# Status of the Advanced Packaging Business

European Packaging, Assembly, and Test – Workshop 2023

6<sup>th</sup> September 2023

Gabriela Pereira





#### PRESENTATION OUTLINE



# Status of the Advanced Packaging Business

- Semiconductor Device and Packaging Market
- Advanced Packaging: Market Trends & Market Forecast
- Advanced Packaging: Players and Investments
- Advanced Packaging Market by Location
  - Focus on Europe
- Q&A

#### Data extracted from Yole's:

- Status of the Advanced Packaging Industry 2023
- Advanced Packaging Market Monitor Q2 2023



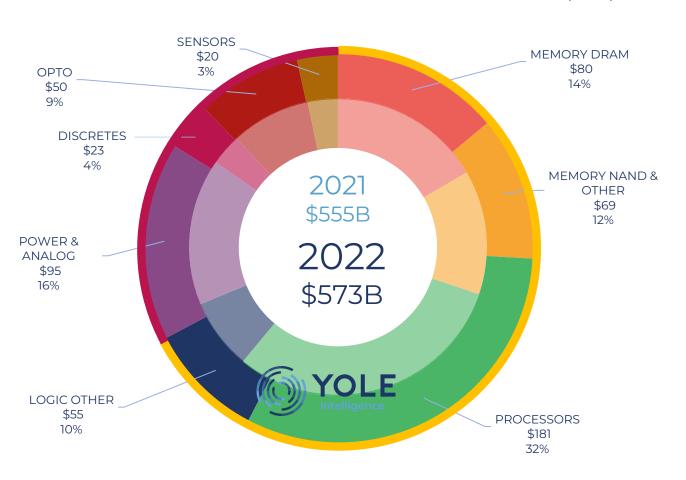




# SEMICONDUCTOR DEVICE AND PACKAGING REVENUE (\$B)

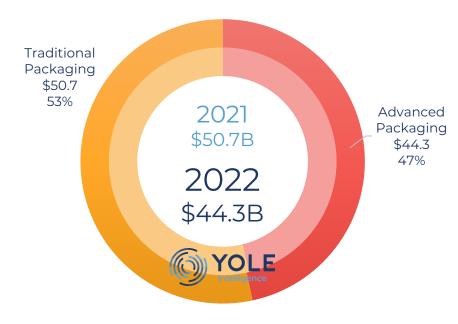


#### 2021-2022 Semiconductor device revenue breakdown (in %)



(in %)

2021-2022 Packaging revenue breakdown



More than Moore (MtM) 32%

More Moore (MM) 68%



## **NEW TRENDS & DRIVERS: OPPORTUNITY FOR ADVANCED PACKAGING**



5G



Mobile



Vehicle

electrification

AD/ADAS



AI/ML



**HPC** 



IoT/IIoT **€** 



Data center



Cloud computing



Blockchain / cryptocurrency



Main

applications

(non-exhaustive)

System requirement

More computing power

More bandwidth

Lower latency

Lower power consumption

More functionality

System integration

More memory

Lower cost

Lower form-factor

Opportunity for various devices

CPUs, GPUs, SoCs, APUs, FPGAs ASICS, DSPs, MCUs MEMS/Sensors Power ICs/discretes Memory Optoelectronics

Opportunity for Advanced Packaging

CIS, 3D SoC, Embedded silicon bridge, Active/Passive silicon interposers, 3DS, HBM, 3D NAND

Fan-Out Packaging

RF, PMIC, Audio, Connectivity, APU, (x)PU, ASIC, **FPGA** 

**WLCSP** Fan-In Packaging

RF, PMIC, Audio, Connectivity, Driver IC, DC/DC converter

System-in-Package (SiP)

AiP/mmW FEM, FEM, PA module, Wi-Fi/BT module

**FCBGA** Packaging

(x)PU, networking ASIC, FPGA, automotive & infotainment modules

**FCCSP Packaging** 

APU, RF. Baseband, PMIC, memory

2.5D/3D Stacked Packaging

(x)PU, ASIC, FPGA, 3D NAND, HBM, CIS

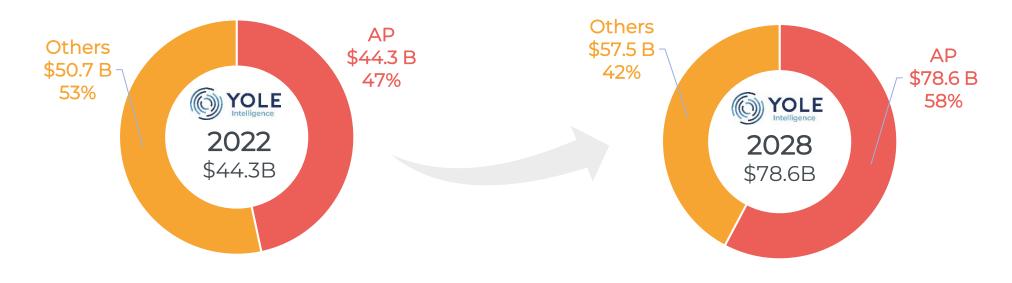


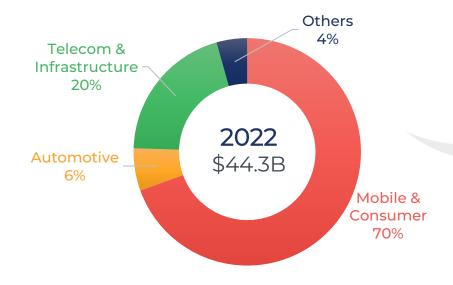
# ADVANCED PACKAGING TECHNOLOGIES OVERVIEW 2022 to 2028

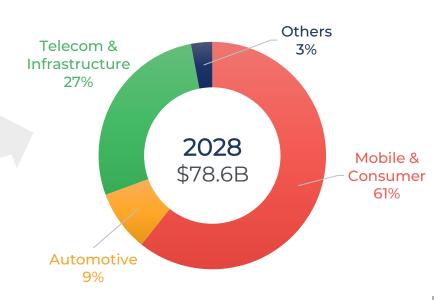


# Revenue Split (\$B)

Advanced
Packaging
revenue is
swiftly
catching up
to that of the
traditional
packaging
market





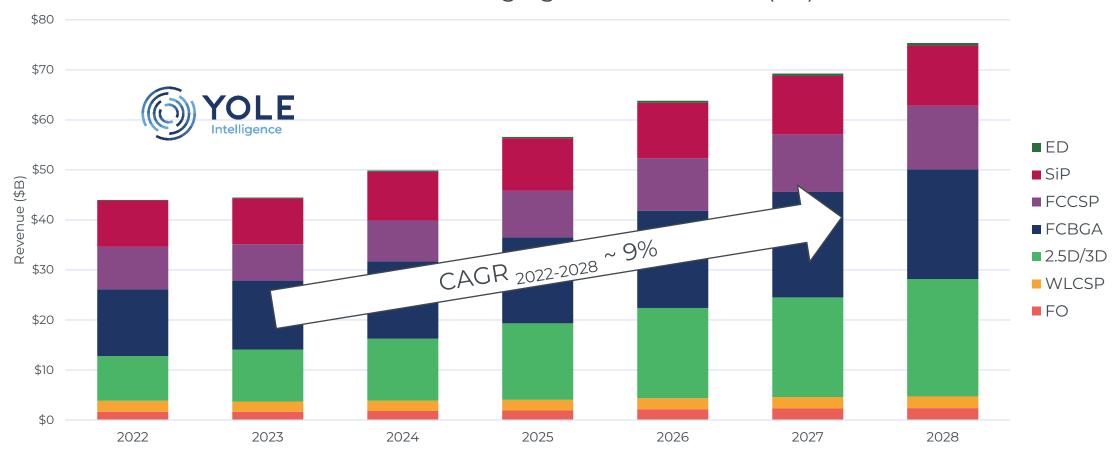




# ADVANCED PACKAGING MARKET DYNAMICS - REVENUE



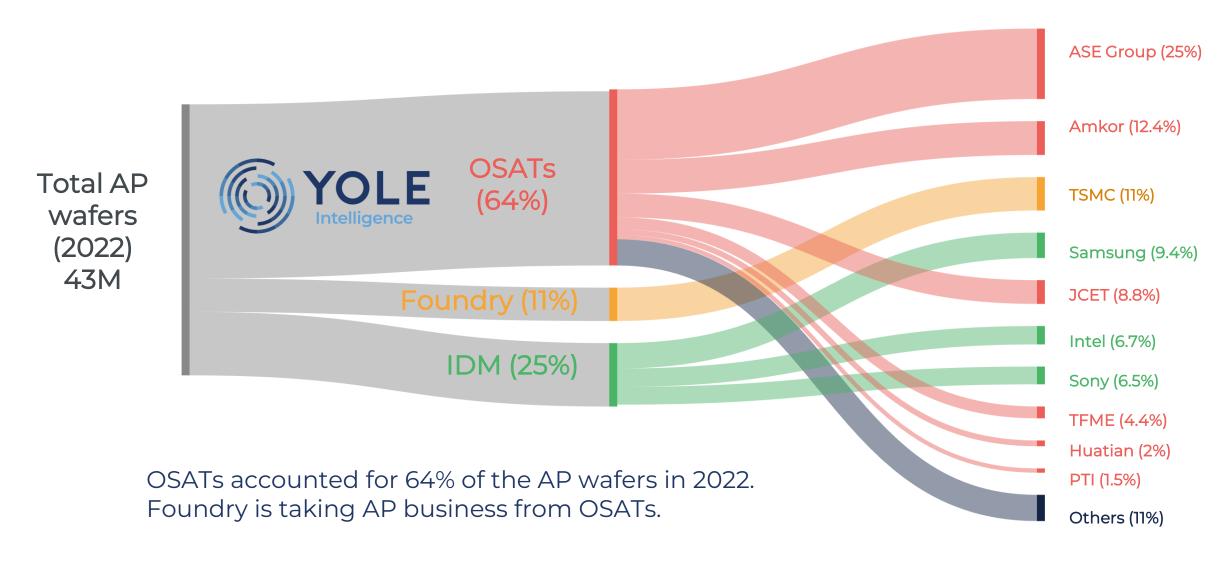
# Advanced Packaging Market Revenue (\$B)





# ADVANCED PACKAGING 2022 WAFER MARKET SHARES BY BUSINESS MODEL





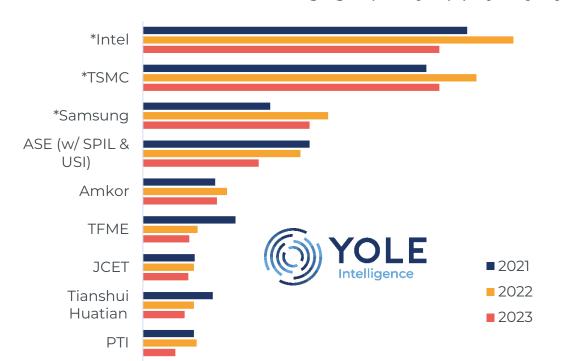


## 2022-2023 CAPEX HIGHLIGHTS FOR TOP 9 PACKAGING PLAYERS

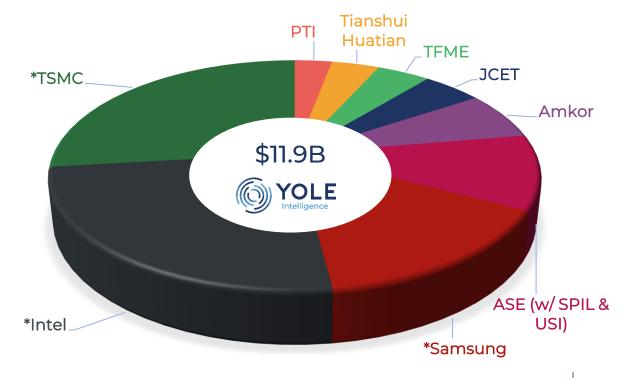




#### Estimated 2021-2023 Packaging CapEx by top players [\$M]



#### Estimated 2023 Packaging CapEx Split





## CHIP INVESTMENTS ACCELERATE AS GOVERNMENTS STEP UP EFFORTS



# Semiconductor support-plans to face geopolitical tensions



# Science and chips Act

- Signed in August 2022.
- A total budget of \$278B in spending over a decade.
- The biggest share is for scientific R&D and commercialization (>\$200B)
- A tax credit of \$24B for chip production
- \$3B for leading-edge technology and wireless supply chain.
- \$2.5B for Advanced Packaging programs.
- Out of the total \$278B, \$52B is for production, R&D, and workforce development.



#### **EU CHIP ACT**

- Signed in April 2023.
- Double the EU's share of global chip production by 2030 (up to 20%).
- Reduce its vulnerability to geopolitical shocks.
- \$3.5B was allocated to support large-scale technological capacity building and innovation across the EU in the semiconductor sector
- R&D tax credits.
- \$43B support plan for the European semiconductor industry.





# China plan

- To be implemented in 2024 Q1.
- Target self-sufficiency in chip production.
- \$143B support package for the local semiconductor. ecosystem, allocated over 5 years (by 2028).
- Corporate revenue tax exemptions of around \$20B.
- Preferential tax policies for the local semiconductor industry.



#### K-CHIP ACT

- Passed in March 2023.
- Secure the chip production leadership.
- Safeguard economic priorities and foster a vibrant semiconductor industry for the country.
- Increase tax credit to 15% from the current 8% for major companies investing in manufacturing facilities.
- For smaller and medium size companies, the tax break goes to 25%, up from 16%.



# Japan strategy for semiconductors

- Aiming to maintain 10% of the market by 2030.
- The Japanese government is providing a subsidy of up to 476B yen (\$3.68 B) to support and develop chip technologies.
- The government will cover 1/3 of the semiconductor equipment investment of any company in exchange of 10 years guarantee of domestic shipments during any possible shortages.

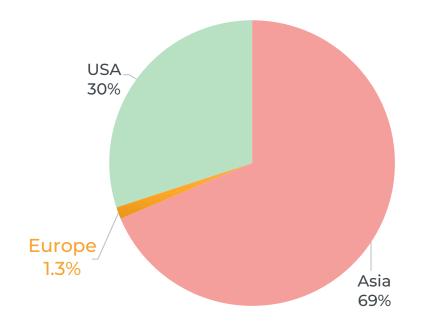


#### ADVANCED PACKAGING REVENUES BY LOCATION



HQ vs. Fab location & main European revenue contributors

Advanced Packaging revenue market share by HQ - 2022

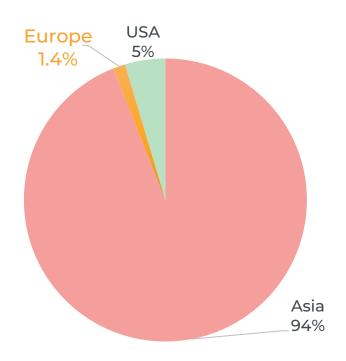




Main advanced packaging revenue conttributors in Europe



Advanced Packaging revenue market share by fab location - 2022



Manufacturing in EU

Currently, more than 90% of the AP revenues are generated in fabs located in Asia, although only 69% of the revenues are created by companies headquartered in Asia.



# EUROPEAN MANUFACTURING PACKAGING SERVICES PROVIDER (NON-EXHAUSTIVE LIST)

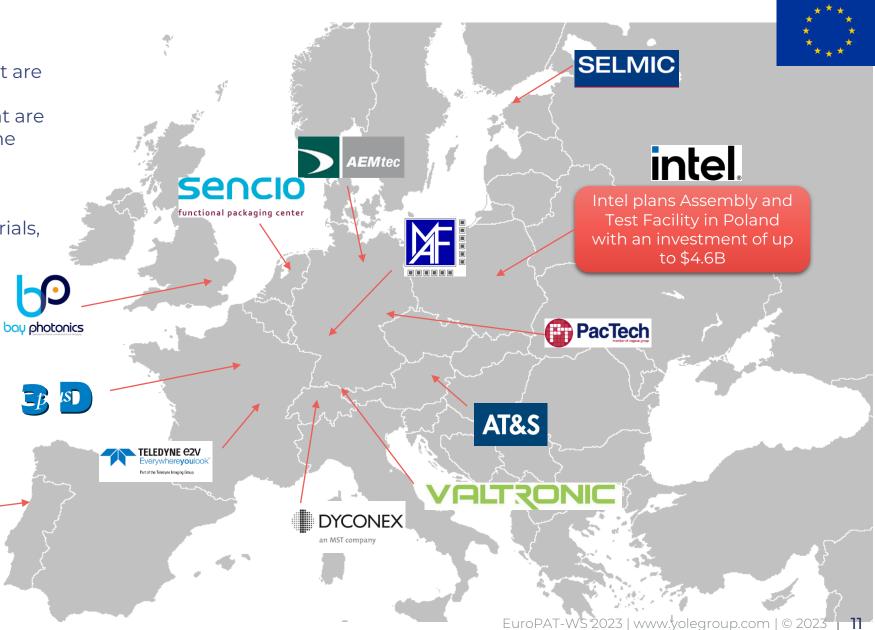


Europe has packaging services that are focused on delivering solutions for power, MEMS, Imaging devices that are designed and manufacturing on the continent

Serving mainly Automotive, Industrials, Telecommunication and Medical markets

\* Companies offering pure-play packaging design services or packaging manufacturing services only for internal products are not reported here







# THANK YOU FOR YOUR ATTENTION!

Q&A?

