



New EU initiative INFRACHIP to accelerate the development of emerging semiconductor chips through technology access, support, and training.

February 7th, 2024

The project INFRACHIP obtained the support of the European Union, in the framework of the HORIZON Europe funding programme on Research and Innovation actions. This ambitious project will facilitate access to state-of-the-art technologies in the field of semiconductors to accelerate research and innovation and respond to challenges in line with the goals set out by the EU Chips Act.

The European Union has enacted a comprehensive set of measures to strengthen the EU's semiconductor ecosystem through the European Chips Act which entered into force on 21st of September 2023. The proposed actions include investments in next-generation technologies, greater access across Europe to design tools and pilot lines for the prototyping, testing and experimentation of cutting-edge chips, and furthermore, the fostering of skills, talent and innovation in microelectronics. These are crucial for Europe to strengthen EU's R&I capacity as a globally competitive player in semiconductor technologies.

In this context, a consortium of fourteen partners led by Tyndall National Institute launched the INFRACHIP project.

INFRACHIP is **to implement the first integrated, distributed research infrastructure as a wider European research platform for the sustainable development of next-generation and future semiconductor chips**. Running for a planned period of 4 years, INFRACHIP will provide guidance and access to its users, mobilising a critical mass of people. INFRACHIP will provide access to knowledge and technology blocks through leading experts. INFRACHIP addresses the need of capital investment in state-of-the-art equipment to address the EU's twin digital and green transition and ensure Europe's capacity to innovate at the early to medium technology readiness levels.

INFRACHIP builds on existing RI communities, namely ASCENT+ on Nanoelectronics, EMERGE on Sustainable Flexible Electronics and EnABLES on Powering the Internet of Things (IoT). It aims at advancing the state-of-the-art, by supporting comprehensive user projects for multi and trans-disciplinary path-finding research on sustainable Information and Communications Technologies (ICT) driven by the secure edge.

These challenge-driven projects will target the introduction of new materials, proof-of-concept and feasibility studies of new manufacturing processes or disruptive technologies.

To **accelerate the translation of results from the lab to the fab**, INFRACHIP will channel project activities to Testing and Experimentation Facilities, European Digital Innovation Hubs and Pilot Lines. It will also **develop talent and train a skilled workforce through its Research Accelerator Programme and additional hands-on courses** and education resources to support early career innovators and the semiconductor industry.

As a whole, INFRACHIP will significantly contribute to research and innovation on capacity within the objectives of the European Chips Act.

Consortium members



Tyndall National Institute, INFRACHIP project coordinator.

Tyndall is a leading European deep-tech research centre in integrated ICT (Information and Communications Technology) materials, devices, circuits and systems and a research flagship of University College Cork. Tyndall is Ireland's largest Research and Technology Organisation (RTO) specialising in both electronics and photonics. Tyndall works with industry and academia to transform research into products in its core market areas of electronics, communications, energy, health, agri-food and the environment. With a network of over 200 industry partners and customers worldwide, Tyndall is focused on delivering human and economic impact from excellence in research. Tyndall is home to a multidisciplinary research community of over 600 people of 52 nationalities, including over 160 postgraduates.

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Hellenic Mediterranean University, Institute of Emerging Technologies (i-EMERGE)

HMU Research and Innovation Center was established in 2019, aiming to create a one-stop research facility housing all the HMU scientific & technological disciplines through six research Institutes. Its mission is to perform forefront research and, to promote innovation and competitiveness for the benefit of society.

i-EMERGE is a multidisciplinary research institution focusing on frontier science and technology of cutting-edge materials and production processes with the potential to enable sustainable technologies to enhance citizens quality of life with economic benefits. There are currently three research divisions: Nanotechnology and Printed Electronics; 3D-Printing and Additive Manufacturing; 5G and Internet of Things applications, each of critical mass, which embrace the full spectrum from fundamental science to applied engineering. The Nano@HMU division is dedicated to revolutionizing printed electronic and

energy devices, such as photovoltaics, humidity sensors, pressure sensors, photodetectors and memristors for complex neuromorphic computations.

Find out more: <https://nanohmu.gr/>



NCSR - National Center For Scientific Research "Demokritos"

NCSR "Demokritos" is the largest research organisation in Greece comprises six Institutes: the Institute of Nanoscience and Nanotechnology (INN), the Institute of Nuclear Science and Particle Physics, the Institute of Biological Applications, the Institute of Information and Telecommunications and the Institute of Radiological protection, Energy and Safety and the Institute of Quantum Computing and Quantum Technology. INN is the largest ICT research institute (80 researchers) with research priorities in the areas of Micro Nano Systems, Photonics and Microsystems. INN addresses topics in 5 KETs (Key Enabling Technologies): Nanotechnology, Advanced materials, Micro- and nano-electronics, Photonics, and Advanced Manufacturing Technologies.

NCSR has extensive fabrication cleanroom facilities (Nanotechnology & Microsystems Laboratory, NML) in nanoelectronics (Si, 2D materials), photonic devices and MEMS, which are fully supported by extensive test and characterization facilities at a single site.

Find out more: <https://www.demokritos.gr/>



CNRS: FMNT - Micro and Nanotechnology Federation

FMNT is a research federation of the French National Research Centre (CNRS) grouping together seven laboratories (> 300 researchers) in the Grenoble area, with major research activities in microelectronics and micro-nanotechnologies. The research activities within the FMNT are structured around five strategic axes: microelectronics, components and systems for telecommunications, integrated measurement devices, components and systems for bio & health, materials and components for energy. Through its laboratories, the FMNT has important human resources and facilities. Some of this equipment are pooled in a dedicated platform named OPE)N(RA relating to functional characterization of materials and devices.

OPE)N(RA allows addressing electrical characterizations, for some combined with measurements under magnetic field (0 - 9T), mechanical stress (for MEMS/NEMS applications), temperature (2K - 1000K). Electrical characterizations sweep the frequency ranges from DC to a few hundred GHz. Some equipment is very low noise, others allow to work with controlled light source. Some of these

equipments can accommodate 300 mm or 200 mm wafers or smaller scale devices. Anechoic chambers are dedicated to equipment for telecom applications. A wide range of equipment is also dedicated to photonics through characterization or prototyping and packaging. Other peripheral facilities are also available for a more material oriented analysis (Raman, XPS, ellipsometer...).

Find out more: <https://fmnt.fr/>



UNINOVA - Instituto de Desenvolvimento de Novas Tecnologias

UNINOVA is a R&D institute organised in centres of excellence, involving >200 researchers, participating in this EU infrastructure through the Center of Excellence in Microelectronics, Optoelectronics and Processes (CEMOP). CEMOP integrates the Institute for Nanostructures, Nanomodelling and Nanofabrication (i3N, www.i3n.org), an Associated Laboratory since 2006 and one of the leading Portuguese institutions in the area of nanoscience and nanotechnology. The institute is strongly committed to UN 2030 Agenda for Sustainable Development and its activities are in line with the EU Green Deal approach, taking nanotechnologies and advanced functional materials to a broad range of cross-cutting fields, seeking to enhance the quality of life and to achieve sustained economic and citizens benefits.

R&D follows 4 main thematic areas: Sustainable Micro and Nanofabrication; Green and Clean Energy Systems; Nanomaterials Engineering and Functional Interfaces; Biomedical devices and systems. For more than 25 years CEMOP has been coordinating and participating in several national and international projects with academia and industry, in the field of optoelectronic sensors, biosensors, solar cells, thin-film transistors and integration of such components. In these R&D activities, CEMOP researchers have been exploring materials and processes away from silicon to conceive devices and systems on rigid or flexible substrates.

Find out more: <https://www.uninova.pt/>



INL - International Iberian Nanotechnology Laboratory

The International Iberian Nanotechnology Laboratory (INL), located in Braga, Portugal, is home to a micro- and nanofabrication facility that is the largest in Portugal for research and includes some of the most advanced instrumentation on the Iberian Peninsula. The core of the fabrication facility is housed in a 1200 m² cleanroom: Class 100 in the lithography bays and Class 1000 in the other areas. The unique combination of tools and expertise for deposition, patterning, and etching of a broad range of materials enable extensive in-house capabilities for producing electronic, magnetic, optical, or MEMS devices as well as various “hybrid” combinations, e.g., MEMS structures functionalized with magnetic sensors or optomechanical MEMS devices. All of these fabrication processes are implemented at 200-mm wafer scale. Additional heterogeneous integration capabilities include structures that combine bottom-up and top-down methods for (self)organisation and patterning of nanomaterials and

nanostructures. These fabrication capabilities are supported by in-house expertise on process design and integration as well as by a comprehensive suite of nanocharacterisation instruments and expertise, where the electron microscopy and spectroscopy facility plays a key role with 7 pieces of equipment (including SEM, TEM/STEM, DualBeam FIB-SEM or XPS).

Find out more: <https://inl.int/>



JOANNEUM RESEARCH - MATERIALS (Institute for Sensors, Photonics and Manufacturing Technologies)

JOANNEUM RESEARCH is a successful national and internationally active research institution owned by the Austrian federal states of Styria, Carinthia and Burgenland. Ideally embedded in the national and international innovation network, our researchers innovate in three high-level fields of expertise: “Information and Production Technologies”, “Human Technologies and Medicine”, and “Society and Sustainability”. At our seven institutes we use our ideas, innovative power and considerable research experience to support companies both private and public not only with the development of technology, methods and products, but also with societal topics.

JOANNEUM RESEARCH’s institute MATERIALS, located in Weiz, has long standing experience in managing a wide range of research cooperation, thus enabling the clients to successfully participate in national and international funded research projects. The team of around 90 researchers provides interdisciplinary solutions across the entire value chain – from the idea to the prototype – using cutting edge technologies and methods based on miniaturisation, integration and materials optimisation. Combined with state-of-the-art fabrication facilities and characterisation infrastructure, MATERIALS offers innovative solutions and services tailored to the needs of business and industry. The institute runs a 150m² ISO14644 certified class 6 cleanroom, equipped with e-beam-lithography, photolithography and reactive ion etching. MATERIALS provides access to the latest technologies required for implementing innovative products and services

Find out more: <http://www.joanneum.at/materials>



CHALMERS
UNIVERSITY OF TECHNOLOGY

Myfab Chalmers, Chalmers University of Technology

Chalmers University of Technology conducts research and offers education in technology, science, shipping and architecture, with a sustainable future as its global vision. Chalmers is well-known for providing an effective environment for innovation and has eight priority areas of international significance – Built Environment, Energy, Information and Communication Technology, Life Science, Materials Science, Nanoscience and Nanotechnology, Production, and Transportation. Situated in Gothenburg, Sweden, Chalmers has 11,000 full-time students and 3,000 employees. Chalmers is the

host of Myfab the national research infrastructure for micro and nano fabrication. Myfab has cleanroom nodes at Chalmers, The Royal Institute of Technology, Lund University, and Uppsala University.

The local node, Myfab Chalmers, offers a broad platform for micro- and nanofabrication with approximately 190 tools in operation in our 1250 m² cleanroom facility. Two especially strong areas of expertise are in microwave- and photonic components and quantum components. Both areas rely on the strength and strong heritage within nanolithography. The staff consists of technicians, research engineers and senior research engineers, in total 21 persons. The cleanroom staff is responsible for the service and maintenance of the whole infrastructure including the facility. The infrastructure is used by more than 200 individuals annually, approximately 85 % come from academia and 15 % come from industry. The infrastructure is in the middle of a five year long reinvestment period where we invest approximately 175 MSEK in 34 new tools, where half of them replace outdated tools and the other half provide new techniques and capabilities.

Find out more: <https://www.chalmers.se/en/infrastructure/myfab-chalmers>



AMO GmbH

The research foundry AMO GmbH is a non-profit SME specialising in R&D for micro- and optoelectronic applications. AMO acts as a pathfinder for innovative technologies for nanoelectronics and nanophotonics applications for the German and European industry. The mission is to demonstrate innovative technologies and to introduce new materials, including their implementation in novel device architectures, prototyping and small volume fabrication. A broad base of advanced semiconductor process technologies is available.

As a research-oriented company, AMO efficiently closes the gap between university research and industrial applications. For this purpose, AMO identifies those topics from basic research that seem particularly suitable for industrial implementation and demonstrates these in application-oriented technology. In parallel to applied research, AMO engages in ground-breaking research in several FET Open and similar low TRL projects that lay the foundation for high TRL research and transfer to larger industry at a later stage.

One of the main activities at AMO falls within research on More Moore and Beyond CMOS devices in cooperation with leading European academic and industrial partners. The current focus lies on electronic and opto-electronic devices based on two dimensional materials. The strength of AMO lies in the implementation and demonstration of novel devices and architectures at a prototype level. The team has long-standing expertise in nanoelectronic devices, from nanowire / FinFETs to ultra-thin body SOI. Research on new material has led to the demonstration of high-k / metal gate integration. In recent years, AMO has become a global player in 2D materials research for electronics and photonics.

Find out more: <https://www.amo.de/en/>



Warsaw University of Technology

Centre for Advanced Materials and Technologies
CEZAMAT

Warsaw University of Technology and Centre for Advanced Materials and Technologies CEZAMAT

Warsaw University of Technology (WUT) is the largest and one of the best universities in Poland involved in scientific and research activities in applied science in nearly all technical areas. Research and development work conducted at WUT meets the challenges of modern science and the economy. Centre for Advanced Materials and Technologies CEZAMAT of Warsaw University of Technology is one of the greatest investments in Poland in the area of high technologies. CEZAMAT addresses topics in 5 KETs (Key Enabling Technologies): Nanotechnology, Advanced Materials, Micro- and Nano-electronics, Photonics, and Advanced Manufacturing Technologies.

CEZAMAT is a unique research centre that enables interdisciplinary research on future-oriented materials and technologies. The main goal of CEZAMAT is to provide a platform that will integrate the research community and enable the development of interdisciplinary research. CEZAMAT collaborates with Polish and international scientific communities and companies that use innovative technologies and products. The laboratories of CEZAMAT are the most advanced and the largest of their kind in Poland. These laboratories include almost 4000 m² of cleanroom space (suited for both semiconductor and bio-oriented research).

Centre for Advanced Materials and Technologies CEZAMAT of Warsaw University of Technology is carrying out R&D in nanotechnology, biotechnology, printed electronics, microelectronics and photonics, emphasizing novel nano-electronic sensors and devices, energy harvesters and photonic integrated circuits. The state-of-art laboratories of CEZAMAT allow the development of new marketable technologies with commercial potential, which are supposed to contribute to economic development. WUT-CEZAMAT is a member of European associations: EPoSS, AENEAS.

Find out more: <http://www.cezamat.eu/>



SiNANO Institute

The SiNANO Institute is the European Academic and Scientific Association for Nanoelectronics, acting as a network of excellence connecting the European Research and Academic community in semiconductor science and technologies. It gathers 26 academic/RTO and members in the area of fabrication, characterization, modelling, design and simulation of emerging nanoelectronic materials, devices, circuits and systems from 16 European Countries. Recently, 22 deeptech Start-ups were connected to SiNANO community.

The SiNANO Institute was established in 2008 following the request of the European Commission at the end of the very successful Network of Excellence SiNANO. Since then, its mission is to secure the future of European semiconductor science and technology by mobilising and nurturing the European

Research and Innovation community, promoting and strengthening synergies in the field through our membership, accelerating the translation of excellent research into European knowhow, technologies, and products together with our start-ups and industrial partners, ensuring the pipeline of talented researchers and the growth of skilful talent in an inclusive and diverse environment with equal opportunities for all. In this framework, the SiNANO Institute organizes large-scale events, specialised workshops, webinars, Summer Schools and dedicated Young Researchers events.

Members of the Institute are particularly exploring disruptive science and technology aspects to identify the most promising topics for future ICT and speed up technological innovation. Activities from More Moore, More than Moore, Beyond CMOS, covering Sustainable Electronics, Smart Systems and System Design are sound competences of the SiNANO Institute's members.

The SiNANO Institute is also organizing international Workshops and Conferences to develop high competence levels in Europe, and participating in roadmap definition. In this respect, the Sinano Institute is the European representative of IRDS "International Roadmap for Devices and Systems". SiNANO plays an important role in structuring European programmes and nurturing synergies in the European ecosystem. In collaboration with Research Institutes and Industry, SiNANO strengthens the overall innovation efficiency of the European research in Nanoelectronics.

SINANO has started to integrate the spin offs of its members to complete the innovation value chain of the SINANO Institute ecosystem – from renown universities and academic departments to mid-size research and technology infrastructures (Tyndall, VTT, INL, ...) and to the start-ups/SMEs innovators. The SiNANO Institute ambition is to act as the early-stage research platform that fosters the next generations of Key Digital Technologies.

Find out more: <https://www.sinano.eu/>



Minalogic

Founded in 2005, the Minalogic Auvergne-Rhône-Alpes innovation cluster is the driving force behind digital transformation, serving the strategic challenges of reindustrialization, national sovereignty, and sustainable development.

With offices in Grenoble, Lyon, Saint-Etienne and Valence, Minalogic drives an ecosystem of nearly 500 members that includes more than 420 innovative companies from across the region that cover the entire digital technology value chain. Minalogic's members also include 20 research and training organizations (bringing together more than 150 laboratories), local government, banks and investors to sustain a unique network dedicated to innovation in digital technologies.

Minalogic helps all of its stakeholders make business connections through targeted, qualified introductions and create opportunities to innovate and grow at the national, European, and international levels.

Drawing on the recognized expertise of its team, Minalogic's services are based on three complementary missions:

- animating a regional innovation network on an international level,

- supporting innovation projects
- and valorizing the technological expertise of its ecosystem.

Since 2005, the cluster has certified and helped secure financing for 885 projects for a total of €1.14 billion in government funding and a total R&D investment of more than €2.7 billion. With a network of over 20,000 active contacts, the cluster has initiated nearly 3,000 targeted contacts and 12,600 B2B meetings since its creation.

Find out more: <https://www.minalogic.com/>



Silicon Saxony

With more than 500 members, Silicon Saxony is the largest high-tech network in Saxony and one of the largest microelectronics and IT clusters in Germany and Europe. Since its foundation in 2000, Silicon Saxony has been a self-financed association linking manufacturers, suppliers, service providers, universities, research institutes, public institutions as well as industry-relevant start-ups in Saxony and beyond. The cluster's focus is on technological trends of the present and future - e.g. artificial intelligence, robotics, automation, internet of things, sensors, energy efficiency as well as neuromorphic and edge Computing. As a high-profile information, communication and cooperation platform, the association promotes the regional, national and international networking of its members by participating in and organizing industry events. Moreover, Silicon Saxony is one of the founding partners of Silicon Europe - an alliance of twelve European clusters for advanced electronics and software technologies. Since 2012, the network bears the GOLD label for excellent cluster management by the European Cluster Excellence Initiative (ECEI).

Find out more: <https://silicon-saxony.de/en/>