cea

leti innovation for industry

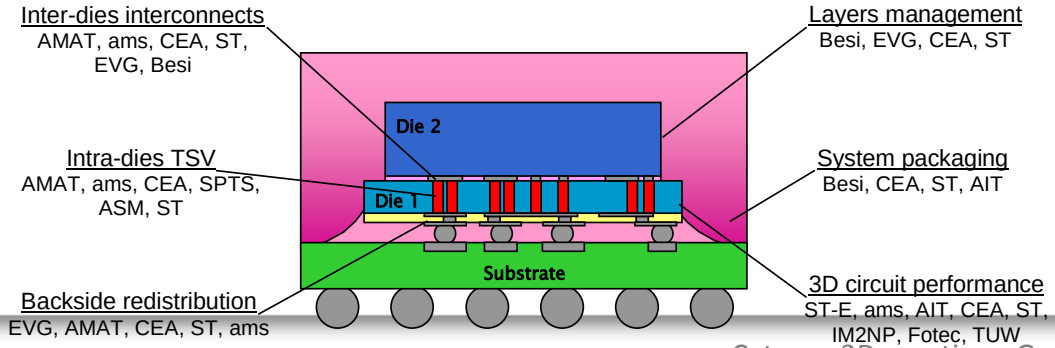
Catrene meeting
Focus on 3D
CEA-Leti experience

COCOA feed back

Chip-On-Chip technology to Open new Applications

COCOA Project

- *Start in July 2010 – end in June 2013*
- *ST leader with an heterogenous but rich panel of partners (STE, AMS, CEA-Leti, EVG, Datacon, Im2np…)*
- *Objective is developement of innovative solutions for Wireless and Sensors applications, quantification of global performance (thermal, mechanical, electrical…) – 4 state of the art demonstrators*
- ***3D** is in the hearth of those solutions, even if strategy used for each demonstrator, is, considering electrical specification and environment constraint, very different*

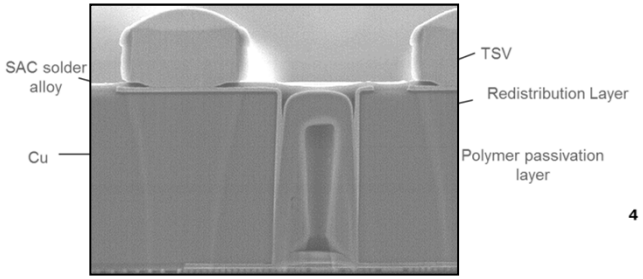


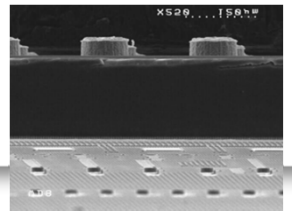
CEA-Leti role in COCOA

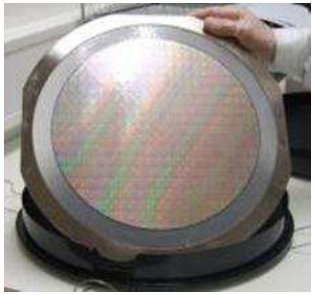
- *CEA-Leti has participated in all work packages, with the lead on WP2 « Elementary process bricks »*
  - *Development of elementary process bricks : TSV, interconnect, temporary bonding, stacking on 200 than 300mm wafers*
  - *Integration of those process bricks in vehicle test*
  - *Analyse of the vehicule test performance and yield*
  - *Simulation work (thermo mechanical impact of TSV) and characterization*
  - *Supply of wafers or particular steps to partners in case of need*
  - *Participation to the demonstrators integration*
- *The project organization allowed us a participation in all work packages*

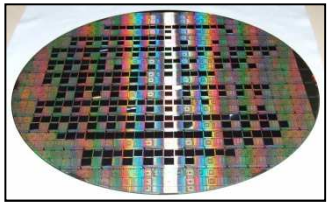
Major results obtained by CEA-Léti

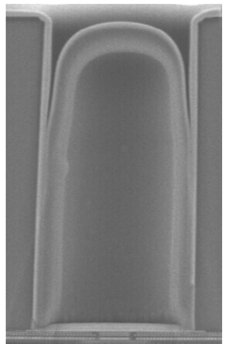
- *Development of **AR2:1 TSV-Last** (which are today included in Open3D Leti's initiative)*
- *Development of **TSV Middle integration**, which became, in 2011-2012, the major 3D integration used worldwide*
- *Development of an innovative **temporary bonding method** and its validation in integration. This method is now one of the 2 leading technologies for temp. Bonding*
- *Development of a **die-to-wafer flow chart** using fine pitch copper pillar and pre-applied underfill*
- *Shift from **200 to 300mm 3D line** in the frame of the project*





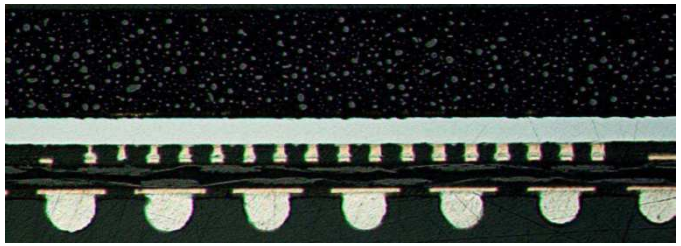






Major results obtained by CEA-Léti

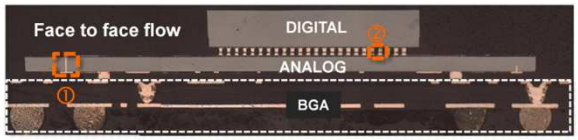
- *And, most of all, participation in 3 state of the art demonstrators*

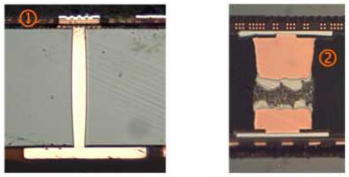


HDMI TSV

Major results for Cea-Leti : product perf similar to a classical Wire bonding packaging – **TSV use validation, TSV-Last and Mid**

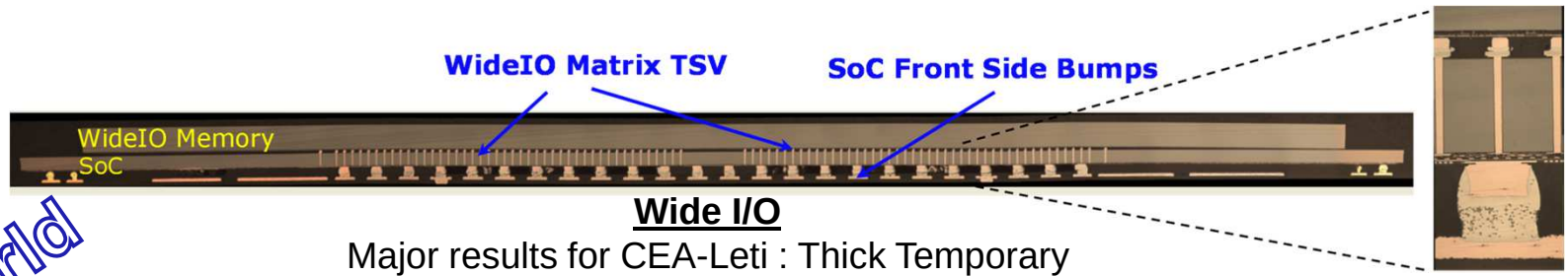
World first





HDMI 3D

Major results for CEA-Leti : development of TSV, interconnection, stacking - **full 3D stack validation on 200mm line, with Face to Face integration**



World first

Wide I/O

Major results for CEA-Leti : Thick Temporary Bonding development -
full 3D stack validation in Face to Back configuration, on 200mm and 300mm line

What are the benefits of COCOA?

- **Technical benefits** are numerous: release of 3 demonstrators – many technical results, some model available …
- **More than 20 publications** included CEA-Leti authors

- **Direct discussions between**: the end user – IDM – equipment supplier - R&D lab and university : **very fruitfull**!
- Many advantages :
  - For the lab : understand the specification, and challenge them
  - For the end used : knowing the real possibilities of the lab, define more precisely the specification
  - For the end user : have the eventual progress very soon
  - …
- Excellent coordination of the project allowed all partners some constructive and open discussions within a work pakage but also WP to WP

What are the benefits of COCOA?

- For the CEA-Léti point of view
  - Creation of the Open3D initiative
  - SPTS-CEA-Leti common lab signed in the time frame of COCOA
  - Collaboration with Semitool/Amat teams placed at CEA-Leti and with ST
  - EVG-CEA-Léti common lab signed in 2013
  - Additionnal collaborative work between AMS & CEA-Leti started in 2013
  - Reinforcement of the Grenoble 3D ecosystem
  - Deep discussion with ST Ericsson that gave us the opportunity to define precisely specification and consequently the development
  - A PhD has started in 2012 with ST/IM2NP and Leti – always 2 to 3 PhD CEA-Leti/ST
  - Participation to the 3D line qualification

    - **The success of the demonstrators is obviously a fantastic advertising for our work and possibility**

    - **Cocoa allows us (and Grenoble 3D ecosystem) to keep in the worldwide 3D race**

Why to chose CATRENE?

- Catrene offered us the possibility to develop some generic technologies and knowledge, partly used for different approaches, for the 2 IDM present in the consortium : ST and AMS

- Meantime, Catrene offered us the possibility to keep in touch with research lab, keeping the link with advanced development

- This mix industrial / research is ideal for CEA-Leti

- Catrene offered us and the global consortium to be in the state of the art by developping full demonstrators, in relation with end-user, so close to application and the market needs

Save the date now!

www.leti.fr

Leti Days

Grenoble • Paris • San Francisco • Tokyo

June 23-27, 2014 | MINATEC, **Grenoble**