George Kelly submitted a comment that there might be a conflict with an IEC activity. Werner Bergholz stated that the SEMI TF is taking a different approach, and that the TF will follow up with George Kelly.  
**Vote:** 4-0

**Action Item:** Werner Bergholz to assist SEMI Staff is acquiring Letter of Intent  
**Attachment:** Introduction to the LID Snarf.ppt

### 5.2 PV Silicon Materials Task Force

Peter Wagner reported.

- Standards developed by the Task Force will be coming up for five-year review, including:
  - PV17: Specification for Virgin Silicon Feedstock Materials for Photovoltaic Applications
  - PV29: Specification for Front Surface Marking of PV Silicon Wafers with Two-Dimensional Matrix Symbols
  - PV32: Specification for Marking of PV Silicon Brick Face and PV Wafer Edge

- Peter noted that the China chapter is revising PV29 (SNARF 6072), but that he would review PV17 and PV32 and prepared SNARFs as necessary for approval at the next PV Materials Europe Chapter meeting.

### 6 Next Meeting and Adjournment

The next meeting is scheduled for November 2018, at SEMICON Europa in Munich Germany. An interim meeting at Intersolar Europe in June will also be considered. See [http://www.semi.org/standards-events](http://www.semi.org/standards-events) for the current list of events.

Minutes submitted by:  
James Amano  
SEMI HQ

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<tr>
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<tbody>
<tr>
<td><strong>Title</strong></td>
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<tr>
<td>SEMI Standards Required Elements_June2016.ppt</td>
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| #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.

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