3D Packaging & Integration North America TC Chapter

Meeting Summary and Minutes

NA Standards Fall Meetings 2019

Thursday, November 7, 14:00 – 16:00 Pacific

SEMI Global Headquarters, Milpitas, California/USA

TC Chapter Announcements

Next TC Chapter Meeting

NA Standards Spring Meetings 2020

Thursday, April 2, 14:00 – 16:00 Pacific

SEMI Global Headquarters, Milpitas, California/USA

Table 1 Meeting Attendees

Italics indicate virtual participants

Co-Chairs: Bill Kerr (Evergreen Enhancement), Chris Moore (Covalent Metrology), Sesh Ramaswami (Applied Materials)
SEMI Staff: Laura Nguyen

Company	*Last*	*First*	*Company*	*Last*	*First*
Air Products	Arslanian	Gregory	Namics Corp.	Takahashi	Mark
BW & Associates	Wu	Bevan	Nordson SONOSCAN	Martell	Steve
Chroma ATE Inc.	Viloria	Enrique	Othman & Oartners, LLP	Othman	Maslina
Corning	*Schmidt*	*Ilona*	Shin-Etsu Polymer Co., Ltd.	Shida	Hiroyuki
Evergreen Enhancement	*Kerr*	*Bill*			
MicroSense KLA	*Perroots*	*Len*	SEMI	Nguyen	Laura

Table 2 Leadership Changes

None

Table 3 Committee Structure Changes

None

Table 4 Ballot Results

Document #	*Document Title*	*Committee Action*
6555	Reapproval of SEMI 3D9-0914, Guide for Describing Materials Properties for a 300 mm 3DS-IC Wafer Stack	**Passed**; as balloted.
6556	Reapproval of SEMI 3D10-0814, Guide to Describing Materials Properties for Intermediate Wafers for Use in a 300 mm 3DS-IC Wafer Stack	**Passed;** as balloted.
6557	Reapproval of SEMI 3D11-1214, Terminology for Through Glass Via and Blind Via in Glass Geometrical Metrology	**Passed;** as balloted.
6558	Reapproval of SEMI 3D12-0315, Guide for Measuring Flatness and Shape of Low Stiffness Wafers	**Failed**

#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*
6591	SNARF	PLP Panel TF	Revision to SEMI 3D20-0719, Specification for Panel Substrate Characteristics for Panel Level Packaging (PLP) Applications ***– TC Member Review took place between 09/27/2019-10/11/2019*** ***– Approved by GCS on 10/22/2019***

Table 6 Authorized Activities

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

None

#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*	*TF*	*Details*
6591	Cycle 2-2020	PLP Panel TF	Revision to SEMI 3D20-0719, Specification for Panel Substrate Characteristics for Panel Level Packaging (PLP) Applications

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

None

Table 9 SNARF(s) Abolished

#	*TF*	*Title*
6558	NA 3DP&I Committee	*Reapproval of SEMI 3D12-0315, Guide for Measuring Flatness and Shape of Low Stiffness Wafers* ***– Reapproval ballot failed Committee review, issue LI SNARF to address negatives.***

Table 10 Standard(s) to receive Inactive Status

None

Table 11 New Action Items

Item #	*Assigned to*	*Details*
2019Nov#01	Laura Nguyen	Send SEMIViews access to participants for the current list of Standards coming up for Five-Year Review. Completed. Closed.

Table 12 Previous Meeting Action Items

None

1 Welcome, Reminders, and Introductions

Bill Kerr (Evergreen Enhancement) called the meeting to order at 14:03 Pacific. 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 July 2019

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:	Steve Martell (Nordson SONOSCAN) / Len Perroots (MicroSense KLA)
Discussion:	None.
Vote:	7-0 in favor. Motion passed.

Attachment: [2019West] 3DP&I NA TC Chapter Meeting Minutes FINAL

3 Liaison Reports

3.1 *3D Packaging & Integration Japan TC Chapter*

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

Meeting Information

- Last meeting
  - October 11, 2019 at the Japan Fall 2019 Meetings; SEMI Japan office, Tokyo
- Next meeting
  - March 6, 2020 at the Japan Spring 2020 Meetings; SEMI Japan office, Tokyo

Leadership

- Committee Co-Chairs
  - Kazunori Kato – AiT
    - 1st GCS voting member; 1st 3D Packaging & Integration representative to the JRSC
  - Masahiro Tsuriya – iNEMI
    - 2nd GCS voting member; 3rd 3D Packaging & Integration representative to the JRSC
  - Haruo Shimamoto – AIST
    - 2nd 3D Packaging & Integration representative to the JRSC

Committee Structure Changes

- Encapsulation Characteristics for Wafer Level Package and Panel Level Packaging TF
  - Approved by Committee on: 10/11/2019
  - TF Leaders: Tsuriya Masahiro (iNEMI), Arai Hidetoshi (Apic-Yamada)
  - Charter:
    - This taskforce will work on the development of standard for WLP/PLP encapsulation characteristics and measurement methodology.
  - Scope:
    - This taskforce will develop the WLP/PLP encapsulants characteristics and testing methods of key properties. These include:
    - Material Characteristics. This includes the list of key characteristics of all types of encapsulate.
    - Property measurement methods. This includes flowability or curability of materials.

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        - Measurement of key behaviors which related to encapsulated WLP wafers and PLP panels, etc. This includes the warpage measurement methods of wafer or panel.
- 3DS IC Bonded Layer Inspection Metrology TF
    - Approved by Committee on: 10/19/2019
    - TF Leaders: Ono Shigeru (Hitachi Power Solutions), Shimamoto Haruo (AIST)
    - Charter:
        - This Task Force will focus on the reference sample specification for multi stacked wafers/dies more than two.
    - Scope:
        - This Task Force will develop a standard focusing on quality of joint boundary between wafers/dies such as void inspection metrology by providing a specification for a reference sample with the following areas to be addressed:
        - Determine the specification for separating the stacked layers of more than two wafers by standardized 3D wafer structure.
        - Determine the identification marks and size.

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

Authorized Activities

Doc #	Type	SC/TF/CFG	Document Title/Details
--	TFOF	Encapsulation Characteristics for Wafer Level Package and Panel Level Packaging TF	Encapsulation Characteristics for Wafer Level Package and Panel Level Packaging TF ***- New TFOF approved at TC Chapter meeting held on 10/112019***
--	TFOF	3DS IC Bonded Layer Inspection Metrology TF	3DS IC Bonded Layer Inspection Metrology TF ***- New TFOF approved at TC Chapter meeting held on 10/112019***
6590	SNARF	PLP Glass Carrier TF	New Standard: Specification for Glass Carrier Characteristics for Panel Level Packaging (PLP) Applications ***- TC Member Review took place between 8/2/2019 and 8/15/2019 before approval at the TC Chapter Meeting.***

Authorized Ballots

Doc #	When	TF	Document Title/Details
6497A	Cycle 1/2-2020	JA 450mm Assembly and Test Die Preparation TF	Line Item Revision to SEMI G95-0314 "Mechanical Interface Specification for 450 mm Load Port for Tape Frame Cassettes in the Backend Process" with non-conforming title change to "Specification for Mechanical Features of 450 mm Load Port for Tape Frame Cassettes in The Backend Process"

Task Force Highlights

Panel Level Packaging (PLP) Glass Carrier Task Force

- Leader: Mark Takahashi / Namics Corporation
- Members: Corning, AGC, Namics Corporation, Shimazu, Hitachi Chemical, Disco, Shin-Etsu Polymer, Kuramoto
    - Need to invite more participants
- SNARF 6590: New Standard: Specification for Glass Carrier Characteristics for Panel Level Packaging (PLP) Applications
    - Approved at the Japan TC Chapter meeting on October 11

Encapsulation Characteristics for Wafer Level Package and Panel Level Packaging TF

- Leaders: Tsuriya Masahiro (iNEMI), Arai Hidetoshi (Apic-Yamada)
- Members: AIST, Apic-Yamada, Namics, Panasonic, Shin-Etsu Chemical, Sumitomo Bakelite, Toray Engineering, TOWA
  - Need to invite more participants
- Kick-off meeting to be held on November 18

3DS IC Bonded Layer Inspection Metrology TF

- Leader: Ono Shigeru (Hitachi Power Solutions), Shimamoto Haruo (AIST)
- Members: Nordson Sonoscan, Nippon Barnes, Ultra Memory
  - Need to invite more participants
- Kick-off meeting to be held on November 18

Open SNARFs

- 6496: Line Item Revision to SEMI G63-95 (Reapproved 0811) “Test Method for Measurement of Die Shear Strength”
  - Thin Chip Handling TF
  - Expiration date: 02/21/2022

Standards to receive Inactive Status

- SEMI G57-0302 (Reapproved 1015), Guide for Standardization of Leadframe Terminology
- SEMI G75-0698 (Reapproved 0615), Standard Test Method of the Properties of Leadframe Tape
- SEMI G81-0307 (Reapproved 0315), Specification for Map Data Items

Five-Year Review

Designation	Standard Title	Action By	Assigned to
SEMI G52-1115	Test Method for Measurement of Ionic Contamination on Semiconductor Leadframes	Fall 2020	3D Packaging & Integration 5 Year Review TF
SEMI G74-0699 (Reapproved 0215)	Specification for Tape Frame for 300 mm Wafers	Winter 2020	JA 450mm Assembly and Test Die Preparation TF
SEMI G77-0699 (Reapproved 0215)	Specification for Frame Cassette for 300 mm Wafers	Winter 2020	JA 450mm Assembly and Test Die Preparation TF
SEMI G82-1115	Specification for 300 mm Load Port for Frame Cassettes in Backend Process	Fall 2020	JA 450mm Assembly and Test Die Preparation TF
SEMI G87-1108 (Reapproved 0215)	Specification for Plastic Tape Frame for 300 mm Wafer	Winter 2020	JA 450mm Assembly and Test Die Preparation TF
SEMI G92-0315	Specification for Plastic Tape Frame for 300 mm Wafer	Winter 2020	JA 450mm Assembly and Test Die Preparation TF

Staff Contact: Chie Yanagisawa; cyanagiswa@semi.org

Attachment: 201910_3DP&I-Japan_Liaison_v2.0

3.2 *3D Packaging & Integration Taiwan TC Chapter*

Laura Nguyen (SEMI HQ) reported for the Taiwan TC Chapter. Of note:

Meeting Information

- Previous meeting:
  - October 8, 2019 at the SEMI Standards Taiwan Summer Meetings; SEMI Taiwan office, Hsinchu
- Next meeting:
  - February 11, 2020 at the SEMI Standards Taiwan Winter Meetings; SEMI Taiwan office, Hsinchu

Leadership

- Committee Co-Chairs:
    - Wendy Chen (King Yuan Electronics)
    - Roger Hwang (ASE)
    - Chien-Chung Lin (ITRI)

Leadership Changes

- Testing Task Force
    - Previous Leader: Ming-Chin Tsai (KYEC)
    - New Leader: Wendy Chen (KYCE)

Organization Chart *{See attachment for Org Chart}*

Task Force Highlights

3DP&I Middle-End Process Task Force

- Study the feasibility of submitting a new SNARF for CMP standards in the next TC meeting.

Testing Task Force

- Study the feasibility of submitting a new SNARF for tracing each component in 3D IC

Staff Contact: Dean Chang, E-mail: dchang@semi.org, Tiffany Huang, E-mail: thuang@semi.org

Attachment: 20191009_TW_3D P&I TC Liaison Report v1

3.3 *SEMI Staff Report*

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

SEMI Global Calendar of Events

- SEMICON Europa (November 12-15; Munich, Germany)
- SEMICON Japan (December 11-13; Tokyo, Japan)
- SEMICON Korea (February 5-7; Seoul, Korea)

Upcoming North America Standards Meetings

- NA Standards Spring 2020 Meetings (March 30-April 2, SEMI HQ in Milpitas, California)
- SEMICON West 2020 Meetings (July 20-23, Moscone Center, San Francisco, California)
- NA Standards Fall 2020 Meetings (November 2-5, SEMI HQ in Milpitas, California)

Letter Ballot Critical Dates for 2019

- Cycle 8-2019: Ballot Submission Due: Oct 11/Voting Period: Oct 25 – Nov 25
- Cycle 9-2019: Ballot Submission Due: Nov 14/Voting Period: Nov 26 – Dec 26
- Cycle 1-2020: Ballot Submission Due: Jan 6/Voting Period: Jan 15 – Feb 14
- Cycle 2-2020: Ballot Submission Due: Jan 30/Voting Period: Feb 11 – Mar 12
- Cycle 3-2020: Ballot Submission Due: Mar 11/Voting Period: Mar 25 – Apr 24

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

Standards Publications Report

Cycle	New	Revised	Reapproved	Withdrawn
March 2019	2	3	0	0
April 2019	2	12	5	0
May 2019	1	1	1	0
June 2019	2	9	2	0

Total in portfolio – 1,010 (includes 269 Inactive Standards)

New Standards

Cycle	Designation	Title	Committee	Region
July 2019	SEMI S30	Safety Guideline for Use of Energetic Materials in Semiconductor R&D and Manufacturing Processes	EHS	NA
July 2019	SEMI 3D20	Specification for Panel Characteristics for Panel Level Packaging (PLP) Applications	3D-IC	NA
August 2019	SEMI A3	Specification for Printed Circuit Board Equipment Communication Interfaces (PCBECI)	Automation Technology	TW
August 2019	SEMI HB11	Specification for Sapphire Single Crystal Ingot Intended for Use for Manufacturing HB-LED Wafers	HB-LED	CH
September 2019	SEMI E177	Specification for Transmission Electron Microscope (TEM) Lamella Carriers Used in Electron Microscopy Workflow	PIC	NA
October 2019	SEMI 3D21	Guide for Describing Glass-Based Material for Use in 3DS-IC Process	3D-IC	NA
October 2019	SEMI PV91	Specification for Trichlorosilane 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	24
MEMS	3
Metrics	9
Micropatterning	30
Photovoltaic	1
Physical Interfaces & Carriers	19
Silicon Wafer	11
Traceability	8

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

Regulations & Procedure Manual

- *Regulations* (Feb 28, 2019)
  - Latest version clarifies procedures applicable for Copyrighted Items and trademarks
- *Procedure Manual* (Feb 28, 2019)
- Style Manual Version 6 (March 25, 2019)
  - Additions and revisions to harmonize with updated *Regulations* and *Procedure Manual*
  - Updates
    - *Company or Organization Trademarks (Table 1, #1-24)*
    - *Active vs. Passive Voice (Table 4, #4-4)*
    - *Word Usage (Table 4, #4-5)*
    - *New Safety Guideline Conformance Notice (Table 8, #8-1)*

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

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

Five-Year Review

Designation #	Standard Title	Action By	Original TF assigned to:
SEMI 3D13-0715	Guide for Measuring Voids in Bonded Wafer Stacks	West 2020	Inspection & Metrology
SEMI 3D4-0915	Guide for Metrology for Measuring Thickness, Total Thickness Variation (TTV), Bow, Warp/Sori, and Flatness of Bonded Wafer Stacks	West 2020	Inspection & Metrology

Attachment: Staff Report November 2019_3DP&I

4 Ballot Review

NOTE 1: 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 Document # 6555, Reapproval of SEMI 3D9-0914, Guide for Describing Materials Properties for a 300 mm 3DS-IC Wafer Stack

- The ballot passed TC Chapter review as balloted. See attachment for ballot adjudication.

Attachment: 6555_Ballot Review

4.2 Document # 6556, Reapproval of SEMI 3D10-0814, Guide to Describing Materials Properties for Intermediate Wafers for Use in a 300 mm 3DS-IC Wafer Stack

- The ballot passed TC Chapter review as balloted. See attachment for ballot adjudication.

Attachment: 6556_Ballot Review

4.3 Document # 6557, Reapproval of SEMI 3D11-1214, Terminology for Through Glass Via and Blind Via in Glass Geometrical Metrology

- The ballot passed TC Chapter review as balloted. See attachment for ballot adjudication.

Attachment: 6557_Ballot Review

4.4 Document # 6558, Reapproval of SEMI 3D12-0315, Guide for Measuring Flatness and Shape of Low Stiffness Wafers

- The committee found the negative related and persuasive. The ballot failed and returned to the task force for re-work and re-ballot. A new SNARF will be reissued to reflect change in scope and SNARF 6558 will be abolished.

Motion:	To fail Doc 6558 based on the negative #5 submitted by Peter Wagner Consultant.
By / 2nd:	Ilona Schmidt (Corning) / Steve Martell (Nordson SONOSCAN)
Discussion:	None.
Vote:	7-0 in favor. Motion passed.

Motion:	To abolish SNARF 6558, Reapproval of SEMI 3D12-0315, Guide for Measuring Flatness and Shape of Low Stiffness Wafers
By / 2nd:	Ilona Schmidt (Corning) / Steve Martell (Nordson SONOSCAN)
Discussion:	None.
Vote:	7-0 in favor. Motion passed.

Attachment: [Ballot Results] Cycle 06-2019 3DP&I I&M_TFresponse

5 Subcommittee and Task Force Reports

5.1 *Panel Level Packaging (PLP) Panel Task Force*

Steve Martell (Nordson SONOSCAN) reported for this Task Force. Of note, the key items are as follows:

Review Doc 6591

- Addition of table to the requirement with: Dimension, Thickness range, Warp, Mass
- Elimination of orientation parameter from requirement

Action Items from Last Meeting

- Stefan and Daniel
  - Pull from COT for definition of warp (add discussion to align with 3D20)
  - (flat stone warp, total warp, process induced warp…etc.)
- Bold items in Table for Requirement (add note) or move to another table or delete the word "optional"?
- Reword or remove "as options": Section 6.8 - Additional panel properties are listed in Appendix 1 as options. Many of these properties are process specific and may vary from customer to customer.
- During the Fall Meetings, TF will ask the TC Chapter to authorize for Ballot in Cycle 1 or 2-2020.
  - Adjudication at the NA Spring Meetings 2020 (March 30-April 2, 2020)
  - Exact date for the PLP Panel TF is TBD

Motion:	To authorize Doc 6591 for Letter Ballot in Cycle 1 or 2-2020, pending TF edits of the document.
By / 2nd:	Steve Martell (Nordson SONOSCAN) / Bevan Wu (BW & Associates)
Discussion:	None.

Vote: 7-0 in favor. Motion passed.

Attachment: PLP Panel TF Meeting_2019Nov_v2

5.2 *3DP&I Inspection & Metrology and Bonded Wafer Stacks Task Force*

Task Force Leaders Steve Martell (Nordson SONOSCAN) and Ilona Schmidt (Corning) reported for both the 3DP&I Inspection & Metrology and 3DP&I Bonded Wafer Stacks Task Forces.

Of note, during the task force meeting, the task force reviewed the ballot results that can be found in Section 4 of these minutes.

Attachment: [Ballot Results] Cycle 06-2019 3DP&I I&M_TFresponse

6 Old Business

6.1 *Standards due for Five-Year Review*

The committee reviewed the Standards due for Five-Year Review. The committee discussed these documents and decided to submit requests for SEMIViews access to the members present in the meeting for review to determine if the Committee wants to ballot as Reapproval or Revisions.

Action Item: 2019Nov#01, Laura to submit requests for Five-year Reviews SEMIViews access to committee members present in the meeting.

6.2 *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 meeting is scheduled in conjunction with the NA Standards Spring 2020 Meetings at SEMI Headquarters in Milpitas, California, March 30-April 2, 2020. See http://www.semi.org/standards-events for the current list of events.

Tentative Schedule:

Thursday, April 2

11:00-12:00 Joint 3DP&I Bonded Wafer Stacks (TF) and 3DP&I Inspection and Metrology (TF)

13:00-14:00 PLP Panel (TF)

14:00-16:00 3DP&I (C)

Adjournment: 14:47.

Respectfully submitted by:

Laura Nguyen

Sr. Coordinator, International Standards

SEMI Global Headquarters

Phone: +1.408.943.7019

Email: lnguyen@semi.org

Minutes tentatively approved by:

Bill Kerr (Evergreen Enhancement), Co-chair	<Date approved>
Sesh Ramaswami (Applied Materials), Co-chair	<Date approved>
Chris Moore (Covalent Metrology), Co-chair	<Date approved>

Minutes approved by: **3DP&I NA OVTCCM on March 23, 2021.**

Table 13 Index of Available Attachments[#1]

Title	*Title*
SEMI Standards Required Elements July 2019	6555_Ballot Review
[2019West] 3DP&I NA TC Chapter Meeting Minutes FINAL	6556_Ballot Review
201910_3DP&I-Japan_Liaison_v2.0	6557_Ballot Review
20191009_TW_3D P&I TC Liaison Report v1	[Ballot Results] Cycle 06-2019 3DP&I I&M_TFresponse
Staff Report November 2019_3DP&I	PLP Panel TF Meeting_2019Nov_v2

#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.