

Contributions to the APECS Pilot Line: Fraunhofer IMS

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Fraunhofer IMS is one of 14 German research institutes involved in the implementation of the APECS pilot line. As one of the 12 Fraunhofer institutes, Fraunhofer IMS is known for its expertise in embedded software and AI, as well as smart sensor systems and technologies contributes. The institute focuses on the research and pilot production of smart sensor systems and advanced microelectronic circuits. Its work supports innovation across 4 core sectors: health, industry, mobility, along with space & security.

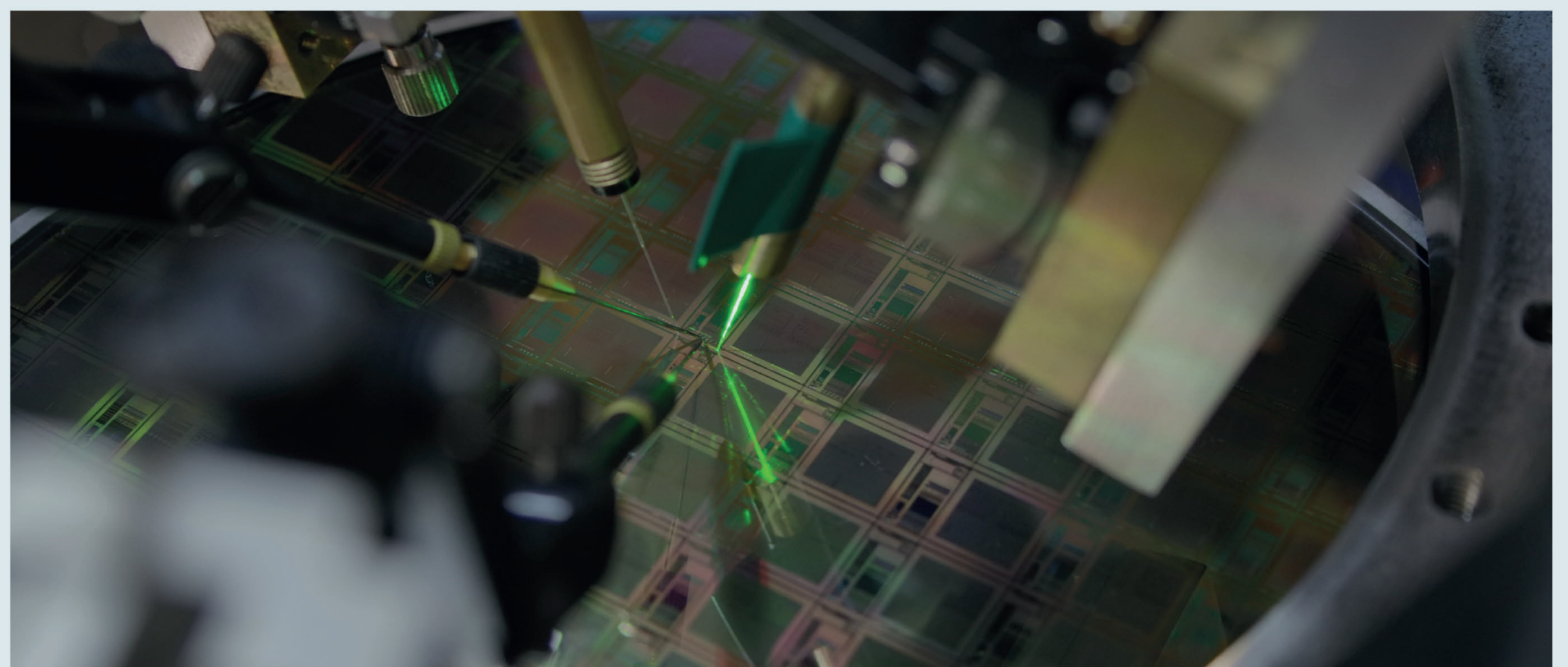
The role of Fraunhofer IMS in the APECS pilot line

Researchers at Fraunhofer IMS create tailored sensor solutions from biomedical and optical systems to embedded AI and quantum technologies.

The institute's Center for Sensor Technology, featuring a 2000 m² cleanroom, enables full in-house fabrication of sensor systems using cutting-edge tools and 200 mm silicon processing.

- Providing Process and Assembly Design Kits (P/ADKs) and design flows to support 2.5D and 3D integration and quasi-monolithic integration (QMI)
- Creating high-level models for system simulation and verification
- Developing complex IP blocks for optical components such as phase shifters and interface technologies supporting high data rates
- Validating technologies and processes through targeted proof of concept demonstrations
- Enabling post-CMOS photonic integration in the backend of sensor wafers, allowing the addition of photonic components such as waveguides, modulators, and detectors on completed CMOS devices without impacting the underlying electronics

Multiple integrated photonic waveguide technologies bridging a wavelength spectrum from 370 nm–3 μm © Fraunhofer IMS



Center for Sensor Technology featuring a with a 2000 m² cleanroom for 200 mm silicon processing © Fraunhofer IMS



Contributions to the APECS pilot line

Within APECS, Fraunhofer IMS focuses on developing processes and tools that make it easier to integrate advanced semiconductor technologies, including:

- strategic investments in state-of-the-art manufacturing infrastructure
- high-precision electrical and optical measurement and testing systems
- design tools and environments
- providing fully automated photonic testers and specialized tools for characterizing photonic quantum measurements

Also remarkable is the collaboration between Fraunhofer IMS with APECS partner VTT to advance interconnect technologies, supporting trustable, high-performance chiplet integration.

What is APECS?

APECS (Advanced Packaging and Heterogeneous Integration for Electronic Components and Systems) is one of 5 European pilot lines established under the EU Chips Act. APECS is the foundation for Europe's competitive position in heterogeneous system integration and advanced packaging. It plays a vital role in enhancing Europe's strategic autonomy by reducing dependence on foreign suppliers and strengthening Europe's capabilities in critical technology areas.

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Additional information

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Microscope image: Ring resonator integrated on CMOS circuitry for Post-CMOS Photonics © Fraunhofer IMS

