**Coordination Action to enable an effective**

**European 450 mm Equipment & Materials Network**

**Enable 450 Newsletter**

**Issue 3** **May/June 2013**

# Enable450 Newsletter

Welcome to the third newsletter for the Enable450 project.

As we are moving into the holiday season there are less announcements and news taking place this newsletter is moving to a bi-monthly release until the autumn.

If you would like to supply information for publication, please contact the editor at mbryant@futurehorizons.com.

Our website is now up to allow previous issues to be downloaded. Please distribute this document to anyone who might be interested and you may place it on your own intranet if you wish.

# Project Membership

There are eleven members of the Enable450 project consortium listed below.

| | | |
|---|---|---|
| ASM International NV (Coordinator) | ASM | Netherlands |
| Applied Materials Israel | AMIL | Israel |
| ASML Netherlands BV | ASML | Netherlands |
| Commissariat à l'énergie atomique et aux énergies alternatives | CEA-LETI | France |
| Fraunhofer IISB | IISB | Germany |
| Future Horizons | FH | UK |
| Intel Performance Learning Solutions (IPLS) | INTEL | Ireland |
| Interuniversitair Micro-Electronica Centrum vzw | IMEC | Belgium |
| RECIF Technologies | RECIF | France |
| SEMI Europe | SEMI | France |
| SOITEC | SOITEC | France |

Project meetings are held on a three monthly basis and information fed to the EEMI450 consortium.

# A European Strategy for micro and nanoelectronic components and systems – EU10/100/20

Probably the most significant news of the past two months was the announcement from the European Commission on a new strategy for nanoelectronics. Although not mentioned in the original document, Vice President Neelie Kroes stated publicly that Europe should aim for around a 20% share of IC manufacturing by 2020, a significant increase on the current level, and this is now stated in the fact-sheet released this week and included in the name of the initiative which means 10 billion Euros of public and private funding for R&D will trigger 100 billion Euros of private investment for manufacturing which is aimed to yield 20% of the world's semiconductor manufacture.

What is Europe's objective: 10/100/20

- € 10 Billion public/private funding for research and innovation
- € 100 Billion from the industry for manufacturing
- 20% of the global chip production market by 2020

What will this strategy do?

- Reverse Europe's declining trend in micro-/nanoelectronics manufacturing
- Focus on Europe's strengths and support cross-border cooperation to create critical mass in knowledge and financing
- Target public-private investment in:
  - 'More than Moore' on 200mm and 300mm
  - 'More Moore' on 300mm
  - 450mm transition
- Facilitate access to financing CAPEX through loans and equities (EU memorandum with European Investment Bank to prioritize key sectors including micro-/nanoelectronics)
- Simplify European state aid rules and allow for large-scale investment in manufacturing
- Create a level global playing field (eliminate market/trade distortions)
- Align EU, national and regional/local financial resources to achieve large-scale investments on agreed common strategic priorities, rather than continue with fragmented low-scale investments across a wide range of activities
- Create and maintain a highly skilled workforce

Who is this strategy targeting?

- Leading manufacturers and research centres
- SMEs (small and medium-sized enterprises): integrate SMEs into value chains and offer them access to the latest technology and state-of-the-art research facilities
- The entire supply and innovation chain: research, design, materials, equipment, manufacturing processes, device makers
- Focus on European clusters of excellence (Dresden, Grenoble, Eindhoven/Leuven) but cooperate with specialized clusters elsewhere

450mm is further mentioned in the following key bullet point.

"The development of new manufacturing technology on 450 mm wafers. The investment will initially benefit equipment and material manufacturers in Europe who are today world leaders on a market of around €40 billion per year and will provide a clear competitive edge to the whole industry, in a five to ten years range."

However a key point to consider is the now famous statement that 'no-one wants to build the last 300mm fab, nor the first 450mm fab'. To meet the 20% goal Europe will need new fabs and the decision will need to be taken on which wafer sizes are to be produced. The experiences of the KET pilot lines will influence these decisions greatly.

The full document can be downloaded from :

http://ec.europa.eu/digital-agenda/en/news/communication-european-strategy-micro-and-nanoelectronic-components-and-systems

A new fact-sheet can be downloaded from :

http://www.semiconeuropa.org/sites/semiconeuropa.org/files/docs/SEMI_EU10-100-20_Prospect_130704_web.pdf

Heinz Kundert, president of SEMI Europe, gives his view on this initiative in this article :

http://www.electroiq.com/articles/sst/2013/07/getting-ready-for-10-100-20-europe-s-manufacturing-initiative-is-underway.html

# Notchless Wafer Initiative

This change was first proposed for 450mm in about 2007 by the ISMI, and indeed was first touted for the 300mm introduction but the idea seemed to remain dormant for many

years. However the G450C have now proposed it again and there is an invitation-only Industry Briefing taking place at SEMICON West in Esplanade Room 310 at the Moscone Center from 1:00 - 2:30 pm on Wednesday, July 10.

Anyone involved in designing wafer handling equipment will need to be aware of this if it is adopted as it impacts an existing SEMI standard and thus we assume SEMI will be discussing it in future meetings. We will give any more details we can find in the next issue of this newsletter.

# Enable 450 WP 3 Standards Work-Package

Yann Guillou of SEMI Europe contributed a set of slides detailing the current progress on standards at SEMI. These are attached as a separate file to this newsletter.

He also supplied a couple of articles which we hope you may find interesting.

# SEMI Standards – Enabling the 450mm Transition

By James Amano, Senior Director, SEMI International Standards

Since the submission of the first SNARF (standards proposal) in 2007, 450 mm standardization efforts at SEMI have rapidly grown, and as of May 2013, 15 450 mm-related SEMI Standards have been published. These specifications, covering wafers, carriers, loadports, and tape frames, have enabled the industry to continue the development of equipment, materials, interfaces, and processes, but further standardization will be necessary for a successful transition to manufacturing on 450 mm wafers. Directed by customer requirements, SEMI Standards task forces are now at work on 13 other proposals, and new proposals are expected to be generated this summer during SEMICON West.

The first critical milestone was the publication of SEMI M74 - Specification for 450 mm Diameter Mechanical Handling Polished Wafers in 2008, developed by the Silicon Wafer Committee. The specification includes dimensional requirements for 450 mm wafers such as diameter, thickness, notch, edge profile, and surface finish. The selected value for the wafer thickness specification, 925µm, was a compromise between the need for a wafer thick enough to enable good surface topography and minimize wafer breakage, the need to limit the gravitational bow, and the need to maximize the crystal yield. Although industry 450 mm timing was not yet identified, device makers and suppliers required a standard specification for a 450 mm handling wafer to support early designs, feasibility

studies, and design of experiments, and to provide a common reference for comparison. This effort met an immediate need for research and early design investigation, including 450 mm wafers, carriers, load ports, AMHS, metrology, and selected equipment already in development.

Once dimensional specifications were established in SEMI M74, the Physical Interfaces & Carriers Committee was able to standardize key parameters for moving and handling 450 mm wafers, including wafer carriers, load ports and transport systems. SEMI E154 - Mechanical Interface Specification for 450 mm Load Port came first, and included the interfaces between:

Load Port and Carrier Delivery System (equivalent to 300 mm SEMI E15.1 and E64)

Port and Carrier Door (equivalent to 300 mm SEMI E62)

Load Port and Semiconductor Manufacturing Process Equipment (equivalent to 300 mm SEMI E63).

SEMI E158 - Mechanical Specification for Fab Wafer Carrier Used to Transport and Store 450 mm Wafers (450 FOUP) and Kinematic Coupling rapidly followed, with parameters such as reference planes, kinematic coupling pin shapes and locations, conveyor rail locations and dimensions, areas reserved for purge ports, automation handling flange, wafer support features, and distance between adjacent wafer slots (wafer pitch).

Twelve other 450 mm SEMI Standards have since followed, including two back-end documents focused on tape frames from the Assembly and Packaging Committee, and a new standard addressing cluster tool and process module interfaces will be published later this month. (A complete listing of published 450 mm Standards is at http://www.semi.org/node/42416)

As mentioned above, though, there is more work to be done to enable a successful transition to 450 mm wafers. Additional standardization needs will be introduced and discussed at SEMICON West at the Silicon Wafers – Future Standardization to Enable the Transition program, which will be held Wednesday, July 10, 2013, from 2:30 PM to 5:30 PM at the San Francisco Marriott Marquis. Speakers from Intel, G450C, and others will introduce some of these new concepts during this seminar, which will be considered for standardization by the SEMI Standards Advanced Wafer Geometry Task Force under the Silicon Wafer Committee. Among the topics will be proposals and justification for a notchless wafer, a more stringent wafer edge exclusion area, as well as a broad discussion of standards opportunities and challenges related to facilities, as mere scaling will not be an option.

Pre-competitive collaboration is challenging and involves hard work, but creates significant benefits for the industry as a whole as well as for companies that actively

participate. If your company is not yet involved in these efforts to shape the future, learn more about SEMI Standards by visiting www.semi.org/en/Standards.

## SEMICON West - Silicon Wafers – Future Standardization to Enable the Transition

Since 2008, SEMI has published fifteen 450 mm wafer standards, guided by customer requirements and supplier feedback. These specifications, covering wafers, carriers, and loadports, have enabled the industry to continue the development of equipment, materials, interfaces, and processes, but further standardization will be necessary for a successful transition to manufacturing on 450mm wafers. Speakers from Intel, G450C, and others will introduce some of these new concepts during this seminar to be held on Wednesday, July 10, 2013 from 2:30 PM to 5:30 PM at the San Francisco Marriott Marquis.

Proposals discussed during this workshop will be considered for standization by the SEMI Standards Advanced Wafer Geometry Task Force under the Silicon Wafer Committee. The agenda is :

14:30 – 14:50: Mike Goldstein (Intel): Towards 450 mm Silicon Wafers
14:50 – 15:20: Kwangwook Lee (G450C): New Edge Exclusion Proposal
15:20 – 15:50: Pinyen Lin (G450C): Notchless Wafer
15:50 – 16:20: Gerd Pfeiffer (IBM): Wafer Geometry for Advanced Nodes
16:20 – 16:50: Hisashi Furuya (SUMCO): Challenges during 450 mm Silicon Processing
16:50 – 17:20: Allen Ware (F450C): 450 mm Facilities Planning
17:20 – 17:30: Q&A

## SEMICON West 450mm Transition Forum

Increased levels of collaboration, further advancements in tool prototypes, and increased visibility into related supply chain implications have occurred over the past year as the semiconductor industry implements the capability to manufacture its products on 450mm wafers. The SEMICON West 450 Transition Forum will provide the latest updates on the status of 450 R&D, as well as a review of key technology considerations and a discussion of implications and opportunities for the supply chain. It will be held on on Thursday, July 11, 2013. The agenda is :

10:30am-12:30pm: Jonathan Davis (SEMI): Welcome and Introductions

10:35am-10:55am: Paul Farrar (G450C Consortium): G450C Update and Status
10:55am-11:15am: Hamid Zarringhalam (Nikon): Advanced Lithography Systems for 450 mm Applications
11:15am-11:35am: Chris Richard (PricewaterhouseCoopers): Improving Semiconductor Equipment Vendor Profitability During the 450mm Transition
11:35am-12:20pm: 450 Major Equipment Maker Panel

# EEMI450

Any company interested in taking part in future 450mm European projects is asked to first join EEMI450 whereupon they will be able to receive full details of new project proposals.

# European Funded 450mm Projects

An overview of each of these was given in last month's newsletter. In the coming months we hope to publish details of progress where possible, recognizing that some information from these projects has to remain confidential for commercial reasons.

# SEMICON Europa: 450mm Conference

As usual this conference will be held in Dresden this year running from October 9$^{th}$ to 10$^{th}$. It includes a full session on "450mm: towards a global cooperation". This will include an update on worldwide consortia, EC and PA funding opportunities, the role of the Research Institutes and the status of 450mm Equipment and Materials.

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# Consortium Mania Sweeps 450mm Landscape

Mark LaPedus of SemiMD discusses the reasons for there being far more consortia in the 450mm transition than there were for 300mm and how this should avoid at least some of the mistakes made in the previous transition.

http://www.semi.org/en/node/46081?id=sgueu0713

# Nikon to Ship 450mm Wafer Scanners in 2017

Nikon Corp. has contracted with the Albany research foundation for the State University of New York to provide a 450mm wafer ArF immersion scanner for process development by the member companies of the G450C. It will be shipped in April 2015.

Nikon believes it has won the approval and confidence of the industry and expects to see increased orders for its systems in time for shipments of high volume manufacturing systems scheduled in 2017.

# 450mm at The ConFab, Las Vegas

An overview of progress at G450C was given by the General Manager of the Consortium Paul Farrar and this is well summarized in this article :

http://www.electroiq.com/articles/sst/2013/06/trends-in-technology-from-the-confab-450mm-transition-update.html

# The Enabling Role of Metrology in the 450 mm Transition

The challenges facing metrology during the transition to 450mm are well discussed in this article :
http://www.future-fab.com/documents.asp?d_ID=5041

# 450mm – It's bigger than you think

Another interesting article written by SEMI describes wafer standards and how removing the notch and reducing the wafer edge exclusion area could increase the yield per wafer making 450mm processing more cost effective :
http://www.electroiq.com/articles/sst/2013/06/450mm-_-it_s-bigger-than-you-think.html?cmpid=EnlSSTDailyJune72013

# 450mm and EUV: Critical Challenges Facing the Semiconductor Industry

At the April 25 Silicon Valley Lunch Forum, Jim Koonmen, senior VP at ASML and GM at Brion, discussed how the transition from 300mm to 450mm will increase manufacturing efficiencies for very high-volume manufacturing but that it's a challenging proposition.

http://www.semi.org/en/node/45586?id=sgueu0513

# How to Survive the Scaling and 450 mm Transition Challenge

In this article Luc Van den Hove, CEO of Imec, gives an overview of Imec's contribution to the 450mm transition together with an artist's impression of the new 450mm pilot line currently being built at Leuven.

http://www.future-fab.com/documents.asp?d_ID=5031

The planned internal layout of this new building was given in another presentation again given by Luc Van den Hove at the Imec Technology Forum held in Brussels on May 22nd 2013. There is a great amount of information about all of IMEC's activities in this presentation and it is well worth looking at.

http://vimeo.com/m/67295443