Peter Ramm
Fraunhofer Institute for Electronic Microsystems and Solid State Technologies EMFT

Implementation of Applied R&D and European Activities in the „Chips Act Age“
Fraunhofer-Gesellschaft

At a Glance

Applied research organization prioritizing key future-relevant technologies and commercializing its findings in business and industry. A trailblazer and trendsetter in innovative developments and research excellence.

30,000 staff

76 institutes and research units

Finance volume

€2.9 billion

Major infrastructure capital expenditure and defense research

€2.5 billion

Almost 30% is contributed by the German federal and states Governments

More than 70% is derived from contracts with industry and from publicly financed research projects.

2021
From Fraunhofer R&D
Highlights

- mp3 Development of audio compression
- Care-O-Bot Service robot capable of reliable human-machine interaction
- Lab-on-a-Chip-System Biological and microelectronic components and one chip
- White light LED For energy efficient and long-lasting lighting
- Video compression H.264/MPEG-4 AVC standards for multimedia
- Femtosecond Laser World record for powerful ultrashort pulse laser
- Bionic Handling Assistant Robotic gripper inspired by an elephant trunk
- Surgery with Augmented Reality Mobile image-based assistance for safety in complex surgery
- Industrial Data Spaces IT architecture for a secure and self-determined data exchange
- CAR-T Cells for Cancer Therapy Process for the complex production of the cell product
- Rubber from Dandelion Plants Doubling the rubber content in dandelion for industrial applications
- World’s Smallest Pump 25 mm² micro membrane pump
- Highly Secure Quantum Net German pilot network for interception- and tamper-proof data transmission
- AI-Speech Assistant Data sovereignty with smart speaker Made in Germany
- H₂-Technologien Materialien, Systeme und Produktionstechnologie für eine nachhaltige H₂-Wirtschaft

1990s 2000s 2010s 2020s
13 institutes from Fraunhofer and Leibniz

Investment of EUR 350 million for infrastructure and future developments

Our foreign partners come from 38 countries in the world, 21 of which are in the EU

In 2021, we worked together with almost 1000 companies, 531 of which were from abroad

563 Mio FMD Budget
204 Mio EUR industrial revenues

27.7% female quota

Approx. 4500 employees with 2635 scientists

19.500 m² cleanroom space with ISO9001 certification; 1 MES over 10 institutes

Over 2200 equipment in 13 cleanrooms all over Germany
European Pilot Line: Test and Experimentation Facility for Edge AI Components and Systems (TEF HW AI)

PREVAIL

(Partnership for Realization and Validation of AI hardware Leadership)

PREVAIL brings together CEA-Leti, Fraunhofer, imec and VTT to establish a networked 300mm technology platform for the fabrication of chip prototypes.
PREVAIL – Open Access Pilot Line for Edge AI Chip Prototyping

Funded by the European Commission
PREVAIL – Network of European Partners

PREVAIL along the Semiconductor Supply Chain

Funded by the European Commission
Pilot lines in the Chips Act

Goal
To establish a Pilot Line Infrastructure consisting of

- a set of new pilot lines that will play a central role, such as
  - Scaled FD-SOI down to 10nm and below
  - Leading-edge process technology at 2nm and below
  - Advanced Heterogeneous System Integration

- a set of new and existing pilot lines that will be established or upgraded to integrate complementary competences

- a link with the design platform as well as the whole ecosystem, including competence centres

Source: EPoSS
Horizon Europe project ICOS «International Cooperation on Semiconductors» has been officially launched on January 19, 2023 in Brussels.

ICOS, a three-year Coordination and Support Action (CSA) from the European Commission in the frame of Horizon Europe, was launched on 19 January 2023 with its kick-off meeting held in Brussels. ICOS aims to support the growth of the European Semiconductor and Semiconductor-based photonics industry through focused international research cooperation. The strategic importance of semiconductors and the dependence of Europe from other regions of the world were evidenced by the recent international crises. ICOS will play a significant role in helping our continent to regain sovereignty and leadership in that domain, in line with the objectives set out by the EU Chips Act.

An ambitious project in the framework of the European strategy of semiconductors

In this context, ICOS will identify and support the establishment of the most promising scientific collaborations by targeting leaders in the sector worldwide. The project will start with an exhaustive analysis of the value chains of semiconductors for electronics and photonics, the strengths and gaps of European and International industries in this area. The next generation and emerging technologies, especially in advanced computation and functionalities will be identified and the most interesting countries for International Cooperation will be determined. Based on the obtained results, ICOS will then highlight the research subjects likely to benefit the most to the European strategic goals, and translate them into proposals for future bilateral or multilateral research initiatives and practical cooperation modalities.
- Semiconductors & Semiconductor-based photonics are pivotal technologies for almost all existing industrial sectors, as demonstrated by the recent chips shortages.

- In particular, semiconductors are essential enablers for digital and green transitions and for SDGs.

ICOS is an ambitious 3 years project in the framework of the EU Chips Act, funded by the EC Horizon Europe.
## PARTNERS & ADVISORY BOARDS

### PARTNERS

#### ACADEMICS
- Grenoble INP
- Université Gent
- TU Delft
- IU Net
- Fraunhofer

#### RTOS
- leti
- Tyndall
- UMEC
- VTT

#### INDUSTRIAL ADVISORY BOARD
- Robert Chau
  Director Intel Europe Research
- Paolo Azzoni
  Secretary General
  Current Coordinator of ECS SRIA
- Laith Altimate
  President
- Elisabeth Steimetz
  Director
- Carlos Lee
  Director
- Colin Willcock
  Chairman of the Board

### ASSOCIATIONS & CONSULTING COMPANIES
- SINANO Institute
- VDI/VDE IT
- Aeneas
- DECISION ÉTUDES & CONSEIL

### INDUSTRIALS
- STI
- Infineon
- Bosch
- NXP

### INTERNATIONAL ADVISORY BOARD
- Ray, Jui-Lin Yang
  Head of Semiconductor Research Dept.
- Jose Pozo
  Chief Technology Officer
- Hayashi Yoshinori
  Chairman
- Paolo Gargi
  Chairman

---

ICOS General Presentation
OBJECTIVES

- **International cooperation** is key for speeding up technological innovation (e.g. ITRS/IRDS, Optica)
- To build **balanced semiconductor partnerships** with like-minded countries
- To set out cooperative framework on *initiatives of mutual interest*
- To identify and support the establishment of the **most promising scientific international collaborations**
- To support the growth of the European Semiconductor industry through **focused research alliances** based on awareness of advanced research activities
- To strengthen **Europe’s position** in global value chains in this area
IMPLEMENTATION

EXHAUSTIVE ANALYSIS OF SEMICONDUCTORS’ VALUE CHAINS, FOR ELECTRONICS & PHOTONICS
Identification of:
- EU’s economic and industrial strengths & weaknesses
- Strategic dependencies
- Market and cooperation opportunities

IDENTIFICATION OF RESEARCH AREAS FOR INTERNATIONAL COOPERATION
Identification of next generation & emerging technologies, especially in advanced computation and functionalities.

DETERMINATION OF MOST INTERESTING COUNTRIES FOR INTERNATIONAL COOPERATION
Identification of challenges for which international cooperation is critically important.

AGENDA FOR AND INITIATION OF INTERNATIONAL COOPERATIONS
- Dialogue with actors of existing cooperation
- International collaboration with non-EU national authorities
- Define standardisation needs and activities
- Support the European Commission

ICOS General Presentation
WP5 – Foundation for international cooperation

Engaging with Stakeholders
- Engagement with stakeholders in international cooperation
- Mapping of actors, suitable formats

Agenda for International Cooperation
- Matrix with country specific frameworks and cooperation formats
- Policy advice on international cooperation in semiconductors
- Agenda incl. recommendations for international cooperation in semiconductors

Feedbackloop with Community
- Report on Potential R&D initiatives, collaborations or partnerships

International Standards
- Recommendations on Standardisation

Economic Landscape Analysis, Technology Scanning and Foresight
- Results from previous and running EU-funded ICT standardisation projects

(associated) Partners existing connections with ministries in Asia

EU International strategy for semiconductor

Source: VDI/VDE IT
Thank you for your attention

Acknowledgements to

Julia Kaltschew, Leader VDI/VDE IT
Francis Balestra, Director SINANO
Elisabeth Steimetz, Director EPoSS
Oliver Pyper, Senior Manager FMD
Patrick Bressler, Director International Cooperation FMD
Munich Quantum Valley

Diagram showing various quantum-related topics such as quantum communication, quantum information theory, quantum materials, quantum computing, and quantum sensorics. Logos of Max Planck Gesellschaft, Fraunhofer, BA&W, LMU, and TUM are also present.