Physical Interfaces & Carriers North America TC Chapter

Meeting Summary and Minutes

NA Standards Winter Meetings 2021

Monday, February 8, 2021, 15:00 – 16:00 Pacific

via Official Virtual TC Chapter Meeting (OVTCCM)

TC Chapter Announcements

Next TC Chapter Meeting

NA Standards Spring Meetings 2021

Monday, April 26, 15:00 – 16:30 Pacific

via Official Virtual TC Chapter Meeting (OVTCCM)

Table 1 Meeting Attendees

Co-Chairs: Matt Fuller (Entegris), Melvin Jung (Intel)
SEMI Staff: Laura Nguyen

Company	*Last*	*First*	*Company*	*Last*	*First*
Acteon NEXT Corporation	Komatsu	Shoji	Kokusai Electric	Matsuda	Mitsuhiro
Brooks Automation	Babbs	Daniel	Micron	Cicero	Jason
Entegris	Fuller	Matthew	Microtome	Rider	Gavin
ESWIN	Long	Alex	Self	Wagner	Peter
ESWIN	Ma	Jerry	Ted Pella	Rollings	David
Hitachi-Hightech	Mamishin	Shuichi	Tokyo Electron	Mashiro	Supika
Intel	Jung	Melvin	Thermo Fisher Scientific	Kwakman	Laurens
Intel	Radloff	Stefan	Thermo Fisher Scientific	Young	Richard
JEOL Ltd.	Asayama	Kyoichiro	SEMI	Nguyen	Laura
KLA	Johanson	Eric	SEMI	Nguyen	Thai

Table 2 Leadership Changes

WG/TF/SC/TC Name	*Previous Leader*	*New Leader*
Electron Microscopy Workflow Task Force	Laurens Kwakman (Thermo Fisher Scientific)	Laurens Kwakman (Thermo Fisher Scientific) Richard Young (Thermo Fisher Scientific) **[New]**

Table 3 Committee Structure Changes

None

Table 4 Ballot Results

None

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

#	*Type*	*SC/TF/WG*	*Details*
--	Special online ballot for OVTCCM	PIC GTC	Authorizing the special online ballot for adoption of OVTCCM. – ***Approved by GCS on 11/24/2020***

Table 6 Authorized Activities

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

#	*Type*	*SC/TF/WG*	*Details*
6592	SNARF revision	Electron Microscopy Workflow TF	New Standard: Specification for Container for Transport and Storage of Transmission Electron Microscope (TEM) Lamella Carriers within Electron Microscopy Workflows – ***Updated new Milestone and Deliverable dates in the 'Projected Timetable for Completion' section***

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

None

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

None

Table 9 SNARF(s) Abolished

None

Table 10 Standard(s) to receive Inactive Status

None

Table 11 New Action Items

Item #	*Assigned to*	*Details*
2021Feb#01	Laura Nguyen	Send Laurens Kwakman Standards Red 16:9 PPTX template. Completed. Closed.

Table 12 Previous Meeting Action Items

Item #	*Assigned to*	*Details*
2019Nov#01	SEMI Staff	Japan PLP Panel FOUP TF Leader asks for potential LOI from IP owner. Closed.
2019July#01	Laura Nguyen	To clarify footnote in Style Manual with SEMI. Closed.
2017April#04	Laura Nguyen	To identify which documents under the global task force belong to which committees. Ongoing. Unsure how this should be done.

1 Welcome, Reminders, and Introductions

Matt Fuller (Entegris) called the meeting to order at 15:07. The meeting reminders on antitrust issues, intellectual property issues and holding meetings with international attendance were reviewed. Attendees introduced themselves.

Attachment: SEMI Standards Required Meetings Elements (File name: Required Element Nov 2020 Rev1)

2 Review of Previous Meeting Minutes

The TC Chapter reviewed the minutes of the previous meeting.

Motion:	To accept the previous meeting minutes as written.
By / 2nd:	By: Shoji Komatsu / Acteon NEXT LLC Second: Supika Mashiro / Tokyo Electron Ltd.
Discussion:	None.
Vote:	10-0 in favor. Motion passed.

Attachment: [2019Fall] PIC NA TC Chapter Meeting Minutes FINAL

3 Liaison Reports

3.1 *Physical Interfaces & Carriers Europe TC Chapter*

Europe Chapter has been inactive for several years and ERSC voted to disband on November 16, 2020 per *Regulations* § 6.5, Disbandment of a TC Chapter.

3.2 *Physical Interfaces & Carriers Japan TC Chapter*

Laura Nguyen (SEMI HQ) reported for the Physical Interfaces & Carriers Japan TC Chapter. Of note:

Meeting Information

- Last meeting
  - December 22, 2020
    - SEMI Japan, Tokyo, Japan
    - Official Virtual TC Chapter Meeting
- Next meeting
  - April 14, 2021
    - SEMI Japan, Tokyo, Japan
    - Official Virtual TC Chapter Meeting

Current Structure of Japan TC Chapter *{See attachment for Org Chart}*

Ballot Results

- 6684, New Standard: Specification for Panel FOUP Loadport for Panel Level Packaging
  - Passed, with technical changes. Ratification ballot will be issued.
- 6685, New Subordinate Standard: Specification for Panel FOUP Loadport for 510mm-515mm Panel Size
  - Passed, as balloted.
- 6686, New Subordinate Standard: Specification for Panel FOUP Loadport for 600mm-600mm Panel Size
  - Passed, as balloted.

Staff Contact: Hirofumi Kanno (hkanno@semi.org)

Attachment: JA_PIC_Liaison_2020201_v1

3.3 *SEMI Staff Report*

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

SEMI Global Calendar of Events

- SEMICON China (March 17-19, 2021; Shanghai, China)
- SEMICON Southeast Asia (May 18-20, 2021; Penang, Malaysia)
- SEMICON Taiwan (Sept 8-10, 2021; Taipei, Taiwan)
- SEMICON West (December 7-9, 2021; [Hybrid] San Francisco, CA)

Critical Dates for SEMI Standards Ballots

- Cycle 2-2021: Ballot Submission Due: Jan 29/Voting Period: Feb 10 – Mar 12
- Cycle 3-2021: Ballot Submission Due: Mar 9/Voting Period: Mar 23 – Apr 22
- Cycle 4-2021: Ballot Submission Due: Apr 14/Voting Period: Apr 28 – May 28
- Cycle 5-2021: Ballot Submission Due: May 18/Voting Period: June 1 – July 1
- Cycle 6-2021: Ballot Submission Due: Aug 3/Voting Period: Aug 17 – Sept 16
- Cycle 7-2021: Ballot Submission Due: Sept 1/Voting Period: Sept 15 – Oct 15
- Cycle 8-2021: Ballot Submission Due: Oct 8/Voting Period: Oct 22 – Nov 22
- Cycle 9-2021: Ballot Submission Due: Nov 16/Voting Period: Nov 30 – Dec 30

Critical Dates: http://www.semi.org/en/Standards/Ballots

Standards Publications Report

Cycle	*New*	*Revised*	*Reapproved*	*Withdrawn*
November 2020	1	2	0	0
December 2020	1	3	3	0
January 2020	0	1	6	0

Total in portfolio – 1,029 (includes 274 Inactive Standards)

New Standards

Cycle	*Designation*	*Title*	*Committee*	*Region*
November 2020	SEMI C100	Guide for Reporting Chemical Mechanical Planarization (CMP) Polishing Pads Hardness Used in Semiconductor Manufacturing	Liquid Chemicals	NA
December	SEMI PV97	Specification for Silicon Powder Used in Polysilicon Production	Photovoltaic	CH

Inactive Standards

Committee	*Number of Inactive Standards*
Assembly & Packaging	48
Automated Test Equipment	2
Compound Semiconductor Materials	4
Environmental Health & Safety	8
Facilities	15
FPD – Equipment	5
FPD – Factory Automation	14
FPD – Materials & Components	13
Gases	18
Information & Control	37
Liquid Chemicals	26
MEMS	3
Metrics	12
Micropatterning	30
Photovoltaic	1
Physical Interfaces & Carriers	19
Silicon Wafer	11
Traceability	8

Regulations & Procedure Manual

- *Regulations* ((November 5, 2020)
    - Clarification on § 6.5, Disbandment of a TC Chapter
        - Requires an RSC to disband a TC Chapter when it is shown to be inactive by failing to:
            - hold meetings for two consecutive years,
            - report activity to its RSC for two consecutive years, or
            - initiate new Standards Documents activities.
- *Procedure Manual* (November 5, 2020)
    - New § 6.1.3.4.1 defining detailed procedures for disbandment of inactive TC Chapters.

Official Virtual TC Chapter Meeting Rooms *{See attachment for additional slides}*

All Chapters of the PIC GTC have completed the simulation training of an Official Virtual TC Chapter Meeting (OVTCCM).

- Special online ballot to vote on whether to adopt or not adopt was sent out for a 14-day period(11/18-12/02).
- Results were positive.

All official meetings for PIC must now be done via OVTCCM.

https://svm.semi.org/ (Do not use Internet Explorer or MS Edge. These browsers have known issues.)

- Click "Login"
- Enter your Standards membership username and password
    - Same as the one used for voting on ballots
- Username and password can be retrieved at: http://ams.semi.org/ebusiness/ForgotUID.aspx

connect@SEMI - Contact your staff if a TF Site is desired

- Web link - https://connect.semi.org
    - Login using Standards account (username and password)

- Program Member
    - Join any task forces; Post discussion thread
- TF Leader/Community Admin; contact your staff if a TF Site is desired
    - Add member; Upload meeting minutes
    - Communicate TF members
- Details
    - www.semi.org/standards >> Committee Info >> Collaboration Community

SNARF(s) Approved by GCS in between TC Chapter Meetings

- Special online ballot for adoption of OVTCCM.
    - Approved by GCS on 11/24/2020

Nonconforming Titles (See PM Appendix 4) *{None}*

SNARF 3 Year Status, TC Chapter may grant a one-year extension *{None}*

Five-Year Review

- SEMI E83-0515, Specification for PGV Mechanical Docking Flange
- SEMI E92-0302E (Reapproved 0615), Specification for 300 mm Light Weight and Compact Box Opener/Loader to Tool-Interoperability Standard (Bolts/Light)
- SEMI E22-1015, Specification for Cluster Tool Module Interface: Transport Module End Effector Exclusion Volume
- SEMI E21-1015, Specification for Cluster Tool Module Interface: Mechanical Interface and Wafer Transport
- SEMI E156-1115, Specification for Mechanical Interfaces Between 450 mm Automated Material Handling Systems (AMHS) Stocker to Transport Equipment

Note: SEMI E92, E83, E156 – Assigned to Japan

Attachment: Staff Report Feb 2021_PIC_atm

4 Ballot Review

None

5 Subcommittee and Task Force Reports

5.1 *Global PIC Maintenance Task Force*

This Task Force did not meet. There is no update at this time.

5.2 *Electron Microscopy Workflow Task Force*

Taskforce activity update (November 2019 – January 2021)

Since last PIC TC meeting in November 2019, the Taskforce members have not met face-to-face anymore (due to Corona pandemic) but have continued the Phase 2 activities through monthly telephone conference meetings (10 in total) and email/telephone exchanges when necessary.

- SEMI E177 (LC Standard) related activities:
    - One practical limitation has been identified with the 3mm grid LCs:
        - When a laser marked LC is coated with a thin carbon foil, the ID mark read-out quality is low due to optical disturbances induced by the presence of the foil

- ID marks at the bottom side of the LC are judged non-practical (too complex!) and therefore, alternative solutions have been researched, proposed and tested
- Phase 2, Doc. 6592 (LCC Standard) related activities:

  - Taskforce members have started a high-level review of what characteristics are relevant for a LCC and what kind of specifications need to be included in the new SEMI Standard. *End-user's input is essential to define industry-aware concepts*
  - *Translation of high-level market requirements into low-level design and engineering specifications turns out less evident* as TEM automation is new and different engineering solutions can be considered, leading to different LCC specifications

Activity summary *{See attachment for images}*

- Good work was done to address the remaining issues with the 3mm grid LCs as defined in SEMI Standard E177 related to laser ID marking:
  - Laser ID marking issues relate to ID mark readout quality (foil deposition after laser marking)
  - or to particle contamination of the active area (laser marking after foil deposition)
  - Japanese TF liaison (JEOL/Hitachi/KEYENCE) made good progress and did innovate methods together with Protochips in the USA.
  - Protochips has shown the feasibility of a carbon foil deposition + area selective etch process
- The Phase 2 activities to prepare doc. 6592 (LCC Standard) did start off well end 2019 with high level market specifications and advanced with concrete activities in Q1 2020, but it was rapidly realized that the final choice between different technical options and solutions for the LCC is critically related to how the TEM microscopy end-users intend to use and operate such TEM workflows in their real, industrial context
  - needs the 'voice of the key customers': Q2 and Q3 2020 were essentially used to prepare a LCC customer Survey, that finally was executed in Q4 2020. To guarantee full confidentiality of the customer responses, the survey was anonymized and conducted by SEMI HQ.
- The specification of a (new) LCC requires a clear, detailed engineering study of the different technical and operational solutions for equipment automation:
  - End 2020, specific 'focus teams' were created in which marketing and engineering experts from (competing) microscope suppliers work together to translate the top-down market requirements into bottom-up engineering solutions and to translate engineering ideas into generic LCC requirements/specifications

EM Workflow TF also continued its advertising within SEMI

- Standards Watch Newsletter articles in September 2019, December 2019, and December 2020 Issues.
  - See attachment for links.

Activity Outlook

- Challenges for the LCC standardization:
  - Exchange between TEM end-users and TEM suppliers: SEMI hosted surveys are effective!
  - Exchange between competing TEM suppliers , JEOL, Hitachi, Thermo Fisher: building mutual trust over the last 3 years was key to get the technical discussions going in the focus teams!
  - Define standards for an automated TEM workflow that does not exist yet: the new focus teams will work on all relevant details and aspects of an automated TEM workflow (standardization will take at least one more year as originally planned..)
- These Taskforce activities will continue in 2021 with the aim of having a first draft Specification available in December 2021 and a 1st Letter Ballot by April 2022.

- This revised planning is needed as the original plan described in the SNARF was too optimistic and did not take into account the full complexity of the interdependencies of the physical LCC definitions and the functionalities of the LCC in the overall automated TEM workflow.
- However, given the good progress and new learnings in 2020, also based on the very useful customer survey, and with the creation of the new focus teams, the Taskforce is fully confident that 2021 can be a productive and successful year.

SNARF Change Request

The TF phase 2 activity SNARF (doc. 6592) has been approved during the PIC TC meeting on November 6, 2019:

- As reported before, the efforts to come to a new LCC SEMI Standard are significantly more important than originally estimated and milestone and deliverable dates in the SNARF need to be revised/updated.
- The TF leader presented the SNARF revision for approval.
- See attachment for edits.

Motion:	Approve to approve updating of the Taskforce SNARF with new Milestone and Deliverable datesin the ‘ Projected Timetable for Completion’ section as shown in the meeting.
By / 2nd:	By: Laurens Kwakman / Thermo Fisher Scientific Second: Peter Wagner / Peter Wagner Consulting
Discussion:	None.
Vote:	12-0 in favor. Motion passed.

Task Force leadership change request

Due to the retirement of Loek Kwakman on November 1st, 2020, it is proposed to add Richard Young from Thermo Fisher as 2nd Taskforce leader. Loek and Richard will together ensure a smooth continuation of the Taskforce activities, Loek as a consultant to Thermo Fisher and Richard as a formal Thermo Fisher employee.

Motion:	To approve Richard Young as second task force leader to the Electron Microscopy WorkflowTask Force.
By / 2nd:	By: Laurens Kwakman / Thermo Fisher Scientific Second: Peter Wagner / Peter Wagner Consulting
Discussion:	None.
Vote:	10-0 in favor. Motion passed.

Attachment: SEMI TF meeting 8 february 2021_PICupdate V2

6 Old Business

6.1 *Previous Action Items*

Previous action items are noted in Table 12 in ‘red’ and for recent updates in ‘blue’. There is no further old business.

7 New Business

No new business was presented.

8 Next Meeting and Adjournment

The next PIC NA TC Chapter meeting is scheduled for Monday, April 26, 2021 from 15:00-16:30 Pacific via OVTCCM. See http://www.semi.org/standards-events for the current list of events.

Adjournment: 16:14.

Respectfully submitted by:

Laura Nguyen

Sr. Coordinator, International Standards

SEMI Global Headquarters

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Email: lnguyen@semi.org

Minutes tentatively approved by:

Matthew Fuller (Entegris), Co-chair	March 25, 2021
Melvin Jung (Intel), Co-chair	<Date approved>

Minutes approved by: **PIC NA OVTCCM on April 26, 2021.**

Table 13 Index of Available Attachments[#1]

Title	*Title*
Required Element Nov 2020 Rev1	Staff Report Feb 2021_PIC_atm
[2019Fall] PIC NA TC Chapter Meeting Minutes FINAL	SEMI TF meeting 8 february 2021_PICupdate V2
JA_PIC_Liaison_2020201_v1	

#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 Laura Nguyen at the contact information above.