

FRAUNHOFER INSTITUTE FOR SILICON TECHNOLOGY

PRESS RELEASE

Chip innovations from Itzehoe for Europe: Minister President Daniel Günther hands over € 5.2 million grant to Fraunhofer ISIT for the APECS pilot line

Itzehoe, 22 January 2025 - Schleswig-Holstein is sending a strong signal for the future of semiconductor technology: As a leading innovation location in northern Germany, the state is specifically strengthening microelectronics research. In this context, the Fraunhofer Institute for Silicon Technology ISIT received an important visit today: Minister President Daniel Günther handed over a 5.2 million euro funding decision for the "Advanced Packaging and Heterogeneous Integration for Electronic Components and Systems" (APECS) pilot line. This support from the state's economic programme is an important step towards strengthening Schleswig-Holstein as a semiconductor location and implementing the objectives of the EU Chips Act.

The pilot line for 'Advanced Packaging and Heterogeneous Integration for Electronic Components and Systems' (APECS) is an important component of the EU Chips Act to drive forward chip innovations and increase research and production capacities for semiconductors in Europe. The institutes cooperating in the Research Fab Microelectronics Germany (FMD) are working closely with other European partners to set up the APECS pilot line, thus making a significant contribution to strengthening Europe's technological resilience and increasing the global competitiveness of the semiconductor industry. The Fraunhofer Institute for Silicon Technology ISIT represents Schleswig-Holstein as a semiconductor location in the European pilot lines as one of the institutes cooperating in the FMD. The state government is funding the APECS pilot line with 5.2 million euros from the state's economic programme. This was approved by the cabinet on 14 January 2025.

"The next generation of microchips will be made in Europe, developed and manufactured with expertise from Schleswig-Holstein. Fraunhofer ISIT's strength in transferring knowledge from research to industrial production is particularly in demand in this project. As a state, we are very proud that you are playing a key role in setting up a pilot line for the development and production of the latest microchips. The financial support for your research in this project is money well spent for our state, Germany and Europe," said Minister President Daniel Günther at the presentation of the funding decision. A total of around €33 million from the state, federal government and EU will be invested in ISIT over the next few years. The pilot line will provide large industrial companies as well as SMEs and start-ups with low-threshold access to cutting-edge technologies and ensure secure, resilient semiconductor value chains. APECS is co-funded by the Chips Joint Undertaking and national funding from Austria, Belgium, Finland, France, Germany, Greece, Portugal and Spain under the Chips for Europe initiative. The total funding for the APECS pilot line is €730 million over 4.5 years.

It is a great success for Fraunhofer ISIT to expand its technological capabilities within the framework of APECS, to develop new technologies for chip integration and to position the semiconductor location Itzehoe as part of this high-tech pilot line within the framework of the EU Chips Act", emphasised Institute Director Prof. Dr. Holger Kapels on the evening of the cabinet decision. Europe has a dynamic ecosystem of leading companies in traditional industries, small and medium-sized enterprises (SMEs) and start-ups, whose competitive advantage is also based on advanced semiconductor solutions as the basis for innovation. However, these companies today face the challenge of limited access to advanced technologies due to a lack of resources in Europe. Under the EU Chips Act, the European Commission is investing significant resources to strengthen semiconductor technologies and applications in the EU. The aim is to increase Europe's technological resilience, secure supply and value chains and drive innovation in key sectors such as artificial intelligence, mobility, manufacturing, information and technologies, trusted communication and eco-sustainable electronics, neuromorphic and quantum computing.

The APECS pilot line focuses on the scalable industrial transfer of newly developed innovations in the field of heterointegration*, in particular the use of new chiplet** technologies, thus bridging the gap to application-oriented research. Going beyond conventional system-in-package (SiP) methods, APECS aims to deliver robust and trustworthy heterogeneous systems that significantly increase the innovation capacity of the European semiconductor industry.

As part of the pilot line, Fraunhofer ISIT will focus on the heterogeneous integration of innovative functional materials into complex semiconductor systems and technologies such as MEMS, III/V semiconductors and novel glass substrates. In addition to significant investments in state-of-the-art semiconductor processing equipment, we will make access to our infrastructure more accessible in the coming years. The aim is to involve local, national and international industrial companies and SMEs more closely in the developments at ISIT, " explains Dr Michael Mensing, APECS project coordinator at Fraunhofer ISIT: "In this way, we want to give a further boost to the growing microelectronics industry in Schleswig-Holstein and the greater Hamburg area. We also serve as a local contact point for access to the semiconductor ecosystem in Europe and the pilot lines currently being set up.

Investment in strategic projects such as APECS as part of the EU Chips Act is crucial to positioning Europe as an indispensable partner in the global technology industry. Germany plays a key role in this endeavour - both as a leading research location and as a driving economic force. Thanks to substantial funding from the Federal Ministry of Education and Research (BMBF) and the states of Schleswig-Holstein, Saxony, Berlin, Bavaria, Baden-Württemberg, North Rhine-Westphalia, Brandenburg and Saxony-Anhalt, it will be possible to further expand the R&D

infrastructure within the APECS pilot line in the coming years. This is an important step towards securing the long-term economic stability of Germany and Europe.

"Fraunhofer plays a central role in the implementation of large-scale projects such as APECS, which strengthen Germany's innovative strength and technological resilience," said Prof. Holger Hanselka, President of the Fraunhofer-Gesellschaft. Through our practice-oriented research and close cooperation with partners from industry, science and politics, we create the basis not only for the development of the latest technologies, but also for their industrial application. The APECS pilot line is a prime example of bridging the gap between research and industry and shows how close cooperation with ministries and other partners can strengthen Europe's position in the global marketplace.

Innovation where European industry needs it most

The APECS pilot line aims to activate new functionalities and standardise integration technologies through System Technology Co-Optimisation (STCO). This will enable companies to develop advanced products, even in small quantities, at competitive costs. By offering a wide range of technologies in a one-stop-shop, APECS will become Europe's leading hub for advanced packaging and heterointegration, playing a key role in European microelectronics.

As a driving force for collaboration between European research organisations, industry and academia, the APECS pilot line fosters a vibrant innovation ecosystem. As a comprehensive platform, APECS integrates end-to-end design and pilot production capabilities, enabling the advancement of innovations from cutting-edge research to viable, scalable manufacturing processes.

APECS will play a critical role in Europe's transition to a carbon-neutral and circular economy by driving eco-design and sustainable manufacturing initiatives.

Innovation through strong multi-level collaboration

The APECS pilot line builds on the structures created in the German Microelectronics Research Fab (FMD). In Germany, a total of twelve institutes from the Fraunhofer Microelectronics Group and the two Leibniz Institutes FBH and IHP are involved in APECS. The work is coordinated by the Berlin office.

Prof. Albert Heuberger, spokesman of the Fraunhofer Group for Microelectronics and chairman of the FMD steering committee, emphasises: "The success of the EU Chips Act is based on strong partnerships and versatile know-how. This is exactly what the FMD brings to the table by combining the strengths of decentralised research institutions. APECS also builds on this foundation and can therefore become a long-term pilot line accessible to all European stakeholders along the value chain. Together with the other pilot lines under the EU Chips Act, APECS is a crucial component for heterointegration and advanced packaging of an overarching pan-European microelectronics pilot line.

In a strong European consortium, APECS combines the technological competences, infrastructures and know-how of a total of ten partners from eight European countries: Germany (Fraunhofer-Gesellschaft as coordinator, FBH, IHP), Austria (TU Graz), Finland (VTT), Belgium (imec), France (CEA-Leti), Greece (FORTH), Spain (IMB-CNM, CSIC) and Portugal (INL). The APECS pilot line is coordinated by the Fraunhofer-Gesellschaft and implemented by the Research Fab Microelectronics Germany (FMD).

About Fraunhofer Institute for Silicon Technology (ISIT)

Fraunhofer ISIT, based in Itzehoe, Germany, develops and manufactures customerspecific components for microsystems technology and power electronics. It covers the entire value chain from process and device simulation to process development and complete components in an 8' production environment, especially for highperformance applications. Local and external industrial partners provide the potential for industrialisation. Key application areas include energy and automotive technology, the consumer goods industry, medical technology, and communications and automation technology. <u>https://www.isit.fraunhofer.de/</u>

About the German Microelectronics Research Fab (FMD)

FMD, a cooperation between the Fraunhofer Microelectronics Group and the Leibniz Institutes FBH and IHP, is the central contact point for all questions relating to microelectronics and nanoelectronics research and development in Germany and Europe. As a one-stop shop, FMD has been combining scientifically excellent technologies and system solutions from its 13 cooperating institutes of the Fraunhofer-Gesellschaft and the Leibniz Association into a tailor-made overall offer since 2017. Under the virtual umbrella of FMD, the largest association of its kind in Europe has been created, with more than 4,900 employees and a unique diversity of expertise and infrastructure. www.forschungsfabrik-mikroelektronik.de

About the EU Chips Act

The objectives of the EU Chips Act will be achieved through three action lines: the Chips for Europe initiative, security of supply and resilience, and monitoring and crisis management. The APECS pilot line is part of the Chips for Europe initiative, which aims to support large-scale technological capacity building and innovation across the Union, enabling the development and deployment of next-generation advanced semiconductor and quantum technologies. The establishment of semiconductor chip pilot lines in Europe is therefore a key requirement of the EU Chips Act. These pilot lines are specialised infrastructures that test newly developed technologies and manufacturing processes in the field of chip production before they are commercially implemented on a large scale. <u>https://www.apecs.eu/</u>

*About heterointegration

Semiconductor R&D is at the heart of today's technological (r)evolutions, ranging from artificial intelligence and high-performance computing to advanced defence systems, robotics, power electronics, wireless communications, e-health, quantum technologies and more. Such future electronic systems will require more and more functions that cannot be performed by a single chip, even if advanced system-on-chip (SoC) concepts are used. Heterointegration will go beyond current system-in-package (SiP) approaches and will be critical for next-generation electronic systems and devices based on future CMOS nodes, SiGe, SiC, III/Vs such as GaAs or GaN, and all types of micro-electro-mechanical systems (MEMS).

**About Chiplets

The idea behind chiplets is to take advantage of different types of Intellectual Property (IP) that can be used for specific functions. In the semiconductor industry,

IP cores are multi-purpose prefabricated functional blocks of a chip design. It is usually licensed to other IC designers as the intellectual property of the developer for integration into another, usually larger, IC design. The various blocks are already tested and can be assembled like a jigsaw puzzle, so that existing IC structures can be used and only parts need to be redesigned. A chiplet is therefore not a fully functional individual chip, but a part of a chip that can be combined with other functional elements. The concepts and first implementations of chiplets not only promise higher integration densities, but also touch on the environmental characteristics of electronics in terms of resource efficiency, critical raw materials, modularity and reusability of design blocks.



Post-CMOS cleanroom at the Fraunhofer ISIT in Itzehoe © Fraunhofer ISIT

As part of the APECS pilot line, the R&D infrastructure for semiconductor technologies and applications will be further expanded in the coming years.© loewn | Bernhard Wolf

Post-CMOS pressure sensor chiplets with wafer-level packages before their separation. © Fraunhofer ISIT



European partner of the APECS pilotline © FMD

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