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InnoFab: Accelerating the lab-to-fab transition of advanced semiconductor manufacturing technologies in Spain

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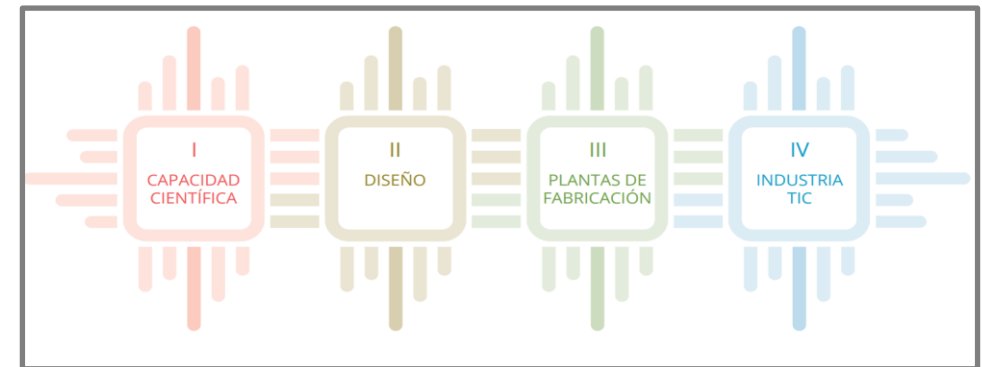
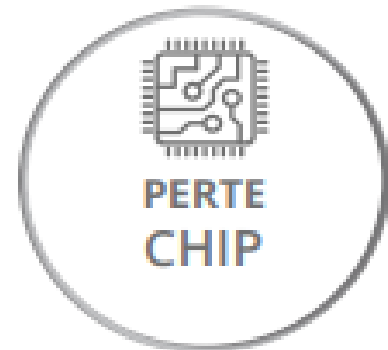
- **PERTE Chip: the Spanish Semiconductor Initiative**
- Introduction to **InnoFab**
- **InnoFab's** innovative Lab-to-Fab co-operation model
- **Summary & Conclusions**

/ European and Spanish initiatives: EU Chips Act & PERTE Chip

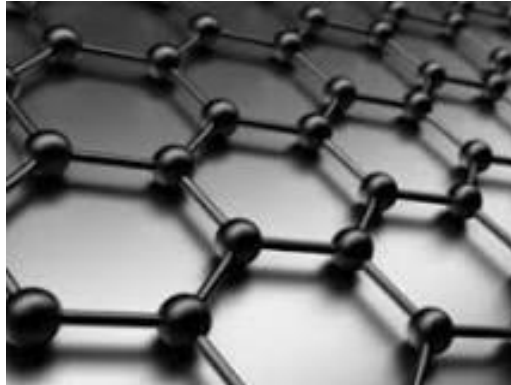


The “strategic fund” PERTE Chip is endowed with 12.3 billion euros and aims to turn Spain into a benchmark in the design and manufacturing of chips

It is fully aligned with the European Chips Act, i.e. directly contributing to its objectives and generating synergies while also complementing other initiatives developed by other Member States and other EU institutions



/ Spain needs to focus on new markets and define a proper growth strategy



Cleanrooms enabling breakthrough innovation in **advanced materials**



Facilities bridging the gap between research and manufacturing through **industrialization capabilities**



Incorporating new business models supporting high-tech start-ups

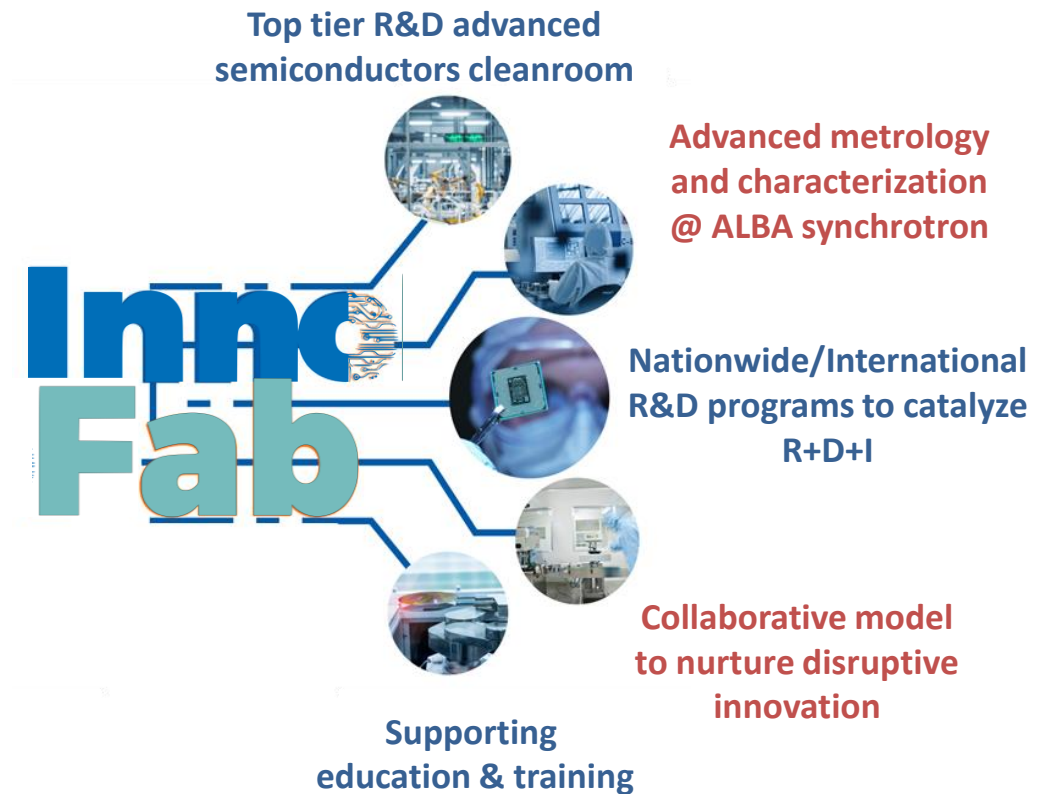
Spanish universities, research centres, startups, SMEs and large industry need flexible cleanroom infrastructure for scaling, prototyping & small/medium series manufacturing to overcome the challenge of accessing large foundries during initial industrialization stages

/ InnoFab's value proposition: *bridging the Lab-to-Fab gap*

A non-profit R&D center for research and disruptive innovation in next-generation, emerging semiconductor technologies

Strategic objectives:

- ❑ Boost R+D+I semiconductors ecosystem with **state-of-the-art R&D cleanroom** for development of **innovative technologies and advanced semiconductors** in an **industry-relevant environment**
- ❑ Facilitate **Lab-to-Fab transition** and **industrialization** with more flexible collaboration models for universities, research centres, start-ups, SMEs, and large industry.
- ❑ Support **education and training** for all professionals in the business, creating **highly qualified talent at all levels**.



InnoFab will boost current capacity in research, development, scaling-up, prototyping, and talent creation in next-generation semiconductor technologies

/ **InnoFab** is fully embedded within the Spanish academic-, start-up- and industrial-ecosystem

Main stakeholders and National Chapters



The InnoFab project is led by Prof. José Antonio Garrido, who is the vice-director of the Institut Català de Nanociència i Nanotecnologia (ICN2)

Other supporters



Additional supporters are being engaged

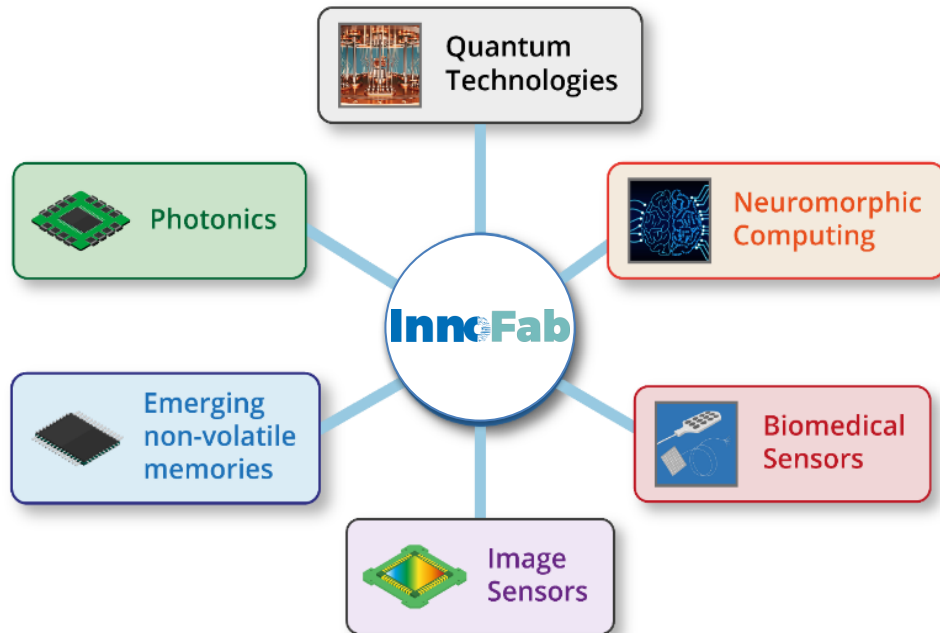
/ InnoFab will support a network of national & international R&D institutions/chapters



- Chapters are key stakeholders of InnoFab, all will contribute to the technology and innovation pipeline of InnoFab.
- Chapters will have synergistic and/or complementary capacities to those of InnoFab, mostly working in lower TRLs, requiring the services of InnoFab to advance in their research
- Collaboration will be in the form of preestablished, long-term collaborative research programs
- InnoFab will co-operate and be complementary to the new IMEC center in Malaga, Spain

/ InnoFab's Technology and Applications focus

InnoFab focusses on technologies and materials with expected market entry in 5 to 15 years



- **Beyond-CMOS application areas**

Neuromorphic computing, quantum technology, advanced photonics, emerging non-volatile memories, sensors, etc.

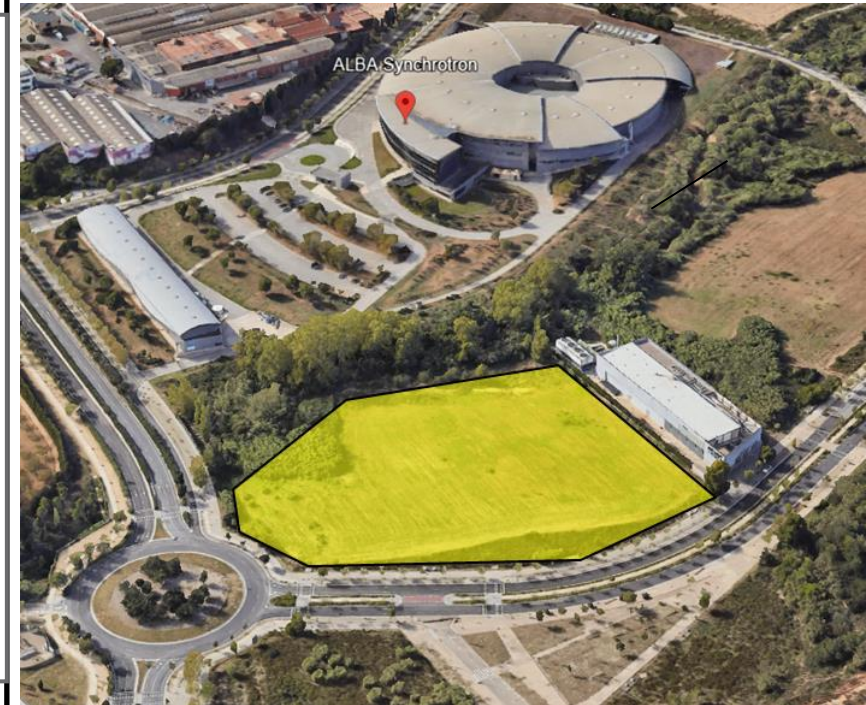
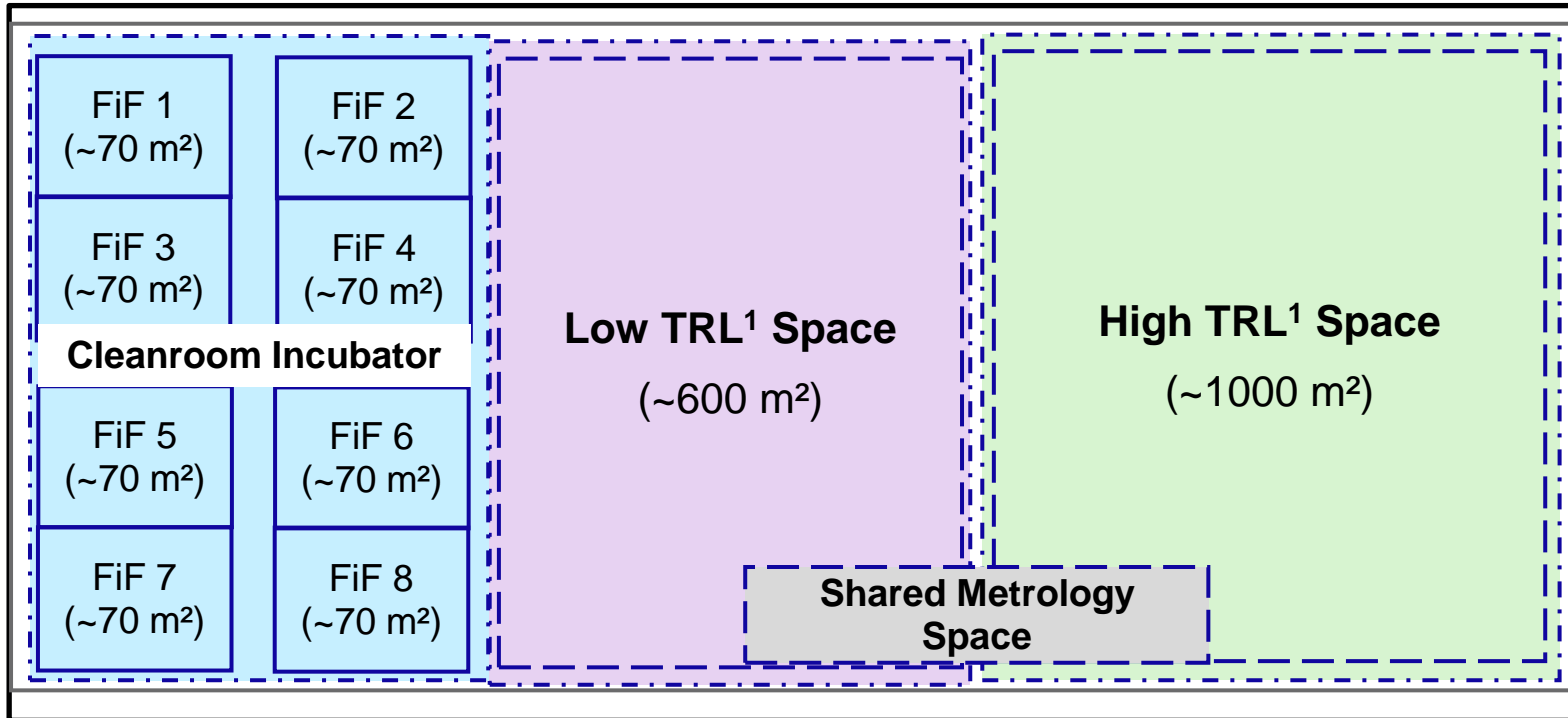
- **Leading-edge / advanced semiconductors and materials**

2D layered materials (graphene, TMD), thin film oxides (metal oxides, ferroelectric oxides), thin film superconducting materials

- **Device technologies**

High mobility BEOL & beyond Boltzmann transistors, NVM (RRAM, FeRAM, etc), neuromorphic/synaptic devices, qubits, sensors, etc.

/ InnoFab's location and cleanroom concept



Cleanroom area of 2200 m² integrated in a 10000 m² building of new construction, including cleanroom and its technical areas, testing labs, and offices.

Premium access to leading-edge materials & devices metrology/characterization + available space for potential future expansions

1. TRL: Technology Readiness Level

/ Summary & Conclusions

- With the PERTE Chip fund, Spain is fully committed to become a serious player within the European and global semiconductor industry
- Spain needs to focus on new markets and define a proper strategy, including organic- and inorganic-growth components
- **InnoFab** will bridge the existing Lab-to-Fab gap in Spain and boost current capacity in R&D, scale-up, prototyping, and talent creation by working with a large network of national & international R&D institutions
- **InnoFab** will focus on “Beyond-CMOS” technologies and materials, which are expected to enter the volume markets in 5 to 15 years
- **InnoFab** will hold a state-of-the-art 2200 m² large cleanroom, including a clean-room incubator, a large industrial research lab and a fully-equipped pilot line
- Through innovative business models, **InnoFab** will enable fast Lab-to-Fab product transition for onsite and external partners, while creating HVM processes and low-volume prototypes