PRESS RELEASE

July 19th 2024

Release of two important ICOS reports for the study of international semiconductor cooperation

The ICOS – International Cooperation on semiconductors – project, started on January 2023, aims at providing a comprehensive analysis of the semiconductor landscape in Europe and leading semiconductor countries, identifying areas for potential cooperation and proposing opportunities for bilateral or multilateral research collaborations. By depicting the geopolitical landscape of the current international semiconductor chessboard, two newly published reports provide in-depth insights into the challenges that stakeholders must address to strengthen semiconductor industries.

The report on "Economic analysis of the EU and International semiconductor ecosystem" coordinated by DECISION Etudes & Conseil, provides a unique semiconductor economic landscape analysis in the EU27 but also eight key countries: the US, Japan, South Korea, Taiwan, China, India, Singapore, and Malaysia. It gives a special attention to the overall environment, highlighting strategic objectives, covering not only the semiconductor markets of these countries, but also the production in terms of location of employees, factories, and market shares of companies by ownership nationality, international trades, overview of key investments, strategies, and policies from governments.

Additionally, the report includes an analysis of the positioning of the EU and the other ICOS countries within the semiconductor-based photonics ecosystem. This analysis covers the entire semiconductor value chain, from raw materials to equipment and manufacturing, across the family of semiconductor products, from advanced processors to innovative functionalities, and across end-user segments, detailing the strengths and weaknesses of semiconductor countries.

The goal was to portray the current situation in semiconductors, to identify the EU's economic and industrial strengths and weaknesses, strategic dependencies, market opportunities and opportunities for cooperation.

The White Paper "Generic Challenges and International Cooperation in the Semiconductor Field – A European Perspective" coordinated by Ghent University, outlines 15 key challenges of the semiconductor field and the main risks they pose to industry development: Manufacturing Fabs, Process Flow, Foundry Access, Second Source, Disruption, Competition, Workforce, R&D Capability, IP Core, Supply Chain Goods, Supply Chain Services, Investment, Export restrictions, Environmental Impact and Social and Governance.

For each challenge, the report discusses the main attributes of the challenge and proposes modalities of international cooperation to address them and mitigate the challenge. It provides a complete analysis of the areas where Europe needs to improve and enhance its competitiveness in the

international scene. The deliverable also prioritizes these challenges based on a survey conducted among European experts, with the results available at the end of the paper.

The whitepaper is written from a European perspective, but, as a result of the generic nature of the approach, its findings have a relatively universal significance. Furthermore, the report may act as a source of inspiration to international stakeholders in the semiconductor field.

These two reports are publicly available on the ICOS website on https://icos-semiconductors.eu/public-reports/. As a part of the ICOS project, they will foster further collaboration with key international stakeholders and help the European Union in shaping its strategy toward the semiconductor industry.

This project has received funding from the European Union's Horizon Europe research and innovation programme under Grant Agreement No 101092562.

About the ICOS Partners

Grenoble INP-UGA, Coordinator of ICOS is one of Europe's leading technology universities, at the heart of innovation from more than a century. It is involved in major development projects such as Minalogic (micro and nanotechnology and embedded software) and TEneRRDIS (renewable energy) industrial clusters.
Grenoble INP also coordinates several Horizon Europe research projects. Lifelong learning is a touchstone of Grenoble Institute of Engineering and Management, from bachelor's degree to ongoing professional development.
8 engineering and management degree courses are on offer in key engineering and management sciences and Grenoble INP also runs masters and doctorate schools. With its solid combination of teaching, research and business promotion, Grenoble INP plays a key role in making Grenoble one of the most attractive scientific and industrial locations worldwide.

More on http://www.grenoble-inp.fr/welcome/

The SiNANO Institute, Technical Coordinator of ICOS is the European Academic and Scientific Association for Nanoelectronics, gathering 27 renown Universities and Research Centers from 16 European countries. Sinano carries out a role of representation and coordination of the associated Organizations in order to strengthen the impact of the research activities at EU level in this very important field for many future applications and markets.
Members of the Institute are particularly exploring disruptive science and technology aspects for long term applications 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 to Smart Systems and System Design are sound competences of SINANO.
SINANO 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 European structuring and programs, in collaboration with Research Institutes and Industry, and strengthens the overall efficiency of the European research in Nanoelectronics.

More information on: www.sinano.eu

Imec is a world-leading research and innovation center in nanoelectronics and digital technologies. Imec leverages its state-of-the-art R&D infrastructure and its team of more than 5,000 employees and top researchers, for R&D in advanced semiconductor and system scaling, silicon photonics, artificial intelligence, beyond 5G communications and sensing technologies, and in application domains such as health and life sciences, mobility, industry 4.0, agrofood, smart cities, sustainable energy, education, … Imec unites world-industry leaders across the semiconductor value chain, Flanders-based and international tech, pharma, medical and ICT companies, start-ups, and academia and knowledge centers. Imec is headquartered in Leuven (Belgium), and has research sites across Belgium, in the Netherlands and the USA, and offices in China, India, Taiwan and Japan.

More information on: www.imec-int.com.

The National Interuniversity Consortium for Nanoelectronics (IU.NET) consists of 13 Italian Universities active in the field of Electronic Technologies and, in particular, physics, modeling, characterization, design and reliability of micro- and nano-electronic components for digital and analog applications, optoelectronic and power devices, sensors and biosensors, renewable energy production facilities, energy harvesting and energy storage. The consortium units are the Politecnici of Milan and Turin and the Universities of Bologna, Calabria, Catania, Ferrara, Modena and Reggio Emilia, Padua, Perugia, Pisa, Rome "La Sapienza" and Udine, Bozen and Venice.
IU.NET has the statutory purpose of promoting research in its various application areas, and acts as a support structure for Associated Universities, coordinating the promotion and implementation of research projects with high innovative content. In conducting European and national projects, IU.NET acts as a unified interface of the Italian Universities, involving from time to time those units with demonstrated competence in the project's themes, and taking care of the scientific and administrative reporting of the activities carried out. The Consortium also organizes every two years courses of advanced training in the Bertinoro conference facility.

More information on: http://www.iunet.info/index_eng.htm.

CEA-Leti, a technology research institute at CEA, is a global leader in miniaturization technologies enabling smart, energy-efficient and secure solutions for industry. Founded in 1967, CEA-Leti pioneers micro-& nanotechnologies, tailoring differentiating applicative solutions for global companies, SMEs and startups. CEA-Leti tackles critical challenges in healthcare, energy and digital migration. From sensors to data processing and computing solutions, CEA-Leti's multidisciplinary teams deliver solid expertise, leveraging world-class pre-industrialization facilities. With a staff of more than 1,900, a portfolio of 3,100 patents, 11,000 sq. meters of cleanroom space and a clear IP policy, the institute is based in Grenoble, France, and has offices in Silicon Valley and Tokyo. CEA-Leti has launched 70 startups and is a member of the Carnot Institutes network.
CEA has a key role in transferring scientific knowledge and innovation from research to industry. This high-level technological research is carried out in particular in electronic and integrated systems, from microscale to nanoscale. It has a wide range of industrial applications in the fields of transport, health, safety and telecommunications, contributing to the creation of high-quality and competitive products.

More information on: www.cea.fr/english

Tyndall National Institute is a key R&D player in the European semiconductor research and ICT ecosystem, addressing electronics and photonics technologies across the value chain – from materials and devices to circuits and systems. Tyndall operates under a unique Agreement between the Irish Government and University College Cork (UCC). Tyndall is Ireland's research flagship in ICT, with a multidisciplinary community of over 600 researchers, engineers and support staff, of 52 different nationalities, including more than 150 full-time postgraduate students. With a network of over 200

industry partners and customers worldwide, we are focused on delivering real impact from our excellent research. We are a major research partner for many of the largest semiconductor companies in Ireland and we also serve a wide base of smaller indigenous enterprises who avail of Tyndall's specialist infrastructure and technical expertise. Tyndall has been involved in technology foresight and strategic road mapping through participation in several CSAs, EC consultations and active engagement in research and industry groups for key digital technologies and enablers.

The Fraunhofer Gesellschaft based in Germany is a world's leading applied research organization. Prioritizing key future-relevant technologies and commercializing its findings in business and industry, it plays a major role in the innovation process. A trailblazer and trendsetter in innovative developments and research excellence, it is helping shape our society and our future. Founded in 1949, the Fraunhofer-Gesellschaft currently operates 76 institutes and research units throughout Germany.
The two Fraunhofer institutes, EMFT and IISB, taking part in ICOS belong to the "Research Fab Microelectronics Germany", FMD. As a One-Stop-Shop, FMD combines the scientifically excellent technologies, applications and system solutions of the cooperating institutes into a overall offer in the field of micro- and nanoelectronics.
The Fraunhofer Institute for Integrated Systems and Device Technology IISB conducts applied research and development in the fields of micro- and nanoelectronics, power electronics, and mechatronics. The Fraunhofer Institute for Microsystems and Solid-State Technologies EMFT is regarded among the global leaders in microsystems technologies, explicitly in interconnect technologies for 3D integrated heterogeneous microelectronic systems, including quantum computing devices (EMFT is key partner in Munich Quantum Valley).

AENEAS is an Industry Association, established in 2006. The purpose of the association is to promote Research, Development and Innovation (RD&I) in order to strengthen the competitiveness of European industry across the complete Electronics Components and Systems (ECS) value chain. AENEAS provides unparalleled networking opportunities, policy influence & supported access to funding to all types of RD&I participants in the field of micro and nanoelectronics-enabled components and systems, and its applications. Member of the KDT JU, AENEAS has also a long track record operating the EUREKA funded programmes, currently Xecs, PENTA and EURIPIDES and previously CATRENE.

VDI/VDE Innovation + Technik GmbH is a leading service provider for issues related to innovation and technology. We support and advise during the analysis of complex projects or market situations, during the promotion of research programmes from the German federal government, the German state governments and the EU and organise branch offices or contact offices for research and business. As the project sponsor, we offer the suitable solution for every step of the innovation process.

We work both domestically and abroad for our customers from politics, research, industry and finance. More than 800 employees cooperate in multi-national and interdisciplinary teams. With a total of 10 divisions and nine cross-sectional divisions, we cover a broad-based content spectrum and have at our disposal highly-qualified experts from the natural sciences, engineering, social sciences and business management.

Delft University of Technology (TU Delft) is the oldest and largest Dutch public technical university. With eight faculties and numerous research institutes, it has more than 27,000 students (undergraduate and postgraduate) and 6600 employees (teaching, research, support and management staff). Through the mission 'Impact for a better society' TU Delft creates collaborations with industry, governments and knowledge institutions. We believe that multi-party collaborations are the key to accelerating innovations and bringing them to society faster. The Faculty of Electrical Engineering, Mathematics and Computer Science (EEMCS) focuses on developing novel, sometimes revolutionary, engineering solutions and technologies. Themes are broad, spanning health and well-being, the energy transition, the transition of our digital society, communication and sensing, IoT, artificial intelligence and unconventional computing/quantum technologies. The Electrical Engineering Departments focus on architectures and targets the invention, design, prototyping and demonstration of disruptive accelerators/engines by making use of unique features of emerging devices. TU Delft closely works with QuTech, performs strong interdisciplinary research on the full stack of quantum computing to enable the design, fabrication and the demonstration of quantum processors and their potential.

DECISION is a market research and strategic consulting company recognized at the EU level as the reference in the study of the electronics value chain, from components to systems. For 30 years, DECISION provides its expertise in the following domains: Electronic components, electronics systems and applications, Electrical engineering through digital (Electric power, electrical equipment, Smart Factory / Industry 4.0), renewable energy sources and systems, sustainable development and Aerospace, Defence & Security industries. Analyses are carried out at the world level with data for all regions: Europe, North America, Japan, China, etc.
DECISION is currently involved in two EU projects: The European Chips Skills Academy (ECSA), aiming at assessing the needs of the European microelectronics industry in terms of skills, and ICOS (International Cooperation On Semiconductors).
DECISION's clients include the European Commission, National Government Bodies, Industry Associations, Industrials and financial institutions (due diligence, etc.).

VTT is one of Europe's leading research institutions. We are owned by the Finnish state. VTT activities are focused on three areas: Carbon neutral solutions, Sustainable products and materials, and Digital technologies. VTT is impact-driven and takes advantage from its wide multi-technological knowledge base to strengthen Finnish and European industrial competitiveness. VTT can combine different technologies, produce information, upgrade technology knowledge, and create business intelligence

and value added for its stake holders. We advance the utilisation and commercialisation of research and technology in commerce and society.
Advanced micro- and nanoelectronics are at the core of tomorrow's technology. VTT's world-class research infrastructure enables innovation, design, prototyping and characterisation of micro- and nanoelectronic components as well as small scale manufacturing. At VTT, we support our customers from the early innovation stage all the way to small-scale manufacturing and technology transfer. Our experts help you develop your next-generation solutions and bring them to market.
VTT's micro- and nanoelectronics research infrastructure supports the entire research and development cycle of technologies such MEMS, optical MEMS, hyperspectral, integrated photonics, 2D materials, piezo materials as well as superconductive and semiconductor technologies.

More information on: www.vttresearch.com

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 carrying out R&D in nanotechnology, biotechnology, microelectronics and photonics, emphasizing novel nano-electronic sensors and devices, energy harvesters and photonic integrated circuits based on Si, SiN, Ge for visible and MIR range. The state-of-the art laboratories of CEZAMAT allow to carry out new marketable technologies with commercial potential which are supposed to contribute to economic development. CEZAMAT is a 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 on modern materials and technologies. WUT-CEZAMAT is a member of European associations: EPoSS, AENEAS. WUT has participated in international and European framework programmes related to semiconductor technologies.

National Institute for R&D in Microtechnologies (IMT-Bucharest) is a non-budgetary public research unit, established in 1996 and supervised by the Romanian Ministry of Research, Innovation and Digitalisation. The institute is structured in 4 R&D centres, grouping 11 laboratories specialized in the following areas: Microsystems for biomedical and environmental applications; Nanobiotechnology; Molecular nanotechnology; Micro-nano photonics; Micromachined structures, microwave circuits and devices; Simulation, modelling, micro-and nano-fluidics; Reliability. IMT employs 200 people with differing expertise in the fields of electronics, computer science, physics, chemistry, and biology.
Being an internationally competitive organisation, IMT has been involved in world class research in the fields of micro- and nanoelectronics, photonics, micro-nano-systems (MEMS, NEMS, MOEMS, RF-MEMS, MNBS), micro and nano-fabrication technologies and new materials. IMT cooperates also with SMEs and academia through R&I, knowledge transfer and technology transfer projects, and direct service contracts. IMT hosts and coordinates the "Science and Technology Park in Micro and Nanotechnologies-MINATECH-RO" and a Technology transfer center, both facilitating the interaction

with end users. IMT is actively participating in European Programmes related to semiconductor technologies with applications in environment, health, space, security, etc.

Ghent University is a top 100 university and one of the major Belgian universities counting over 41,000 students and 9,000 employees. Located in Flanders, Ghent University is an active partner in national and international educational, scientific and industrial cooperation. The Photonics Research Group (PRG) of Ghent University hosts ePIXfab, and it will perform the activities of Ghent University in the ICOS project. ePIXfab is an open non-profit alliance of academic and industrial organizations with a mission to promote silicon photonics science, technology, and applications in Europe and the world. ePIXfab acts as a catalyst for European academia and industry to strengthen the worldwide silicon photonics ecosystem. ePIXfab was founded in Europe by the team of prof. Roel Baets in 2006. It provided the world's first MPW service for silicon photonics. After handing over its MPW operations to Europractice IC in 2015, ePIXfab continued supporting European organizations in their ambition to strengthen the global silicon photonics supply chain. The Photonics Research Group of Ghent University, which hosts ePIXfab, has 11 professors and over 70 research staff in the Faculty of Engineering and Architecture, in the department of Information Technology. The group focuses its research on silicon photonics, with an emphasis on heterogeneous integration, new materials, and design methodologies for a wide range of applications. The group is associated with imec.

The BOSCH Group, divided into 4 business sectors: Mobility Solutions, Industrial Technology, Consumer Goods, and Energy and Building Technology, is the largest manufacturer of micromechanical products and one of the largest automotive semiconductor manufacturers in Europe.

Infineon Technologies AG is a global semiconductor leader in power systems and IoT. Infineon drives decarbonization and digitalization with its products and solutions. The company has around 56,200 employees worldwide and generated revenue of about €14.2 billion in the 2022 fiscal year (ending 30 September). Infineon plays a key role in cloud connectivity, speech recognition, gesture control, and 3D augmented/virtual reality technologies. Infineon's security solutions use innovative encryption technologies to safeguard identities and data. In the IoT, they ensure that devices and services can be reliably authenticated. Infineon sensors, microcontrollers, and security ICs enable a host of comfort and convenience features while securely and intelligently connecting vehicles. Semiconductors from Infineon are used to generate electricity effectively from solar and wind sources. They also enable energy to be transmitted with almost no losses.

NXP Semiconductors Netherlands BV. NXP Semiconductors enables secure connections for a smarter world, advancing solutions that make lives easier, better, and safer. As the world leader in secure connectivity solutions for embedded applications, NXP is driving innovation in the automotive, industrial & IoT, mobile, and communication infrastructure markets. Built on more than 60 years of

combined experience and expertise, the company has approximately 29,000 employees in more than 30 countries and posted revenue of $11 billion in 2021.

More information on: www.nxp.com

STMicroelectronics employs 48,000 people to create and make semiconductor technologies, mastering the semiconductor supply chain with state-of-the-art manufacturing facilities. An integrated device manufacturer, ST works with more than 200,000 customers and thousands of partners to design and build products, solutions, and ecosystems that address their challenges and opportunities, and the need to support a more sustainable world. ST's technologies enable smarter mobility, more efficient power and energy management, and the wide-scale deployment of the Internet of Things and connectivity. ST is committed to becoming carbon neutral by 2027.

More information on: www.st.com

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