



**Capital
Markets
Day 2022**

Technology and Manufacturing

Orio Bellezza

President, Technology, Manufacturing, Quality and
Supply Chain

ST's technology and manufacturing strategy is a key business enabler

In-house manufacturing complemented by outsourcing

- Fast and competitive growth
- Reliable supply chain for our customers
- Product differentiation through proprietary technologies
- Access to leading-edge digital technologies in foundry

Mid-term strategy

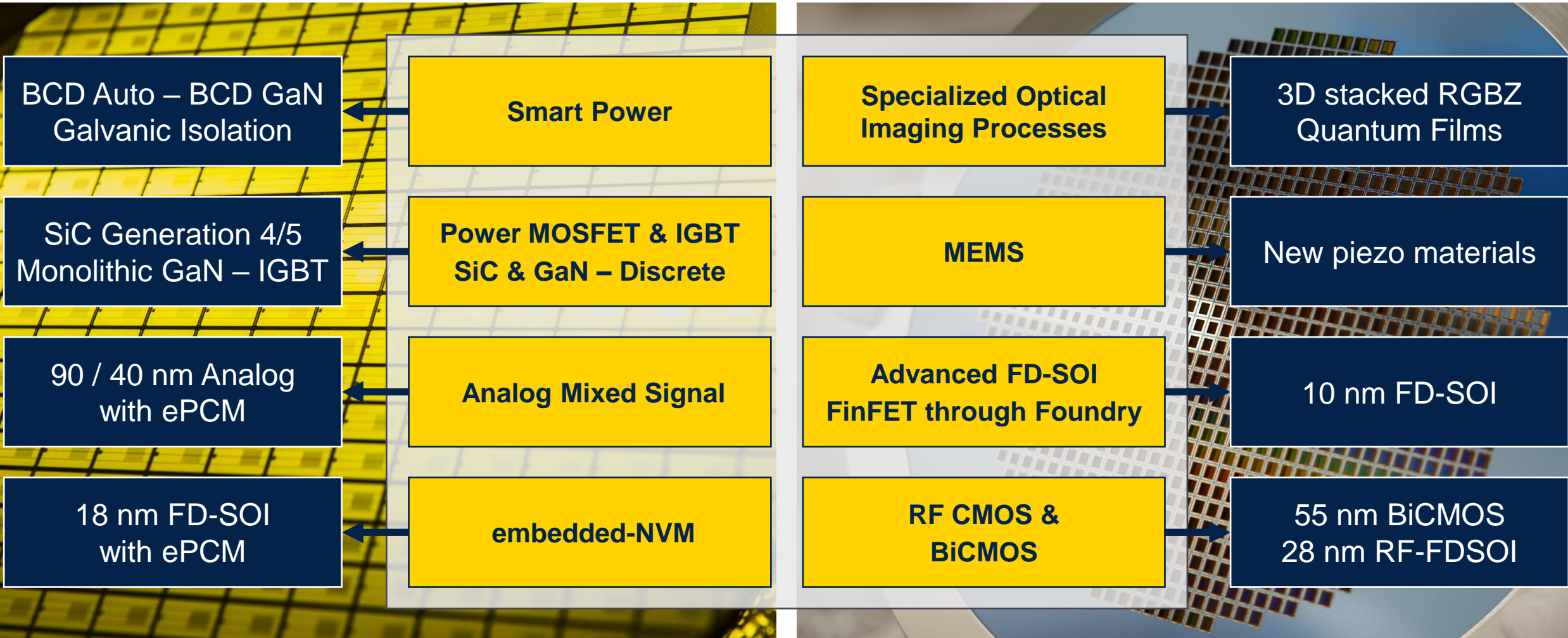
- **300 mm** – double internal capacity
- **Silicon Carbide** – growth, vertical integration and 200 mm
- **Gallium Nitride** – internal 200 mm manufacturing
- Expand **collaborations** with key foundries and OSATs *

*Outsourced Assembly & Test

ST in-house manufacturing



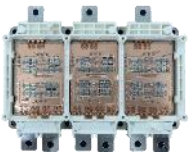
Our proprietary front-end technologies enable product differentiation



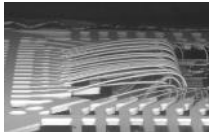
Focused innovation in assembly and testing & OSAT collaboration support our strategy

Innovation focus for packaging supporting strategy
Internal manufacturing and collaboration with subcontractors

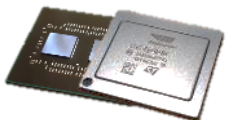
Smart Mobility



SiC Power modules
for car electrification

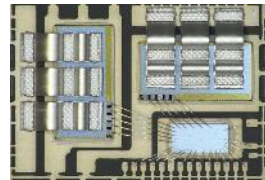


Low cost / Hi-Rel
BGA/QFP for MCU

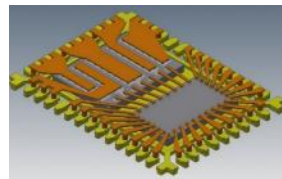


Advanced FCBGA
for ADAS

Power & Energy



Power SiP for smart
power solutions -
GaN, BCD, ViPower

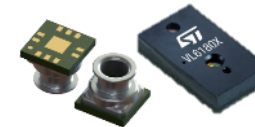


Direct Copper
interconnect for
low impedance

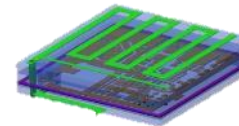
IoT & Connectivity



WLCSP pervasion
for smartphone &
wearable



Sensor package ultra
miniaturization
(ToF, MEMS)



Antenna integration
for mmWave

Strategic manufacturing programs update

300 mm expansion

Crolles



- Second phase of modular expansion completed and third module under construction
- Possible further modular expansion

Agrate



- Equipment installation ongoing
- Wafer start Q3 2022, volume ramp in H1 2023

**Doubling
300 mm
footprint
by 2025**

Wide bandgap

Silicon Carbide vertical integration

Expanding production in Catania and Singapore **front-end** fabs and starting 200 mm production

Growing in Shenzhen and Bouskoura **assembly & test** plants

ST-SiC **substrate pilot line** delivering limited volumes of 150 mm and 200 mm wafers

New plant for internal production by 2023

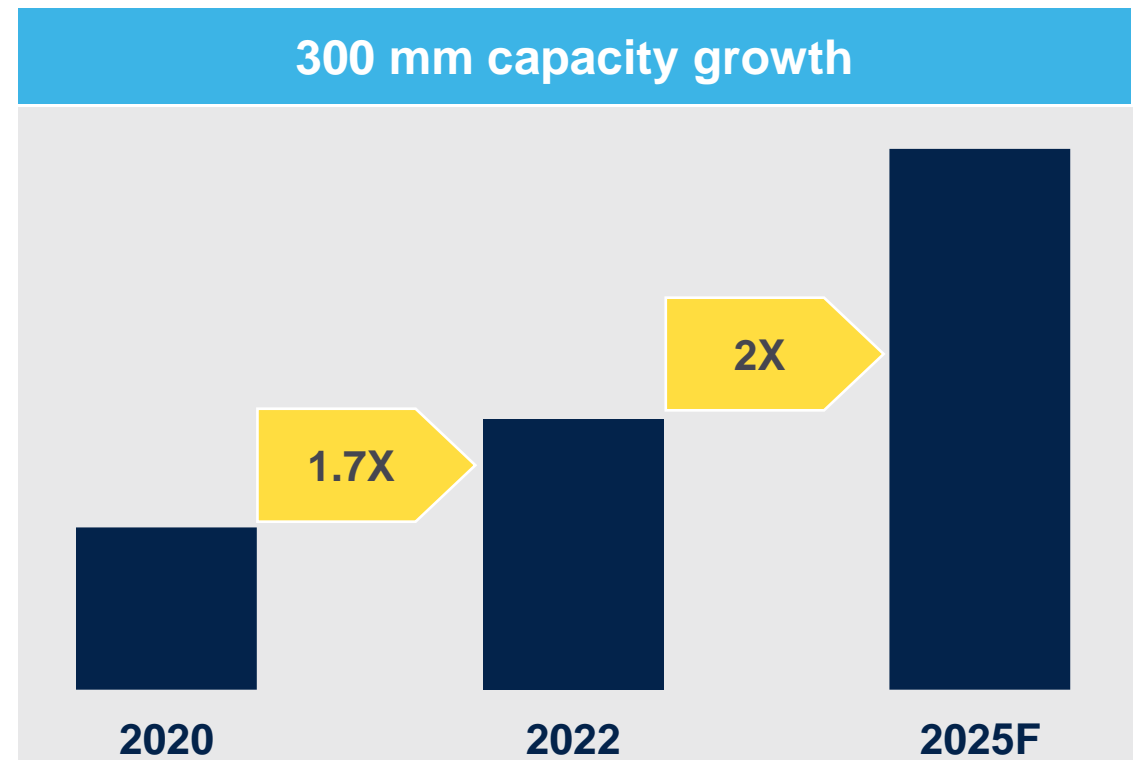
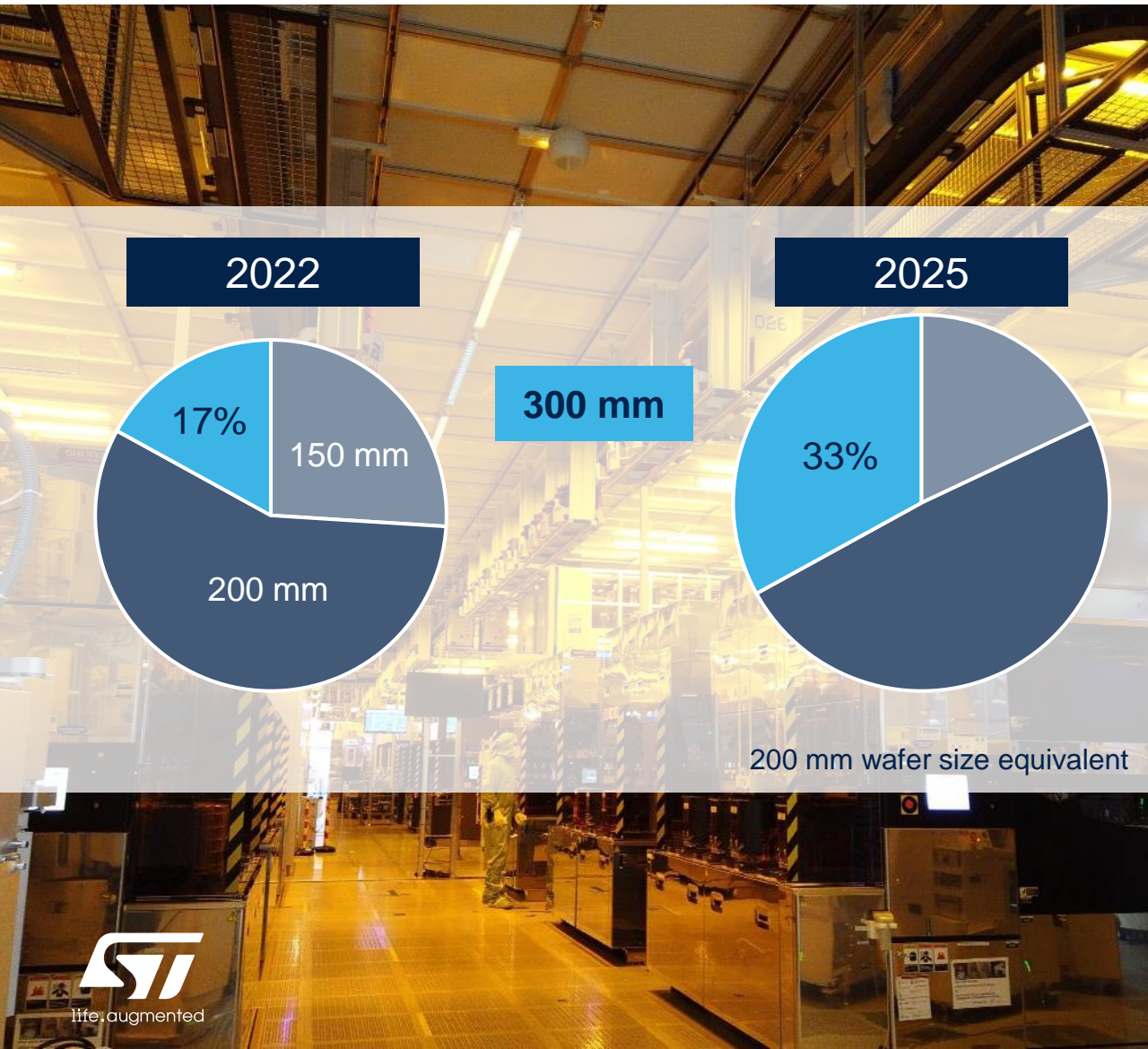
Gallium Nitride

- Internal 200 mm line and Epi center completed in Tours. Volume production in 2023
- Power GaN production in TSMC

Tours



300 mm manufacturing capacity expansion is key to our \$20B+ revenue ambition



Agrate 300 – Progressing for ramp-up in 2023

Status and planning

- Equipment installation ongoing – wafer start in Q3 22
- Production qualification by H1 2023
- Fast ramp - capacity sharing with Tower Semiconductor



Agrate – Crolles synergy

- Process transfer from Crolles for faster qualification
- Road-map alignment : Analog mixed signal, BCD, eNVM
- Designed-in interoperability between the two fabs – digital twins



Accelerating expansion of silicon carbide device manufacturing capacity

In volume production with SiC devices since 2017

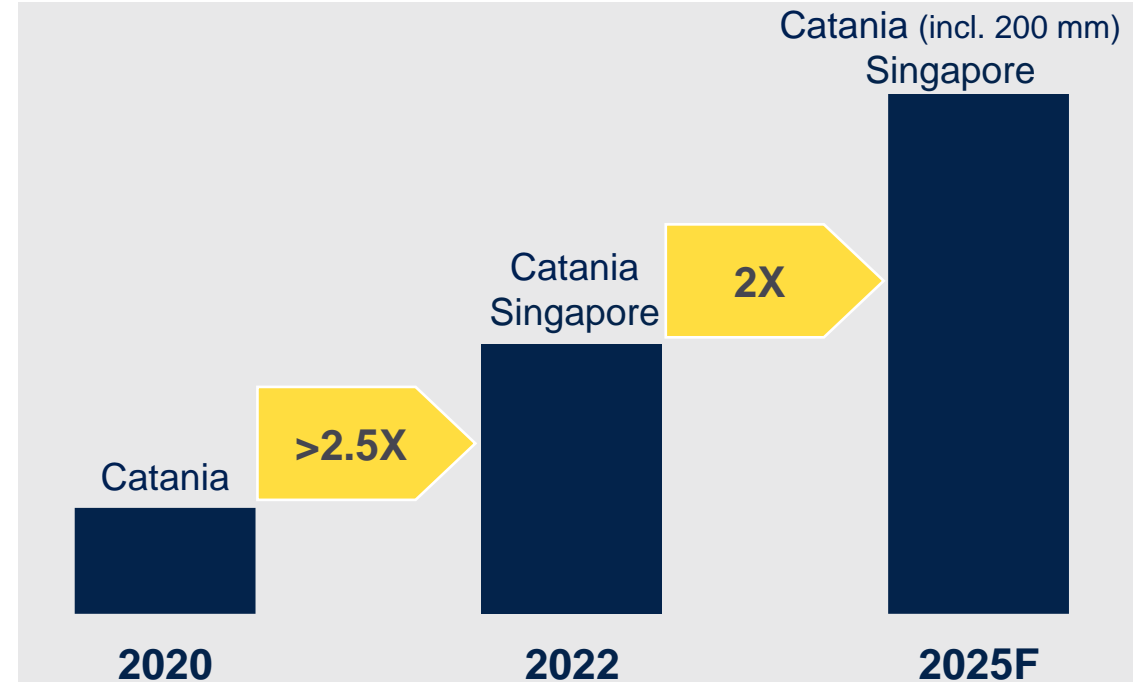
- More than 125 million devices shipped to automotive customers
- Capacity expanded more than 2.5X by 2022 vs 2020



Further >2X and 200 mm by 2025

- 200 mm volume production by 2023
- Assembly & test at two sites: Shenzhen & Bouskoura

SiC capacity growth



Silicon Carbide vertical integration targeting > 40% substrate in-sourcing by 2024

ST-SiC substrate plant

Norrköping



150 mm volume production

200 mm with industrial
quality and yields



New SiC integrated plant

Starting pilot production in 2023



Building Gallium Nitride capabilities and capacity to support business ambitions

Power Conversion GaN and RF-Power GaN

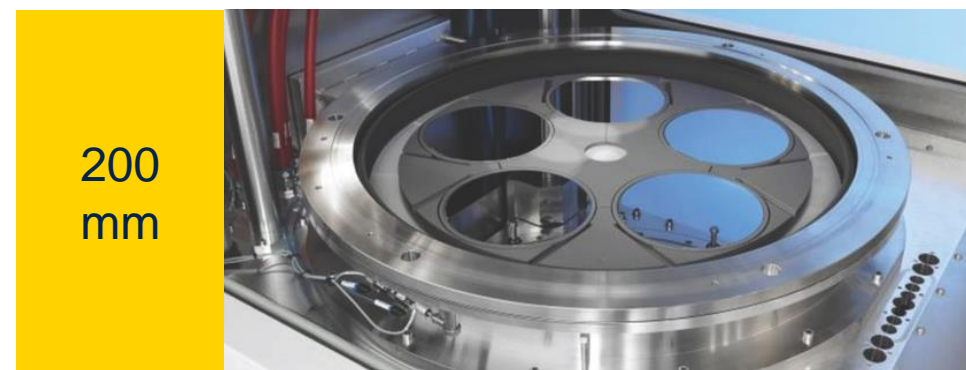
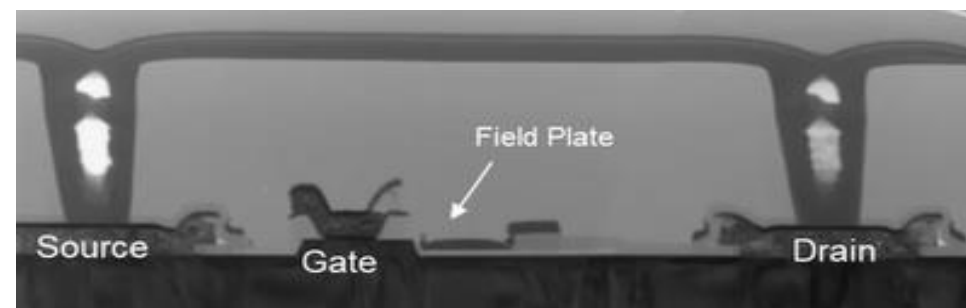
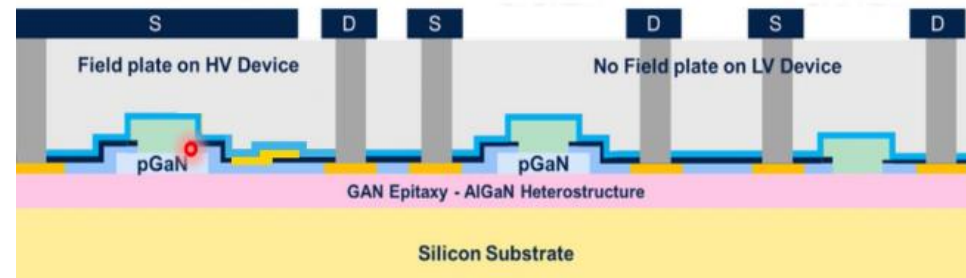
200 mm Power GaN fab in Tours

- Epi capability and pilot line in place
- Fab qualification in 2022
- Volume production ramp in 2023

150 mm RF-GaN in Catania

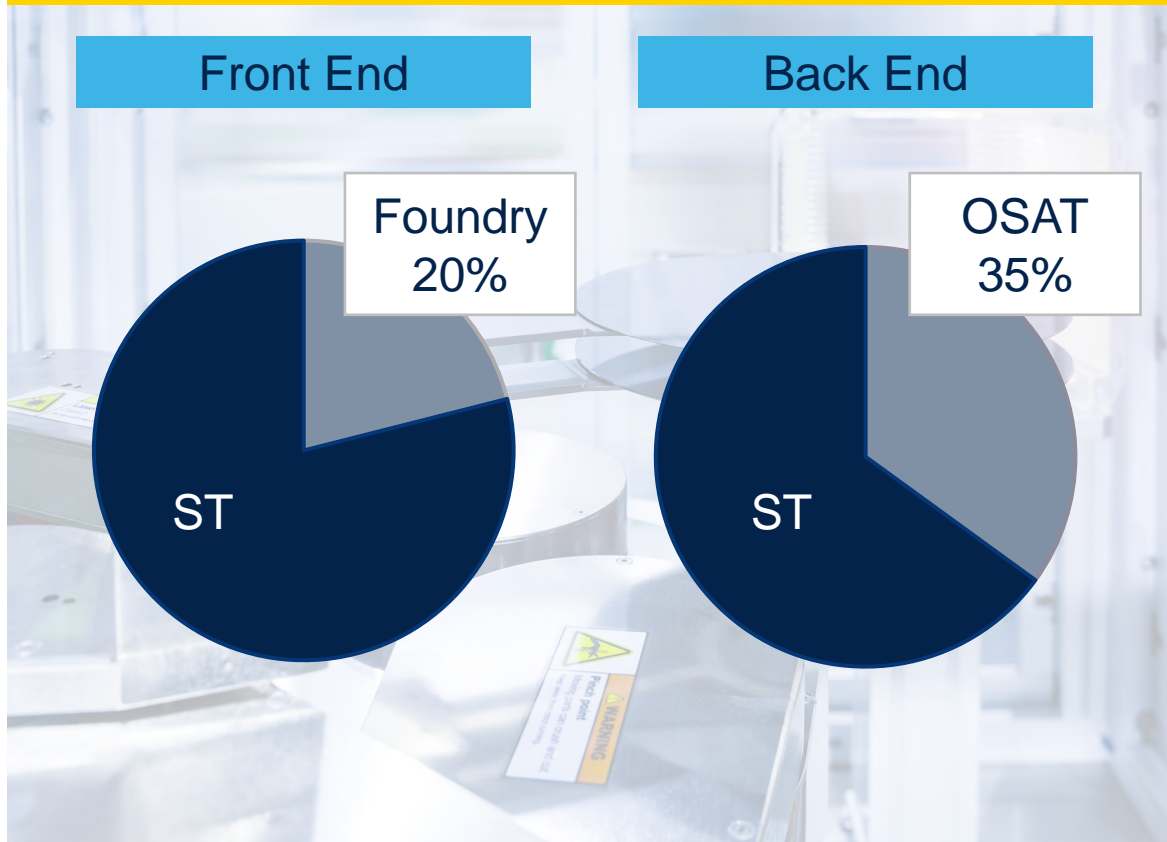
- Fab qualification in 2022

Integrated-GaN and BCD-GaN in development



Strategic manufacturing outsourcing

Outsourcing model



Collaboration model

Collaboration with **leading foundries and OSATs** enable access to selected advanced technologies, complementing our portfolio

Front-end

TSMC: Leading edge FinFET

Samsung Foundries & Globalfoundries: FD-SOI ecosystem

Back-end (Assembly & Test)

ASE, AMKOR: Advanced BGA & WLCSP packages

Creating value from our IDM model supporting ST \$20B+ revenue ambition

Supporting ST growth ambition through technology innovation & cost competitive in-house manufacturing complemented by outsourcing

300 mm manufacturing

Accelerated expansion of Crolles and Agrate new fab volume start-up

Silicon Carbide

Expansion of 150 mm capacity, preparing transition to 200 mm
Vertical integration through internal substrate production

Gallium Nitride

Internal technology capability build-up
200 mm internal production in 2023

Outsourcing

Support from foundries & OSATs on capacity growth, advanced nodes and packages



Our technology starts with You



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