450mm specifications will boost the 300mm yield in wafer manufacturing

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450mm specifications will boost the 300mm yield in wafer manufacturing

• Technical and Economical Challenges.
• Collaborative Programs
• First results are demonstrated
• The benefits of retrofits to 300 mm
• The EUREKA Clusters are supporting further initiatives from Industry
The 450 mm wafer transition is a technical challenge initiated in 2009.
Collaborative Programs have driven innovation thru the 450 mm transition

• EEMI450 was launching the initiative in Europe
A technical challenge intensified by new nodes to be reached along ITRS

22 nm

14 nm

10 nm

7 nm
The combination of the 2 actions has created an economical challenge

- Wafer cost
- Defect density
- Number of masks
- Number of Lithophotography layers

450 mm

- Cost of mm² on good dice
Strengthening of 450mm initiative in Europe has mobilized several projects over the last years.
First positive results are demonstrated at projects ending in 2014

• SOI 450

• NGC450
SOI450: Overview of results on different partners

**EVG:** Bonding tool
- Installed in Soitec Process Development

**Altatech:**
- Manual 450mm inspection platform for metrology

**Soitec / Leti:**
- New bulk validation
- Cleaning improvement on SWC
- Implantation hardware upgraded

**ASM:**
- SOI oxidation. with improved uniformity

**Adixen:**
- Decision to develop APA450.
- Collaboration with G450C for tests and assessments

**Intel:**
- Link to Semi standard

**G450C:**
- Equipment access
- Thermal treatment
EVG has improved the wafer bonding equipment by adding a Megasonic Area Transducer Cleaning

Best result obtained to date on 450 mm SOI wafers

Learnings will be implemented for 300 mm process optimization
Detailed contribution in SOI450

Contamination in SOI supply chain

- Finalizing APA450 design:
  full SEMI compliancy
- Through Filter sampling and electrical/software developments
- Collaboration with G450C on Hardware installation
- Preparation APA450 process evaluation at G450C
Automatic Defect Detection and Classification Software upgraded for 450 mm ready

– Software development has been completed with direct improvement of the 300 mm system

**The NanoVision product line**

Combining Altatech's inspection technologies in order to characterize the whole substrate surface

› Read more
RECIF installs the first 450mm EFEM at imec

- This is the working prototype fully compliant with the SEMI standard in term of surface contamination.
Forecast for Wafer Size Shares of Monthly Installed Capacity

<table>
<thead>
<tr>
<th>Wafer Size</th>
<th>Dec-13</th>
<th>Jan-14</th>
</tr>
</thead>
<tbody>
<tr>
<td>450mm</td>
<td>57.1%</td>
<td>56.9%</td>
</tr>
<tr>
<td>300mm</td>
<td>31.7%</td>
<td>31.6%</td>
</tr>
<tr>
<td>200mm</td>
<td>11.3%</td>
<td>11.4%</td>
</tr>
<tr>
<td>≤150mm</td>
<td>0.0%</td>
<td>0.0%</td>
</tr>
</tbody>
</table>

Source: IC Insights
NGC450: Project profile
The benefits of retrofits the 450mm specifications to 300 mm

- Wafer cost
- Defect density
- Contamination
- Metrology (accuracy, roughness)

Cost of mm$^2$ of good dice
Let’s build your future together

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