

# CAPITAL MARKETS DAY 2020

## INSIGHTS BONDER

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# MORE THAN MOORE MARKET AND TECHNOLOGY TRENDS – APPLICATION DRIVERS FOR WAFER BONDING

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- + Demand for “More than Moore” devices is expected at CAGR (2017-23) of 4 - 13% by Yole Développement
- + Wafer to Wafer (W2W) and Die to Wafer (D2W) bonding is required in many of these applications – see examples below

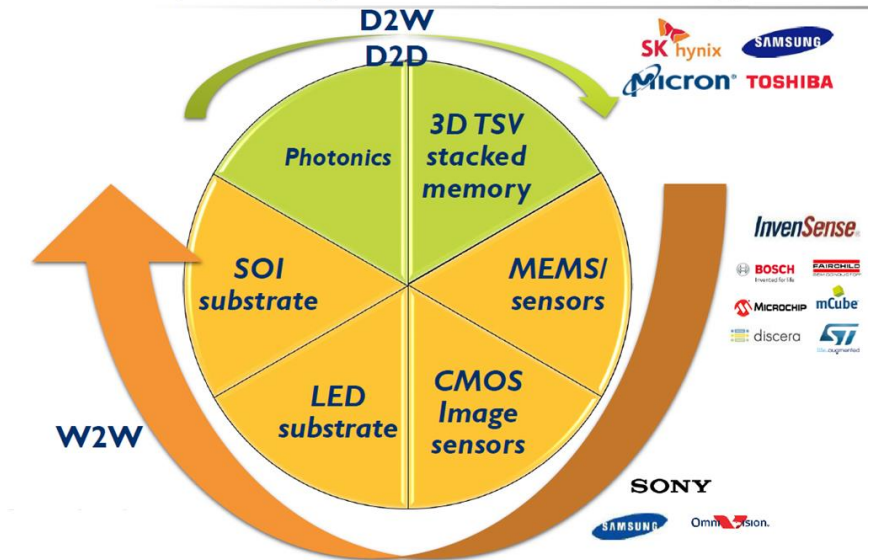
Overall wafer demand for More than Moore devices  
Breakdown by More than Moore application - in 8 inch eq



Source: Yole (2018, 2019)

## APPLICATIONS REQUIRING PERMANENT BONDING

W2W Assembly technology used for More than More applications

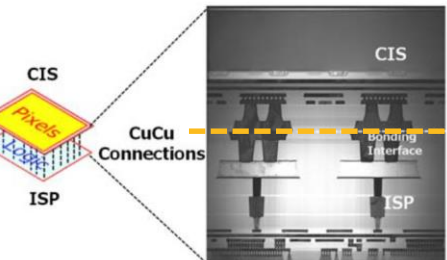


YOLE

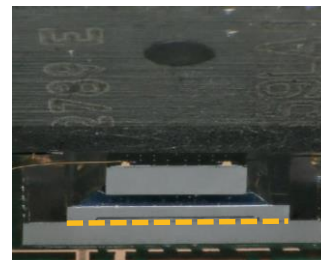


Bonding Interface

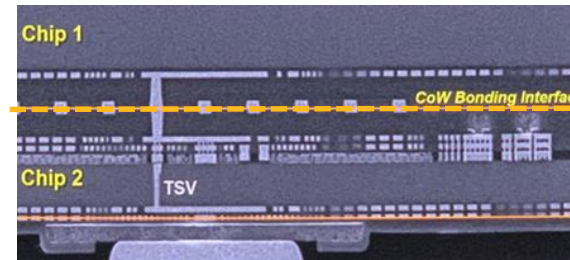
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Sony CMOS Image Sensor (CIS)  
Source: Sony (2019)



InvenSense 7-axis MEMS  
Source: SystemPlus (2017)



tsmc SoIC™ chip with 4μm TSVs and pitch of 9μm  
Source: Techsearch (2020)



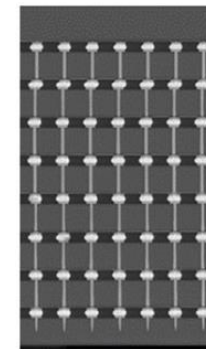
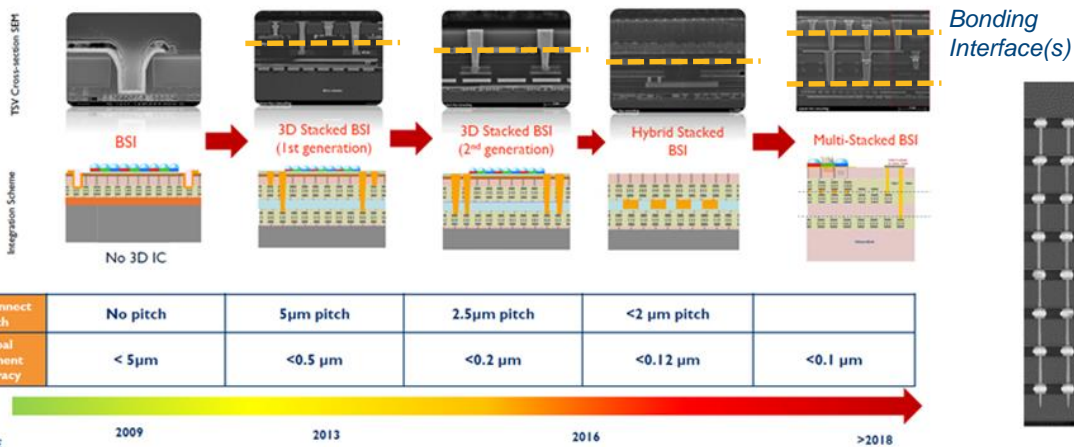
# MORE THAN MOORE MARKET AND TECHNOLOGY TRENDS

## – 2.5D AND 3D STACKING TECHNOLOGY

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- + 2.5D and 3D requires temporary bonding for wafer thinning as well as D2W or W2W bonding
- + D2W bonding enables heterogeneous integration, high yield is achieved by stacking known good dies (KGD)
- + Hybrid bonding will be the main enabler for pitch scaling (TSV and  $\mu$ bump  $\rightarrow$  Cu/Cu interconnects = hybrid bonding)
  - Used for latest generations of CMOS image sensors since 2017
  - Will be used for other new 3D devices by IDMs and foundries
- + Equipment market is forecasted at CAGR (2018-25) of ~25% by Yole Développement

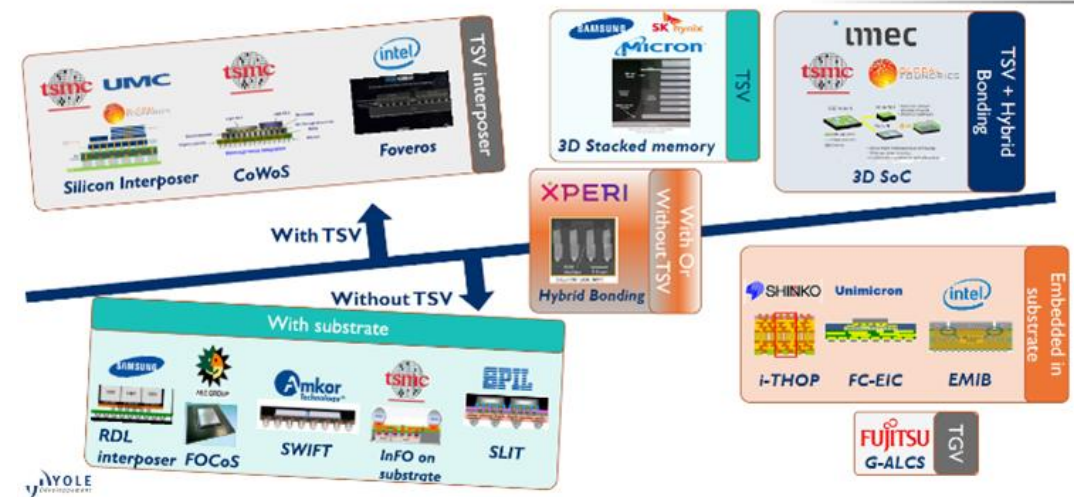
### BSI CIS



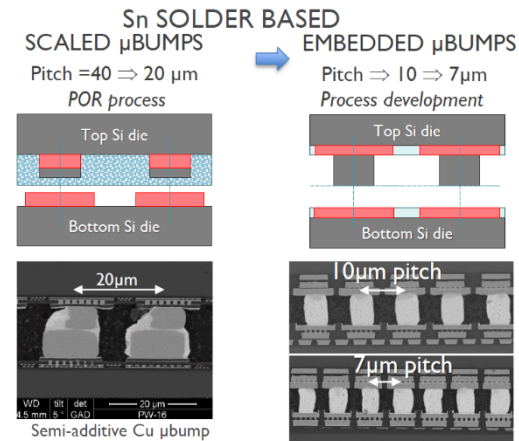
8GB HBM2 (3D memory)  
Source: Samsung

### 2.5D & 3D STACKING TECHNOLOGIES

With / Without TSV. Foundries VS OSATs battle

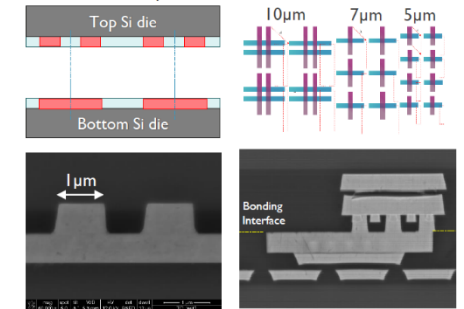


Source: Yole (2018)



Source: imec (2020)

Cu/Cu BONDING  
Hybrid bonding  
Pitch 20  $\Rightarrow$  10  $\Rightarrow$  5  $\Rightarrow$  3  $\mu$ m  
Process development

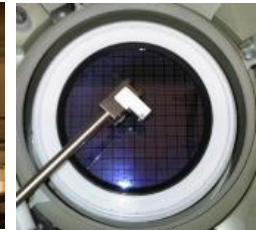
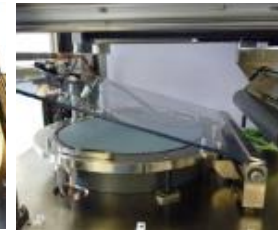
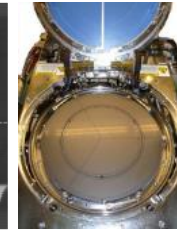
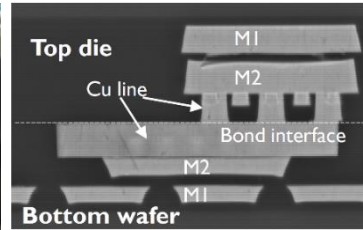
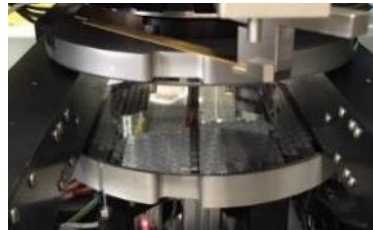
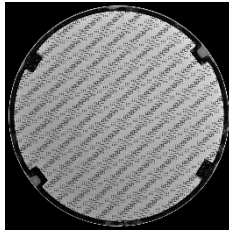


# PRODUCT PORTFOLIO

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## Business Unit Bonder

### More than Moore – MEMS and related



### Semi-Automated Bonders

### Automated Permanent Bonders

### Automated Temporary Bonders, Debonders and Cleaners



SB6/8 Gen2 (20kN)



XB8 (100kN)



XBS200  
W2W Bonder



XBS300  
W2W / collective D2W Bonder



XBS300  
Temporary  
Bonder



XBC300 Gen2  
Debonder (mechanical / laser)  
and Cleaner

### Comment / USP

- Large installed base
- Supports all traditional processes

Supports new high force / high end processes

Fixture-less aligned wafer handling for best cost of ownership

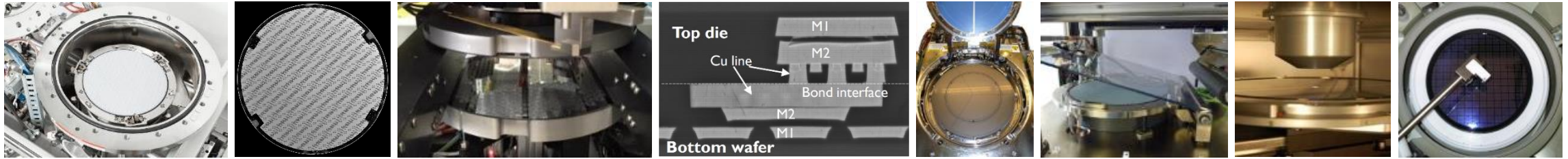
<100nm overlay to support pitch scaling trend in hybrid bonding

- Large installed base with ~40-50%<sup>1)</sup> market share for 2.5D and 3D memory
- Technology enabler applications such as CIS, FO-WLP
- Started transition from mechanical- to laser debonding for next generation of devices

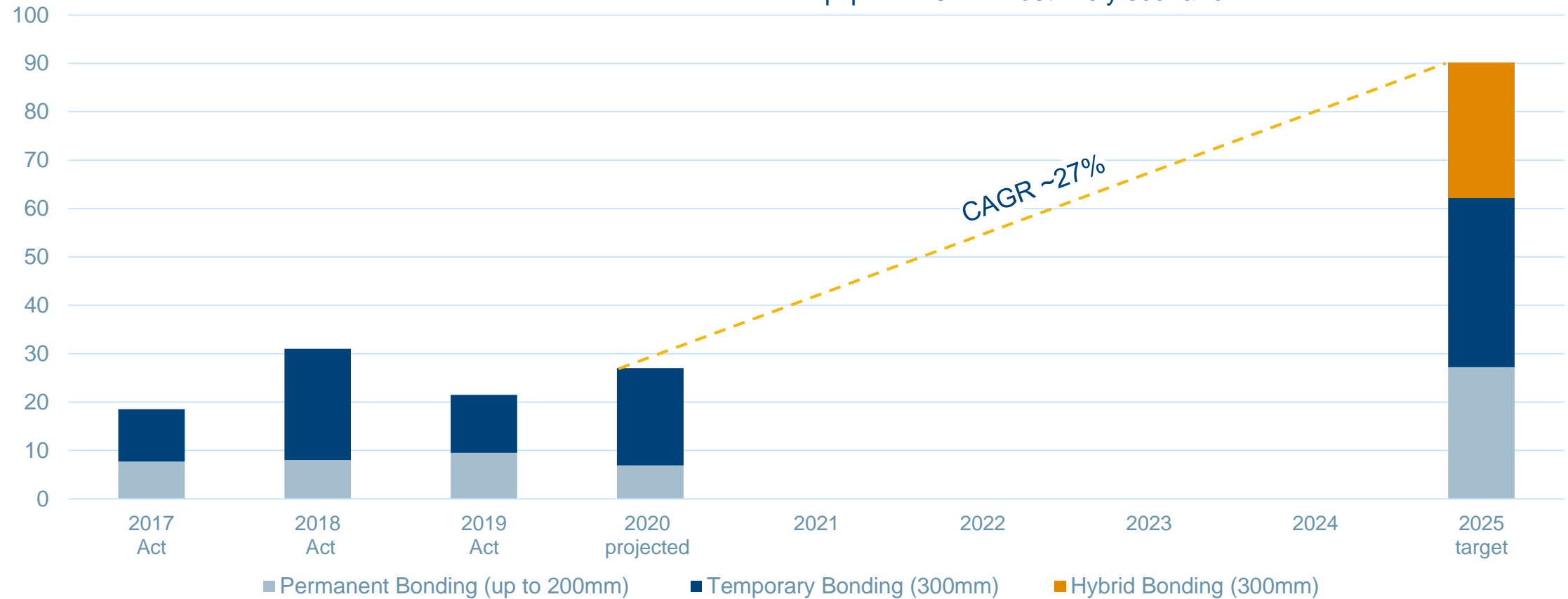
1) SUSS internal estimation

# GROWTH POTENTIAL – ON TRACK WITH SUSS STRATEGY 2025 PROJECTION

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Sales Revenue Bonder Equipment €M – most likely scenario





Thank you!