



## 3DS-IC North America TC Chapter Meeting Summary and Minutes

NA Standards Spring 2017 Meetings  
Tuesday, April 4, 2017, 13:30 – 15:30  
SEMI Headquarters, Milpitas, California

### TC Chapter Announcements

*Next TC Chapter Meeting*

SEMICON West 2017 Standards Meetings

Wednesday, July 12, 2017, 15:00 – 17:00

Marriott Marquis Hotel, San Francisco, California

### Table 1 Meeting Attendees

*Italics indicate virtual participants*

**Co-Chairs:** Richard Allen (NIST), Chris Moore (BayTech-Resor), Sesh Ramaswami (Applied Materials)

**SEMI Staff:** Laura Nguyen

<i>Company</i>	<i>Last</i>	<i>First</i>	<i>Company</i>	<i>Last</i>	<i>First</i>
Asahi Glass	Takahashi	Mark	NIST	Allen	Richard
Asahi Glass	Yoichiro	Sato	Solberg Technical Consulting	Solberg	Vern
<i>BayTech-Resor</i>	<i>Baylies</i>	<i>Win</i>	Sonoscan	Martell	Steve
Canon USA	Shelton	Doug	SEMI	Collins	Junko
Corning	Schmidt	Ilona	SEMI	Nguyen	Laura

### Table 2 Leadership Changes

<i>WG/TF/SC/TC Name</i>	<i>Previous Leader</i>	<i>New Leader</i>
Bonded Wafer Stacks Task Force		Steve Martell (Sonoscan)
Inspection & Metrology Task Force	David Read	Ilona Schmidt (Corning)

### Table 3 Committee Structure Changes

None

### Table 4 Ballot Results

<i>Document #</i>	<i>Document Title</i>	<i>Committee Action</i>
5822	New Standard, Specification for Reference Material for Bonded Wafer Stack Void Metrology	<b>Failed</b>

#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

None

**Table 6 Authorized Activities**

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

#	Type	SC/TF/WG	Details
6175	SNARF	Inspection and Metrology TF	New Standard, Guide on Measurements of Openings and Vias in Glass – <i>New SNARF went out for two-week TC member review prior to TC Chapter meeting</i>

#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
5822A	Cycle 4, 2017 or Cycle 5, 2017	Inspection and Metrology TF	New Standard, Specification for Reference Material for Bonded Wafer Stack Void Metrology
6179	Cycle 4, 2017 or Cycle 5, 2017	NA 3DS-IC Committee	Reapproval of SEMI 3D1-0912, Terminology for Through Silicon via Geometrical Metrology

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

#	TF	Title	Expiration Date
5173	Bonded Wafer Stacks	New Standard, Guide for Describing Silicon Wafers for Use in a 300 mm 3DS-IC Wafer Stack	April 4, 2018

**Table 9 SNARF(s) Abolished**

None

**Table 10 Standard(s) to receive Inactive Status**

None

**Table 11 New Action Items**

Item #	Assigned to	Details
2017April#03	Rich Allen	To contact Victor Vartanian and David Read to see if they are still interesting of being TF leader.
2017April#02	Junko Collins	To set up recurring meetings between NA and Japan every two weeks to discuss the details of the charter proposal and potentially have a final proposal to present at SEMICON West.

**Table 12 Previous Meeting Action Items**

Item #	Assigned to	Details
2016Nov#01	Laura Nguyen	Find out why there is no topic/section for 3D-IC under the “By Topic” on the SEMI Standard Publications Web site. Inquire with Shannon how to update that listing. <b>CLOSED.</b>

**Welcome, Reminders, and Introductions**

Rich Allen (NIST) called the meeting to order at 13:35. The meeting reminders on antitrust issues, intellectual property issues and holding meetings with international attendance were reviewed. Attendees introduced themselves.

**Attachment:** SEMI Standards Required Meeting Elements

## 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 / 2<sup>nd</sup>:** Steve Martell (Sonoscan) / Mark Takahashi (Asahi Glass)  
**Discussion:** None.  
**Vote:** 5-0 in favor. Motion passed.  
**Attachment:** [2016Fall] 3DS-IC Minutes FINAL

## Liaison Reports

### 3.1 3DS-IC Japan TC Chapter

Laura Nguyen (SEMI) reported for the 3DS-IC Japan TC Chapter. Of note:

- Committee Cochairs: Masahiro Tsuruya (iNEMI), Haruo Shimamoto (AIST)
- Organization Chart *{See attachment for Figure}*
- Meeting Information
  - Last meeting – Japan Winter 2017 Meetings: Friday, January 27, 2017 at SEMI Japan office, Tokyo
  - Next meeting – Japan Summer 2017 Meetings: Monday, June 19, 2017 at SEMI Japan office, Tokyo
- TF / SG Updates
  - Steering Group
    - Leadership: Masahiro Tsuruya/ iNEMI, Eiji Yoshino / Hitachi High-Technologies, Haruo Shimamoto / AIST
    - Charter
      - Define the work areas and review the global TC charter
      - Provide the following inputs and opportunities;
        - Plan technical workshop to promote the latest technologies and market trends on the 3DIC/SiP.
        - Brainstorm the areas of potential taskforce activities, and recommend the taskforce team formation to the Technical Committee
        - Handle any type of 3 dimensional IC package technologies including fan-out wafer level package or integrated SiP.
        - Provide the communication link from all layer of supply chain in Japan.
        - Interact with North America and Taiwan Technology Committee for the joint programs planning.
    - Topics
      - Review the current charter as to expand the scope to cover the advanced package technologies (i.e. add FO-WLP), and plan to initiate discussion with other regional TC.
- Workshops for 3DS-IC Standardization
  - 1<sup>st</sup> Workshop
    - Held on Sept. 7, 2015 at SEMI Japan office
    - More than 60 attendees
    - Yole, ITRI, Tokyo Seimitsu and Toray Engineering made presentations
  - 2<sup>nd</sup> Workshop
    - Held on January 12, 2016 at SEMI Japan office
    - More than 60 attendees
    - Yole, Otsuka Electronics and Hitachi Chemical made presentations
  - 3<sup>rd</sup> Workshop
    - Held on June 6, 2016 at SEMI Japan office
    - More than 60 attendees
    - Fukuoka IST, Tohoku University and Toray Engineering made presentations
  - 4<sup>th</sup> Workshop



- To be held on June 19, 2017 at SEMI Japan office
- Other 3DS-IC related activities in Japan
  - Thin Chip Handling Task Force under Assembly & Packaging Japan TC Chapter
    - New Standard: SPECIFICATION FOR ADHESIVE TRAY USED FOR THIN CHIP HANDLING
      - Doc. 5835 was published as SEMI G97-0116 in January 2016
      - SNARF for Line Item Revision to SEMI G97-0116 (Doc. 6028) and the ballot submission were approved at the next Assembly & Packaging Japan TC Chapter on June 10, 2016
    - Doc. 5836: New Standard: TEST METHOD FOR ADHESIVE STRENGTH FOR ADHESIVE TRAY USED FOR THIN CHIP HANDLING
      - Ballot draft to be prepared
- Staff Contact: Chie Yanagisawa ([cyanagisawa@semi.org](mailto:cyanagisawa@semi.org))

**Attachment:** [2017Spring] Liaison Japan 3DS-IC\_v2

### 3.2 3DS-IC Taiwan TC Chapter

Laura Nguyen (SEMI) reported for the 3DS-IC Taiwan TC Chapter. Of note:

- Leadership
  - Committee cochairs: Wendy Chen (King Yuan Electronics), Roger Hwang (ASE), Chien-Chung Lin (ITRI)
- Organization Chart *{See attachment for Figure}*
- Meeting Information
  - Last meeting – SEMI Taiwan, March 9, 2017
  - Next meeting – SEMI Taiwan, June, 2017
- 3DS-IC Standard Committee Highlights
  - Evaluating the feasibility to set up Fan-out Task Force.
  - The draft of Doc#5800 “New Standard: Guide for Wafer Edge Trimming for 3DS-IC Process” will be completed before next TC meeting.
- Staff Contact: Dean Chang ([dchang@semi.org](mailto:dchang@semi.org))

**Attachment:** [2017Spring] Liaison Taiwan 3DS-IC

### 3.3 SEMI Staff Report

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

- SEMI Global 2017 Calendar of Events
  - LED Taiwan (April 12-15, 2017; Taipei, Taiwan)
  - SEMICON Southeast Asia (April 25-27, 2017; Penang, Malaysia)
  - Intersolar Europe (May 31-June 2, 2017; Munich, Germany)
  - SEMICON West (July 11-13, 2017, San Francisco, California)
  - SEMICON Taiwan (September 13-15, 2017; Taipei, Taiwan)
  - PV Taiwan (October 12-14, 2017; Taipei, Taiwan)
  - SEMICON Europa (November 14-17, 2017; Munich, Germany)
  - SEMICON Japan (December 13-15, 2017; Tokyo, Japan)
- Upcoming North America Standards Meetings



- SEMICON West 2017 (July 10-13, 2017, San Francisco, California)
- NA Standards Fall 2017 Meetings (November 6-9 [tentative], SEMI HQ in Milpitas, California)
- Letter Ballot Critical Dates for 2017
  - West 2017 adjudication
    - Cycle 4: ballot submission due: Apr 14/Voting Period: Apr 25 – May 25
    - Cycle 5: ballot submission due: May 12/Voting Period: May 26 – June 26

Critical Dates 2017; <http://www.semi.org/en/Standards/Ballots>

- Standards Publications Report

<i>Cycle</i>	<i>New</i>	<i>Revised</i>	<i>Reapproved</i>	<i>Withdrawn</i>
December 2016	0	2	0	0
January 2017	1	4	4	0
February 2017	1	9	2	0
March 2017	0	16	11	0

Total in portfolio – 972 (includes 170 Inactive Standards – *see attachment to see breakdown*)

- SEMI Standards Publications – New Standards
  - SEMI PV76, Test Method for Durability of Low Light Intensity Organic Photovoltaic (OPV) and Dye-Sensitized Solar Cell (DSSC)
  - SEMI HB8, Test Method for Determining Orientation of a Sapphire Single Crystal
- Nonconforming Titles {*See attachment for full list*}
- 3DS-IC Standards needing Five-Year Review
  - SEMI 3D1-0912, Terminology for Through Silicon via Geometrical Metrology
- SNARF 3 Year Status, TC Chapter may grant a one-year extension
  - Doc. 5173, New Standard: Guide for Describing Silicon Wafers for Use in a 300 mm 3DS-IC Wafer Stack
  - Action needed by Spring 2017

**Attachment:** [2017Spring] Staff Report 3DS-IC

## 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 # 5822, New Standard, Specification for Reference Material for Bonded Wafer Stack Void Metrology

- The committee found the negatives related and persuasive. The ballot failed and returned to the task force for re-work and re-ballot in the next cycle if ready. See attachment for separate minutes regarding the discussion of the reject vote.

**Attachment:** IM TC for 5822 Response\_March 23 - Meeting Notes - Rev 4-4-17



## Subcommittee and Task Force Reports

### 5.1 3DS-IC Bonded Wafer Stacked Task Force

Rich Allen (NIST) reported for the 3DS-IC Bonded Wafer Stacked Task Force. There are currently three open SNARFs, but have not made any significant progress since the last meeting. There was also a discussion of fan-out activities that may be appropriate to develop Standards under this task force. That may require a change in TFOF and will be worked on from now until West.

### 5.2 3DS-IC Inspection & Metrology Task Force

Steve Martell (Sonoscan) reported for the 3DS-IC Inspection & Metrology Task Force. The task force reviewed the following during the task force meeting.

- Reviewed SEMI Draft Doc 5822 ballot results and will decided to ask the committee to send out for ballot.
- Chris is looking for definitions or information from Japan to include in Draft Doc 5976 that he is still currently working on. There is some confusion; there are no Standards that come out of Japan since their 3DS-IC is a WG. Junko informed Steve that Shimamoto-san is interested in working on this document with Chris and he will contact Chris directly.

**Motion:** Authorize to send Doc 5822A out for ballot in Cycle 4 or 5, 2017  
**By / 2<sup>nd</sup>:** Mark Takahashi (Asahi Glass Company) / Steve Martell (Sonoscan)  
**Discussion:** None.  
**Vote:** 4-0 in favor. Motion passed.

## Old Business

### 6.1 Leadership Changes

Rich Allen addressed the committee on this topic.

Rich will contact the previous leader for the current task forces. Rich nominates Ilona Schmidt and Steve Martell as leaders for Bonded Stacked or Inspection & Metrology TF.

**Motion:** Approve Ilona Schmidt as co-leader to the 3DS-IC Inspection & Metrology TF.  
**By / 2<sup>nd</sup>:** Steve Martell (Sonoscan) / Ilona Schmidt (Corning)  
**Discussion:** None.  
**Vote:** 6-0 in favor. Motion passed.

**Motion:** Approve Steve as co-leader to the 3DS-IC Bonded Wafer Stacked TF.  
**By / 2<sup>nd</sup>:** Steve Martell (Sonoscan) / Ilona Schmidt (Corning)  
**Discussion:** None.  
**Vote:** 6-0 in favor. Motion passed.

**Action Item:** 2017April#01, Rich Allen to contact Victor Vartanian and David Read to see if they are still interesting of being TF leader.

## 6.2 Standards due for Five-Year Review

Rich Allen addressed the committee on this topic. There is one document that is due for Five-Year reapproval. The committee discussed these documents and decided to ballot them for reapproval. The following actions are taken below.

- Motion:** To authorize SEMI 3D1 for reapproval ballot in Cycle 4, or 5, 2017.  
**By / 2<sup>nd</sup>:** Mark Takahashi (Asahi Glass Company) / Steve Martell (Sonoscan)  
**Discussion:** None.  
**Vote:** 6-0 in favor. Motion passed.

## 6.3 SNARFs approaching Three-Year Document Development Project Period

Rich Allen addressed the committee on this topic. He would like to ask the committee to extend the open SNARF Doc 5173.

- Motion:** To extend SNARF Doc 5173 for one-year.  
**By / 2<sup>nd</sup>:** Steve Martell (Sonoscan) / Yoichiro Sato (Asahi Glass)  
**Discussion:** None.  
**Vote:** 6-0 in favor. Motion passed.

## New Business

### 7.1 New Charter Proposal

Junko Collins (SEMI Japan) addressed the committee on this topic. The key items are as followed:

Rationale:

- 3DS-IC TC plans to expand its work area from three dimensional stacking wafer technologies to advanced package technologies, such as Fan-Out Wafer Level Packages.
- Various new innovated semiconductor packaging technologies are born recently, and these new packaging technologies are hard to clearly categorized in technology basis.
- This move would cause the duplicate TC responsibilities between 3DS-IC TC and Assembly & Packaging TC.
  - Current SEMI Standards Development:
    - Assembly & Packaging TC Work Area:
      - Terminology
      - Package technologies (specification, configuration, etc.)
      - Packaging Material (i.e.: leadframe, ceramic, flexible material, mold compound, Plating Specification)
      - Packing media (i.e.: Interleaf paper, hard cases for leadframe, carrier for wafer)
    - 3DS-IC TC Work Area:
      - Terminology
      - 3DS-IC Process Flow
      - TSV used interconnection between chips or wafers.
      - 3DS-IC material (i.e.: Si wafer, Si intermediate interposer, Si/ Glass support)
      - Packing media (Wafer coin stack carrier, Si chip carrier)
    - FO-WLP is mainly covered by Assembly & Packaging TC work area.



- RDL related technologies are grey zone of responsibilities between 3DS-IC and Packaging TC

#### Current Charters

##### Assembly & Packaging TC

- This committee explores, evaluates and formulates consensus-based specifications that through voluntary compliance will enhance the manufacturing capability of the semiconductor industry as it relates to the packaging and assembly of the semiconductor chip.
- This includes the materials, piece parts, and interconnection schemes, and unique packaging assemblies that provide for the communication link between the semiconductor chip and the next level of integration.
- Emphasis will be placed on establishing standards, guidelines, test methods, practices, and specifications for materials, equipments, physical and electrical acceptance criteria, environmental testing, and test methods for measuring these standards.
- This committee also discuss total infrastructure for Chip to Final Set system and process such as Testing and Design Software, Transportation Tools, Reliability and Traceability issues, EHS issues, Inspection method and equipments and etc.
- This committee also study and hold workshop to develop standards for materials which meet industry requirements on environmental issue, advanced packages such as SiP, 3D and various Modules, MEMS and MOEMS etc.
- Cooperative alliances have been and will continue to be established with other standard setting organizations such as JEDEC, IPC, JEITA, JIEP, HDP User Group and ASTM, to assure complete integration of industry requirements.

##### 3DS-IC

- To explore, evaluate, discuss, and create consensus-based specifications, guidelines, and practices that, through voluntary compliance, will;
- promote mutual understanding and improved communication between users and suppliers of 3DS-IC materials, carriers, equipment, automation systems and devices
- enhance the manufacturing efficiency, capability and shorten 3DS-IC time-to-market
- reduce manufacturing cost in the 3D-IC industry.

#### Potential Solution to Proposal

- Proposal:
  - Combine both TCs into one TC (this TC will newly be named to properly express its mission and scope)
    - Global Assembly & Packaging TC will be merged into this new TC
    - Global 3DS-IC TC will be also merged into this new TC.
  - This new TC will cover all chip to next generation integration system, which associates with various type packages and 3D integration as well.
  - Charter is drafted in page 7.
- Action Proposal:
  - Approve this proposal by the related regional TC charters
  - Define the charter and work area in 2017.
  - Organize the workshop to deliver the message to the industry and SEMI members.
  - Schedule this technology based symposium in several regions





Advanced Packages and 3D Integration Overview {See attachment for overview}

#### Proposed Charter

- This committee explores, evaluates and formulates consensus-based specifications that through voluntary compliance will enhance the manufacturing capability of the semiconductor industry as it relates to the *semiconductor packaging technologies and systems*.
  - This includes wafers stacking technologies, the materials, system integration processes, and interconnection schemes with unique packaging that provide the communication link between the semiconductor chips and the next levels of integration.
  - Emphasis will be placed on establishing standards, guidelines, test methods, practices, and specifications for materials, equipment, physical and electrical acceptance criteria, environmental testing, and test methods for measuring these standards.
  - This committee also discuss total infrastructure for chip to board interconnection such as Design Software, Transportation Tools, Reliability and Traceability issues, equipment and all others related.

**Action Item:** 2017April#02, Junko to set up recurring meetings between NA and Japan every two weeks to discuss the details of the charter proposal and potentially have a final proposal to present at SEMICON West.

#### 7.2 New TFOFs or SNARF(s)

Ilona Schmidt addressed the committee on this topic.

**Motion:** To approve SNARF for New Standard, Guide on Measurements of Openings and Vias in Glass and submit for doc number. (SNARF went out for two-week TC member review prior to TC Chapter meeting).

**By / 2<sup>nd</sup>:** Ilona Schmidt (Corning) / Steve Martel (Sonoscan)

**Discussion:** None.

**Vote:** 6-0 in favor. Motion passed.

**Attachment:** SNARF Guide on Measurements of Openings in Glass

#### Next Meeting and Adjournment

The next meeting is scheduled for Wednesday, July 12, 2017 at SEMICON West 2017 Standards Meetings at the Marriott Marquis Hotel in San Francisco, California. See <http://www.semi.org/standards-events> for the current list of events.

*\*New proposed schedule change\**

The tentative schedule is provided below:

Wednesday, July 12 (**Tentative**)  
13:00-14:00 3DS-IC Inspection and Metrology (TF)  
14:00-15:00 3DS-IC Bonded Wafer Stacks (TF)  
15:00-17:00 3DS-IC (C)

Adjournment: 15:29.



Respectfully submitted by:

Laura Nguyen  
International Standards Coordinator  
SEMI Headquarters  
Phone: 1.408.943.7019  
Email: [lnguyen@semi.org](mailto:lnguyen@semi.org)

Minutes tentatively approved by:

Richard Allen (NIST), Co-chair	July 12, 2017
Sesh Ramaswami (Applied Materials), Co-chair	<Date approved>
Chris Moore (BayTech-Resor), Co-chair	<Date approved>

**Table 13 Index of Available Attachments<sup>#1</sup>**

<i>Title</i>	<i>Title</i>
SEMI Standards Required Meeting Elements	[2017Spring] Staff Report 3DS-IC
[2016Fall] 3DS-IC Minutes FINAL	New Charter Proposal_ver2
[2017Spring] Liaison Japan 3DS-IC_v2	SNARF Guide on Measurements of Openings in Glass
[2017Spring] Liaison Taiwan 3DS-IC	

#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 Laura Nguyen at the contact information above.