Tampere University

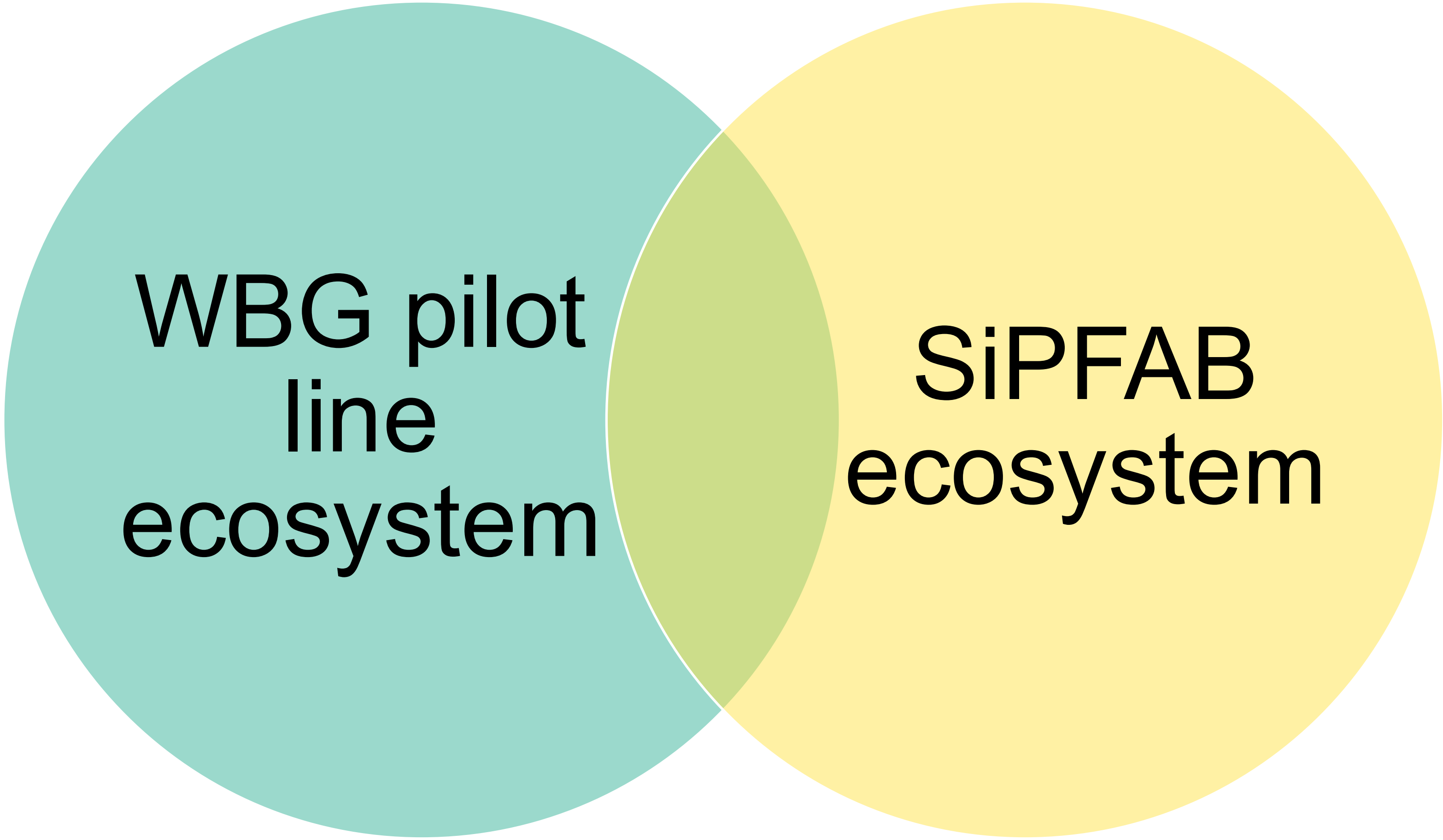
SiPFAB: The System-in-Package Pilot Line

Tuomas Lahtinen, Director of SiPFAB

SiPFAB

- Industry facing semiconductor packaging pilot line in Tampere, Finland
- 40 M€ funding. 26 M€ for equipment
- As part of the project we are building a new cleanroom about 1000 m^2 in size

SiPFAB Ecosystems



WBG pilot line ecosystem

SiPFAB ecosystem

WBG Wide Band Gap

future power electronics

wbg-pilot-line.eu

SiPFAB

Develop and pilot novel GaN, SiC and even GaO, AlN solutions

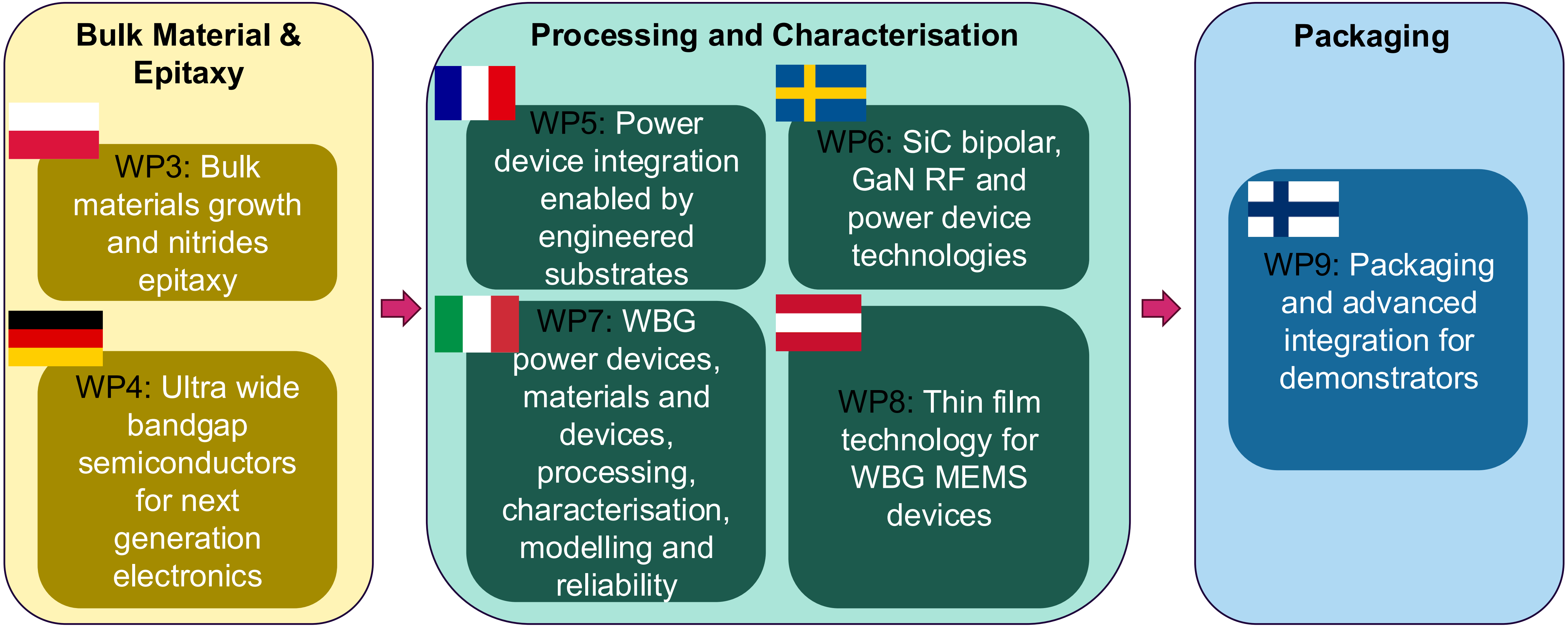
360 M€

Access

Industry

wbg-access.fbk.eu

Wide Band Gap Pilot Line Work Packages



Bulk Material & Epitaxy

WP3: Bulk materials growth and nitrides epitaxy

WP4: Ultra wide bandgap semiconductors for next generation electronics

Processing and Characterisation

WP5: Power device integration enabled by engineered substrates

WP6: SiC bipolar, GaN RF and power device technologies

WP7: WBG power devices, materials and devices, processing, characterisation, modelling and reliability

WP8: Thin film technology for WBG MEMS devices

Packaging

WP9: Packaging and advanced integration for demonstrators

BUSINESS FINLAND

FiCCC

Tampere University

VTT

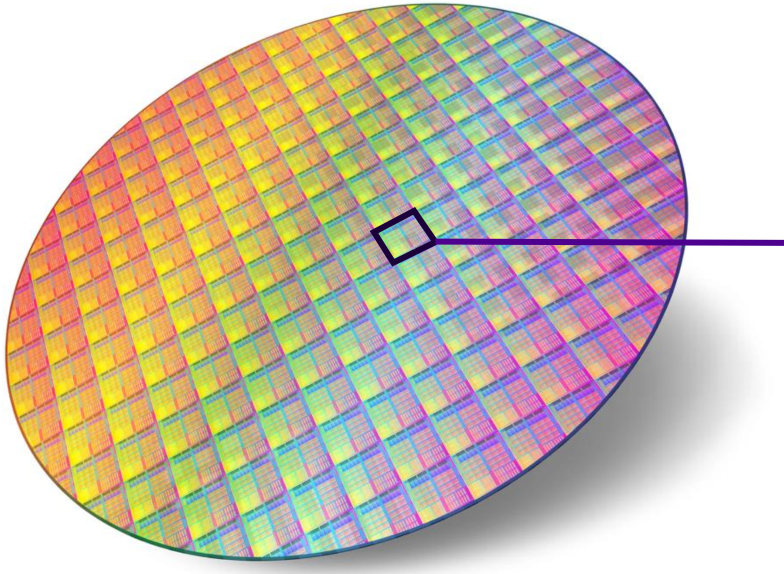
Chips from the North
Technical Chips JU Pilot Lines Workshop

March 23. – 24, 2026

Helsinki, Finland

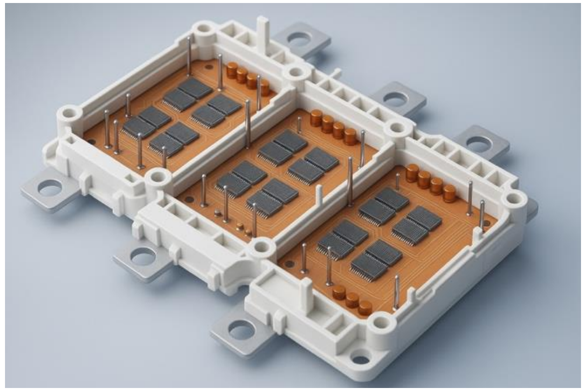
Registration link

Chips Packaging

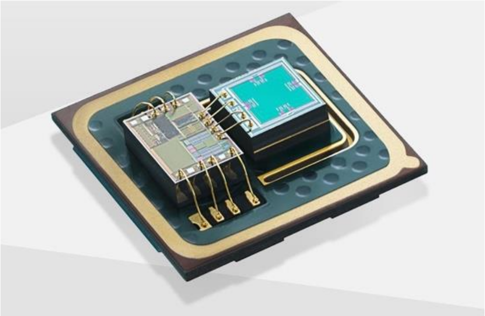


Ref: AMS Osram

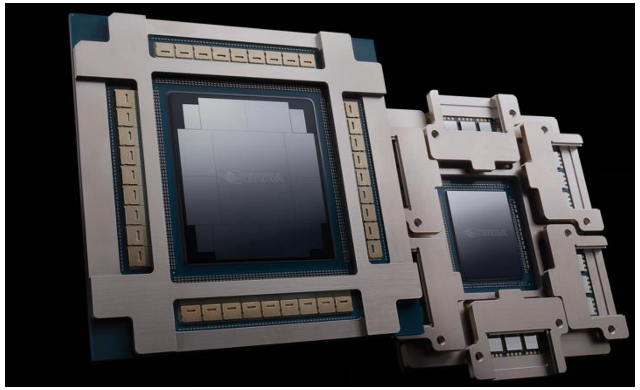
Packaging



Power electronics

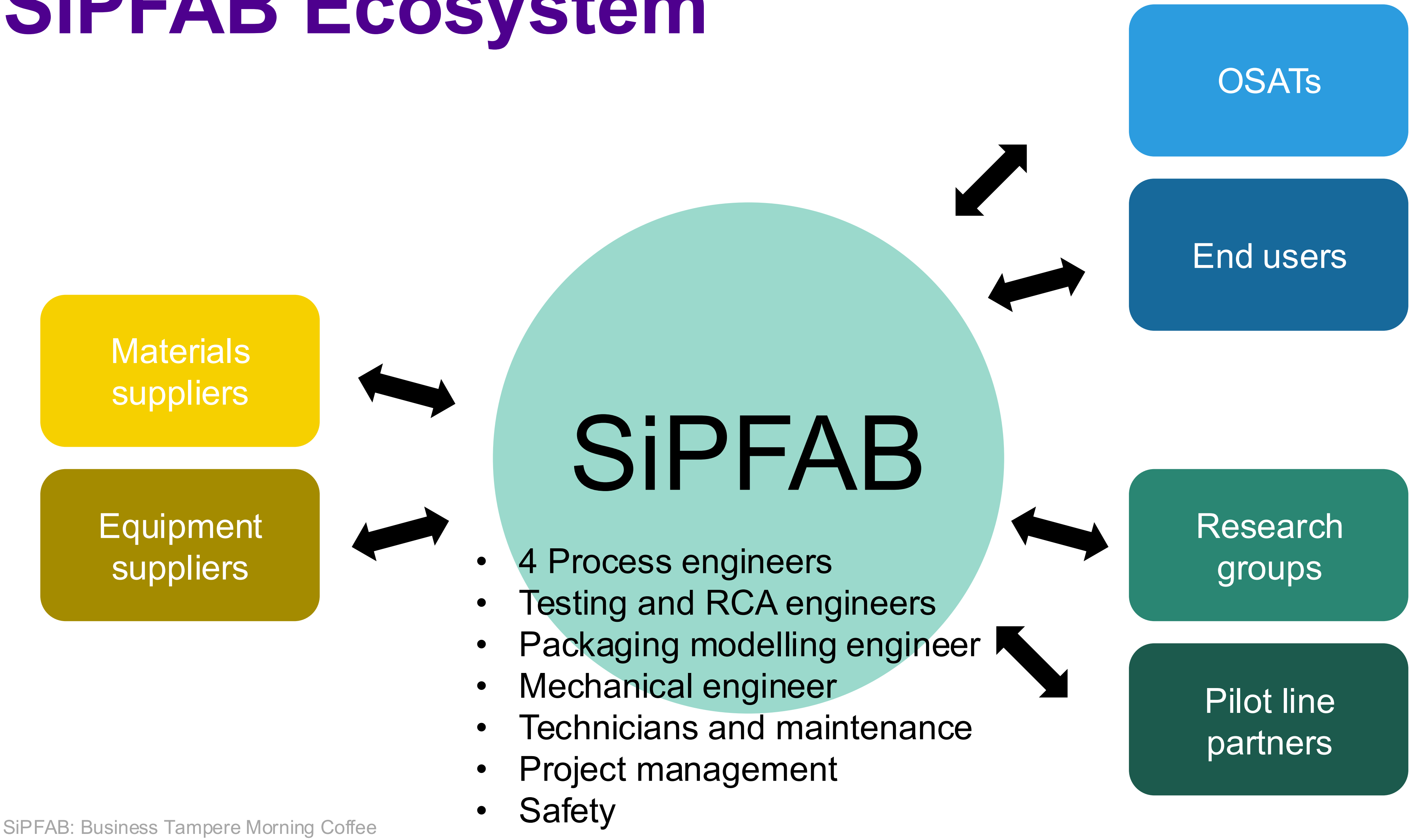


MEMS



HPC

SiPFAB Ecosystem



OSATs

End users

Materials suppliers

Equipment suppliers

SiPFAB

- 4 Process engineers
- Testing and RCA engineers
- Packaging modelling engineer
- Mechanical engineer
- Technicians and maintenance
- Project management
- Safety

Research groups

Pilot line partners

Packaging:
Associate Professor
Jukka Viheriälä

Power electronics:
Professor
Paavo Rasilo

Associate Professor
Petros Karamanakos

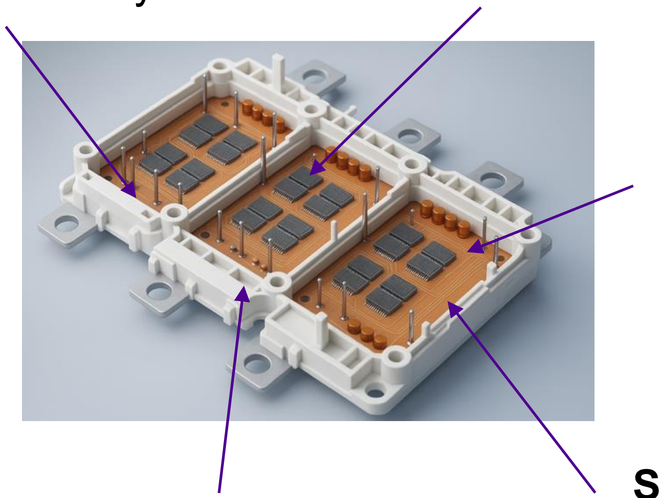
SoCHub

SiPFAB Interconnect Technologies

Power semiconductors

In-fill
- New potting materials
- Increase reliability

Die top connection
- Wire bonding
- Clip bonding



Die attach
- Cu sintering
- SLID soldering

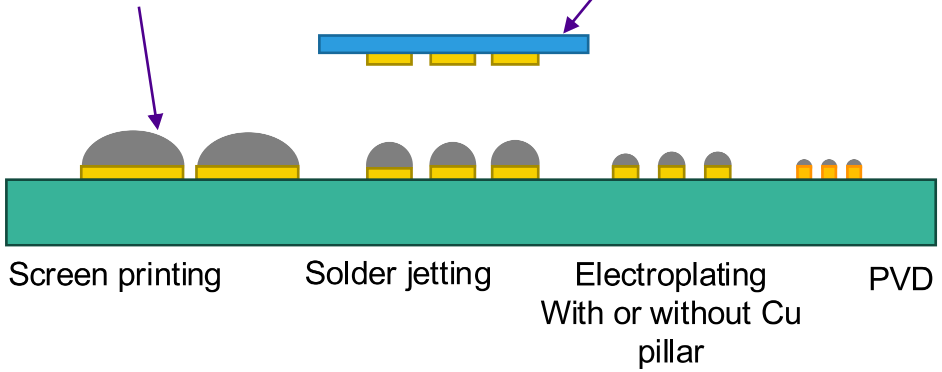
Thermal
- Novel cooling solutions
- New materials

Subsrate
- Ceramic subsrates
- Substrate patterning

Fine pitch interconnects

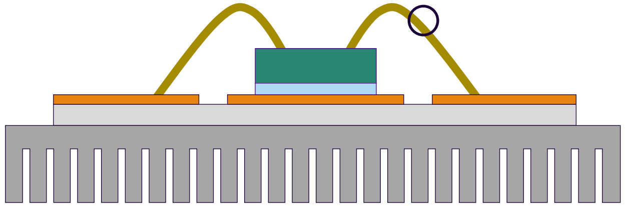
Flip-chip
- UBM: PVD and lift-off

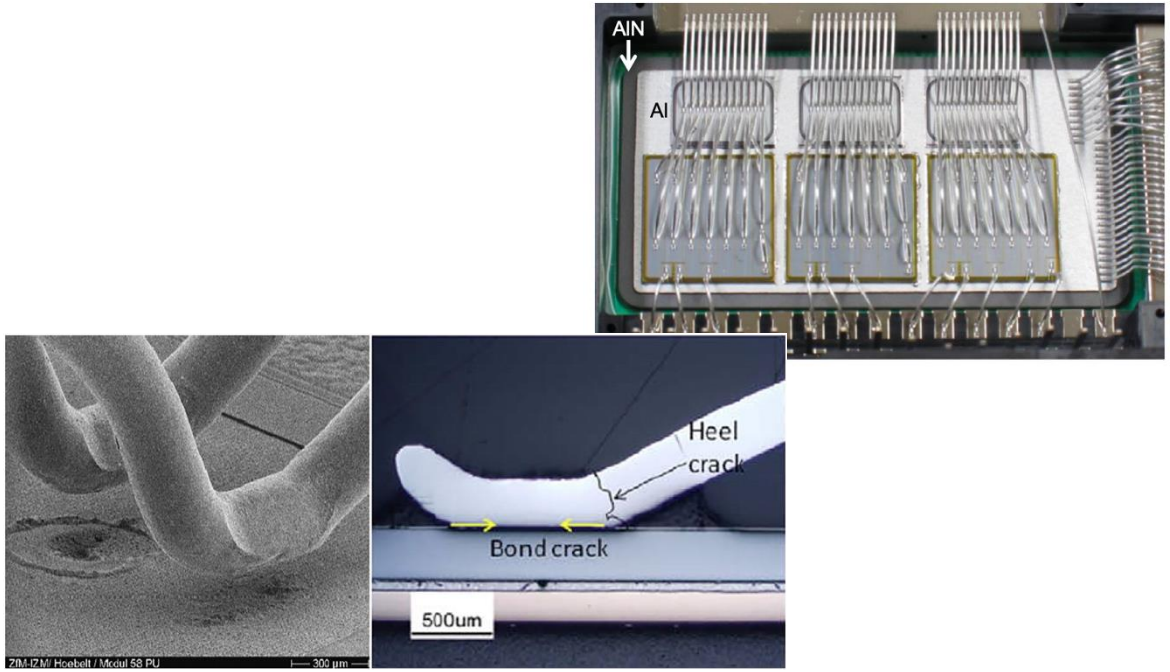
Bumping technologies
- Various bumping methods to serve different applications



Reliabilty

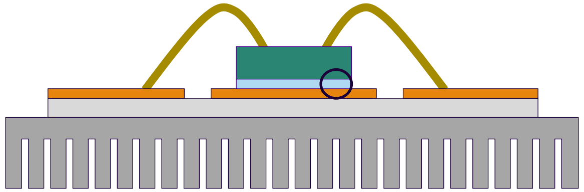
Al wedge-wedge wire bond

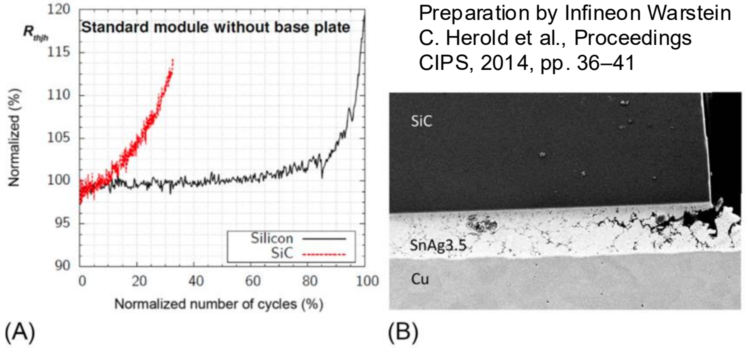




Erping Deng et al., Microelectronics Reliability, **78**, 2017, Pages 25-37

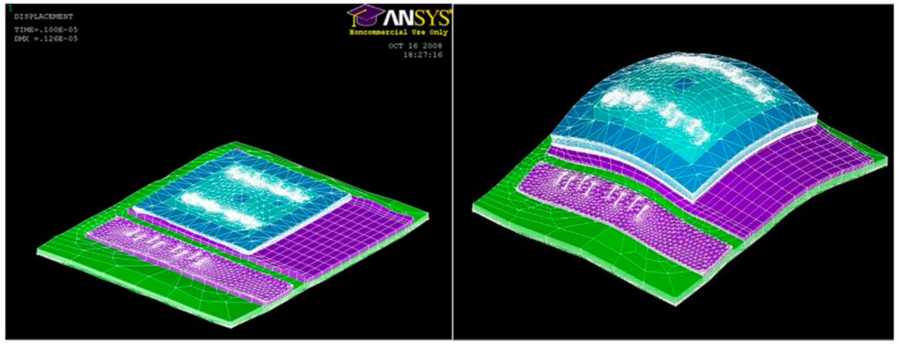
Substrate bonding





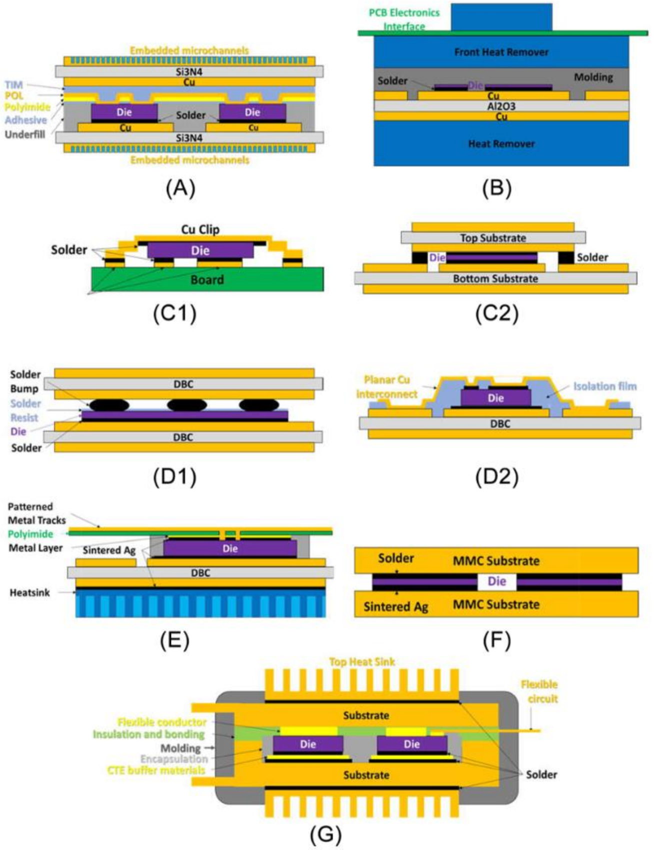
(A) (B)

Preparation by Infineon Warstein
C. Herold et al., Proceedings
CIPS, 2014, pp. 36–41

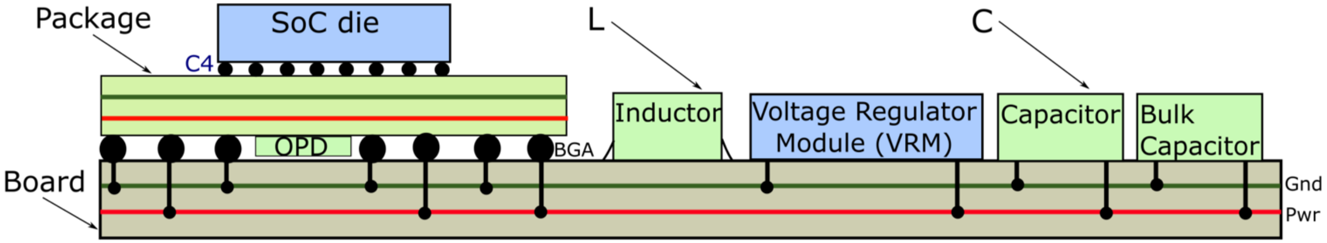


Simulation by T. Poller, Chemnitz University of Technology

Integrated Functionality



Ref: Liu et al, 23 May 2022, IEEE Open Journal of Power Electronics



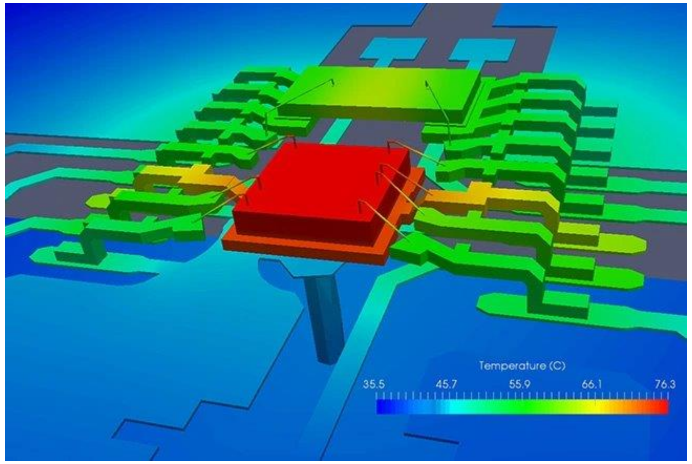
How do we integrate components that operate at very different voltages into the same package?

Avula etl al., IEEE TRANSACTIONS ON COMPONENTS, PACKAGING AND MANUFACTURING TECHNOLOGY, VOL. 12, NO. 1, JANUARY 2022

SiPFAB Offering

Design

- Design simplification
- Multiphysics modelling
- Process design kit (PDK)

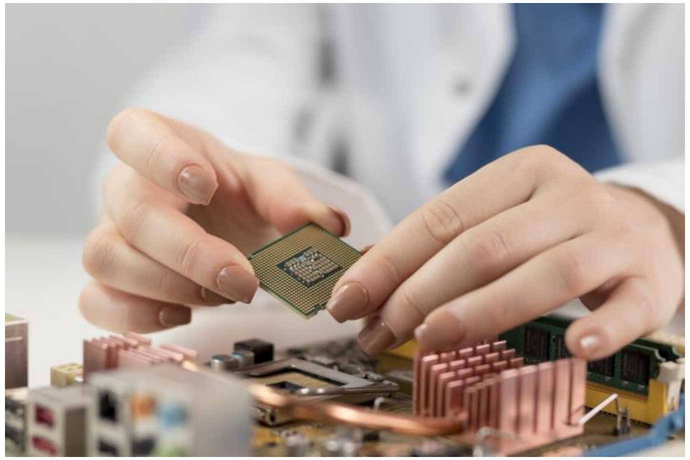


Component assembly

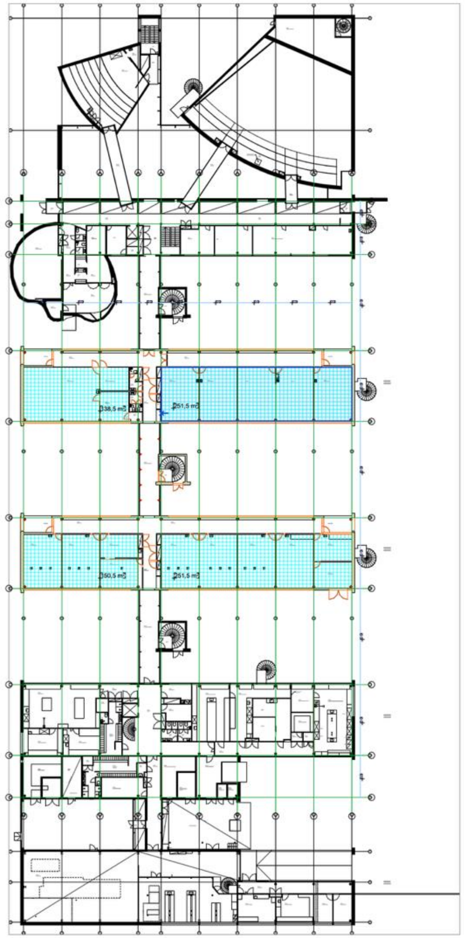
- Rapid prototyping
- New packaging techniques and technologies
- Piloting capabilities

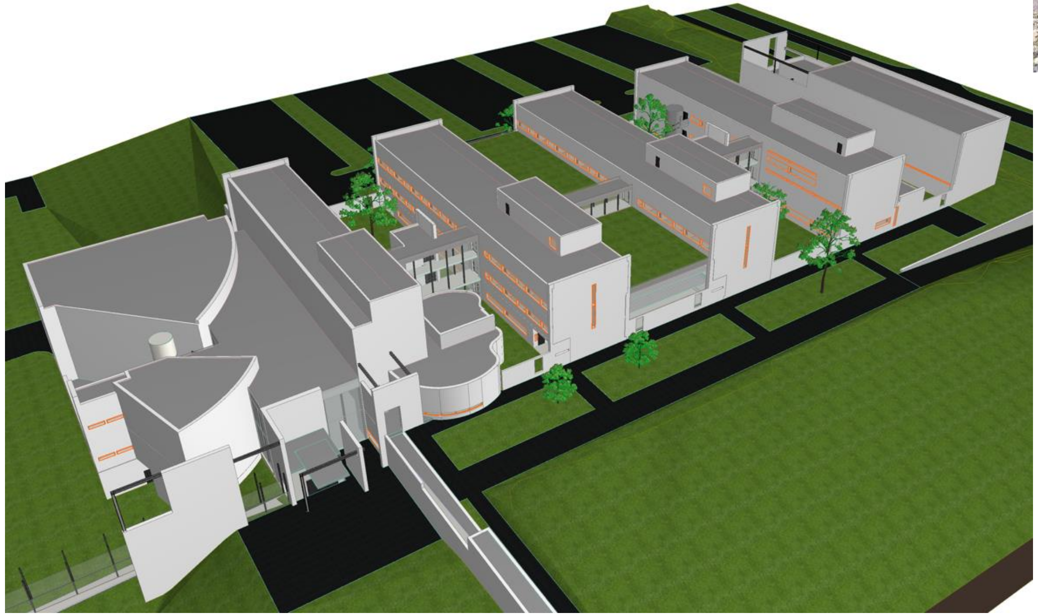
Testing and qualification

- Reliability
- Stress and enviromental testing
- Failure analysis



Cleanroom I

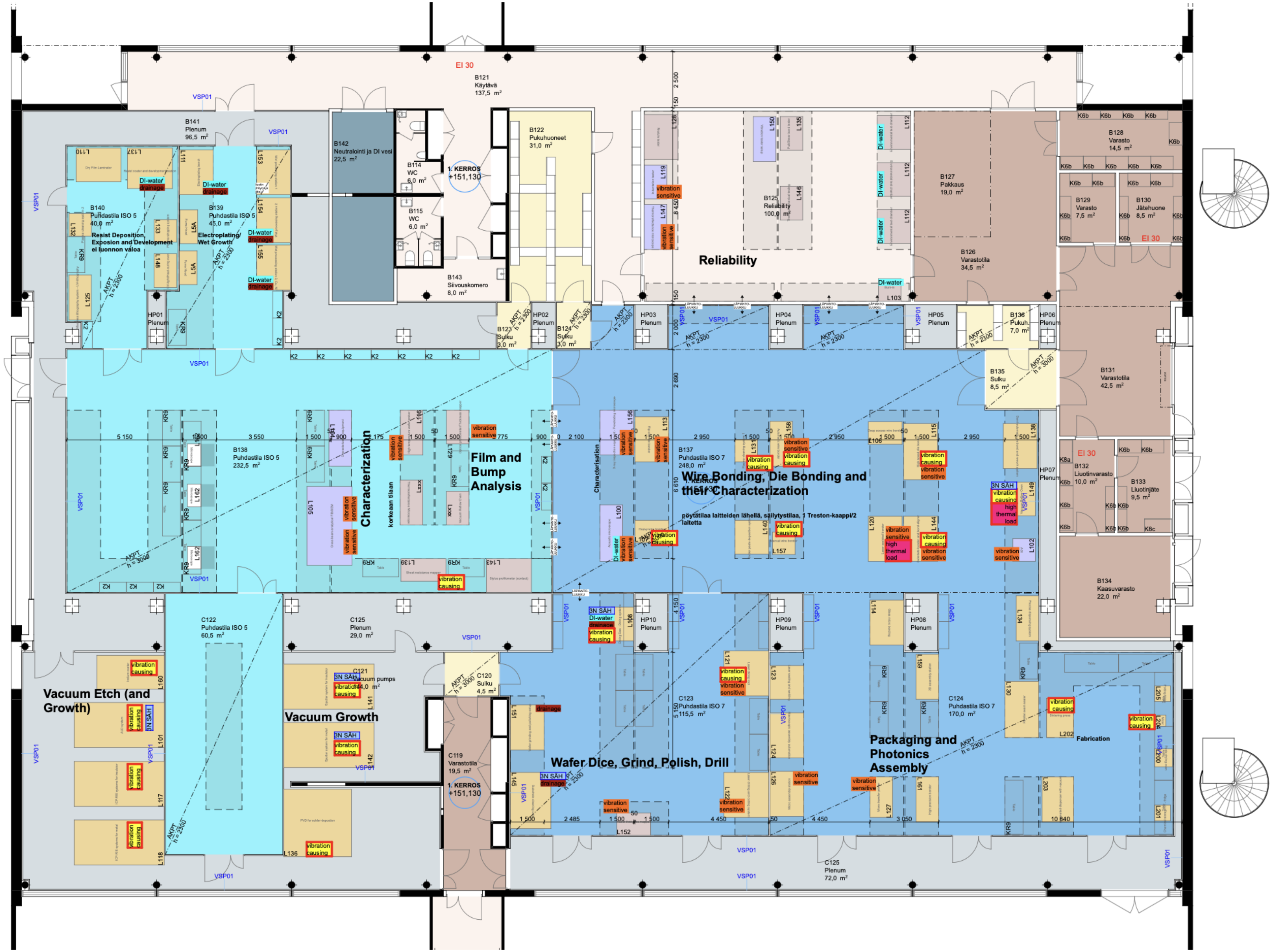




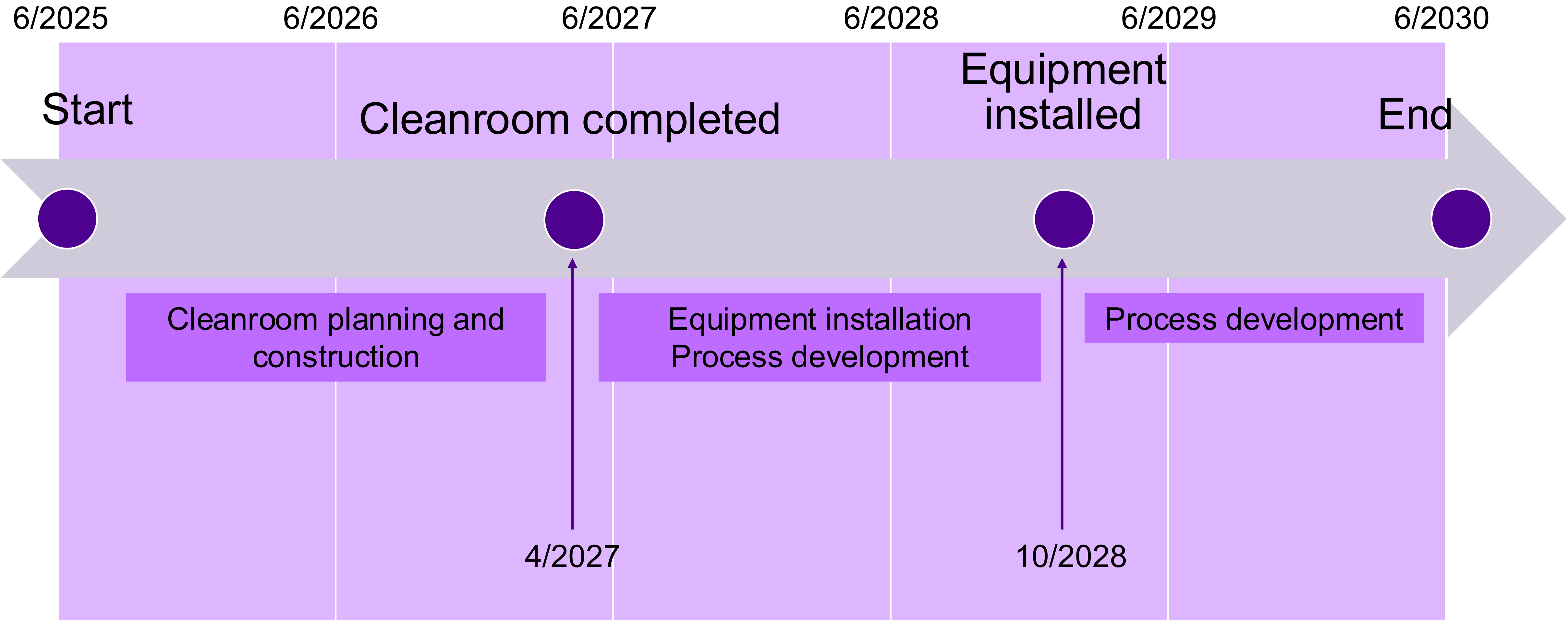
Cleanroom II

Tampere University is making a large investment into the new cleanroom.

SiPFAB and the WBG pilot line are a long term vision for Tampere University.



Schedule



6/2025

6/2026

6/2027

6/2028

6/2029

6/2030

Start

Cleanroom completed

Equipment installed

End

Cleanroom planning and construction

Equipment installation
Process development

Process development

4/2027

10/2028

Take Aways

Reach out to us if you are interested in:

- WBG pilot line activities
- Material or equipment development for semiconductor packaging
- Piloting packaging processes and methodologies for semiconductor devices