« 450mm transition: From a local initiative to global collaboration »

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Chairman & CEO
SEMI European Advisory Board member
OSEO Excellence member
Summary

- Introduction – RECIF short profile
- From a local initiative in EU...
- ...to a global collaboration
- Conclusion
Introduction – RECIF short profile

>30 years experience in semiconductor Business

Vacuum Handling Systems
First Wafer sorters
Recif 300mm Wafer sorters installed on production line
New generation 300mm sorter development
EEMI450 founding member
Task leader in 450mm EEMI-450-PR project

Manual and Automated tools
Early developer of 300mm Wafer sorter
300mm wafer sorter World Leader
Contribution to the 450mm Semi Standards definition
Project leader in NGC450 project
Work package leader in E450-EDL project
Introduction – RECIF short profile

Worldwide Locations

USA Fishkill
France - HQ Toulouse
Taiwan Hsinchu

3 corporate entities = EU (HQ) - USA - Taiwan
Corporate headcount = 65 persons
Summary

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• ...to a global collaboration

• Conclusion
Local initiative in EU

EEMI450 consortium founding members
Local initiative in EU

Distribution along a simplified value chain,
of companies participating to an EU funded 450mm program (closed, running or pending)
Local initiative in EU

Goal is to set-up a 450mm “N10” compliant equipment demo line at Imec

<table>
<thead>
<tr>
<th>Leader</th>
<th>ASM</th>
<th>NGC450</th>
<th>EEM450PR</th>
<th>E450LMDAP</th>
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<th>Consortium</th>
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<th>Goals</th>
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<tr>
<td>R&amp;D for Key Enabling Technologies, applied to 450mm transition</td>
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<td>Develop a wafer handling prototype to support 450mm transition</td>
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<td>Develop modules and tool sets for EU pilot line readiness</td>
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<td>Install an equipment demo line that supports 450mm process development for 1X nm IC manufacturing</td>
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<td>Litho and Metro for “N10” Advanced patterning</td>
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Note: Does not represent SOI450 & SEA4KET
Local initiative in EU

Imec placed at a central focal point...

Central strategy:
- support “More than Moore”
- support “More Moore”
- support a leading edge 450mm R&D and Innovation platform”

Has to be complementary to the G450C initiative


Central position:
=> foster synergies
=> ease modules maturation
=> Helps keeping cost under control
Local initiative in EU

1. Collaborate
2. Define the path
3. Develop

RECIF strategy
1. OEM
   A) EFEM
   B) Sub modules

2. End users (sorters)
Local initiative in EU

Global dissemination road map (RECIF)

2012 2013 2014 2015 2016 2017
Q2 Q3 Q4 - Q1 Q2 Q3 Q4 - Q1 Q2 Q3 Q4 - Q1 Q2 Q3 Q4 - Q1 Q2 Q3

- Prototypes installed @ Imec

Development

Standalone EFEM (Sorter)

User feedback @ Imec

Usage

Final EFEM

User feedback @ Imec

Wafer Sorter (Enhanced)

Assessment and pilot line support

Assessment data

Support of “N10” Advanced patterning

E450-LMDAP
(pending for approval)
Local initiative in EU

Status as today

EEMI450 project achievements retrofitted to 300mm

2012 2013
Q2 Q3 Q4 · Q1 Q2 Q3

450mm best practices

Vibration management
Cleanliness
throughput

300mm Improvement

@ 40 nm = 3 x better Vs 2007
@ 26 nm = best in class

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<th>Link</th>
<th>2013 Surfscan SP3</th>
<th>2007 Surfscan SP2</th>
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<tr>
<td>PWP results</td>
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<td>Particles per Wafer Pass – Front face</td>
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<td>Based on 1000 transfers test</td>
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<td>26 nm</td>
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Local initiative in EU

Next key Milestones

• March 2014 => First product @ Imec

• March 2015 => Enhanced EFEM & Sorter @ Imec

Compliant with time to market Vs first IDM pilot lines
Robotics arrives upstream in the value chain
Summary

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To a global collaboration

Industry road map

Source: Public report ref “SMART20120/062” - Dated 16th of February 2012 (Ordered by European Commission)
To a global collaboration

Phasing Vs Industry road map

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Development and Technology Intercept Targets

Early 450mm Development
- Early development of Silicon and Infrastructure

ISMi 32/22nm Equipment Performance Metrics

Test Wafers to support development and demo
- Tools for Consortium Demonstrations (unit process)

14nm G450C Demonstrations

450mm and 300mm tools progress synchronously through technology generations

Nominal "nm" = ITRS M1 Half Pitch


Presented
Sept. 11th 2013
SEMI North east forum

1st pilot line introduction
To a global collaboration

=> Share an updated view on dynamic changes, for aligned strategy

2012 Status

2013 Status

Presented @ semicon's

Presented Sept. 11th 2013 / SEMI North east forum

3Q shift for IC maker pilot line
To a global collaboration

• An SME can not afford being at multiple places at the same time

• The willingness to collaborate with multiple initiatives can be achieved only by a “cross collaboration”

• “Cross collaboration” would enable to
  - Go beyond the 60 process tools DTM (as defined by G450C)
  - Exchange technical achievements based on bilateral agreements with G450C
To a global collaboration

- Need to address some open questions!
  (notchless wafers standard, PWP budgets and time line, ...)

- Need to exchange

  

  = “World of Users & early tools”

  

  = “World of EU based equipment vendors + Labs”

* European Equipment Demo Line @Imec
Some of G450C “Demonstration Test Methods” (DTM) can be performed @ Imec
- Results could be shared with G450C
- Some of G450C members are partnering also in EU initiative

Next step is **cross collaborative**

Prototypes installed @ Imec

Continuation in LMDAP
Conclusion

• Need to Exchange / collaborate with G450C
• Open questions to be addressed down the road
• Extend beyond identified 60 process tools
• No focus on AMHS / Sorters at G450C

Proposals

⇒ Technical assessment at Imec to be disseminated to G450C members?
⇒ Let’s define communication channels for such dissemination

ENABLE 450 / Bridge450 for EU?
Thank you!