SEMICONDUCTORS INDUSTRY IN **POLAND**

2026

Description

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technologia ekonomia kooperacja

Patronage

PAIH
PFR Group

semi

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GLOBAL SUPPLY CHAIN
FOR SEMICONDUCTORS PRODUCTION

There is likely no business more international than semiconductor production. The supply chains of individual companies almost always involve a dozen or more countries across Asia, America, and Europe. Due to the highly complex nature of the process, which requires strict specialization by individual companies, no country or region is entirely independent or autonomous within the entire supply chain [1].

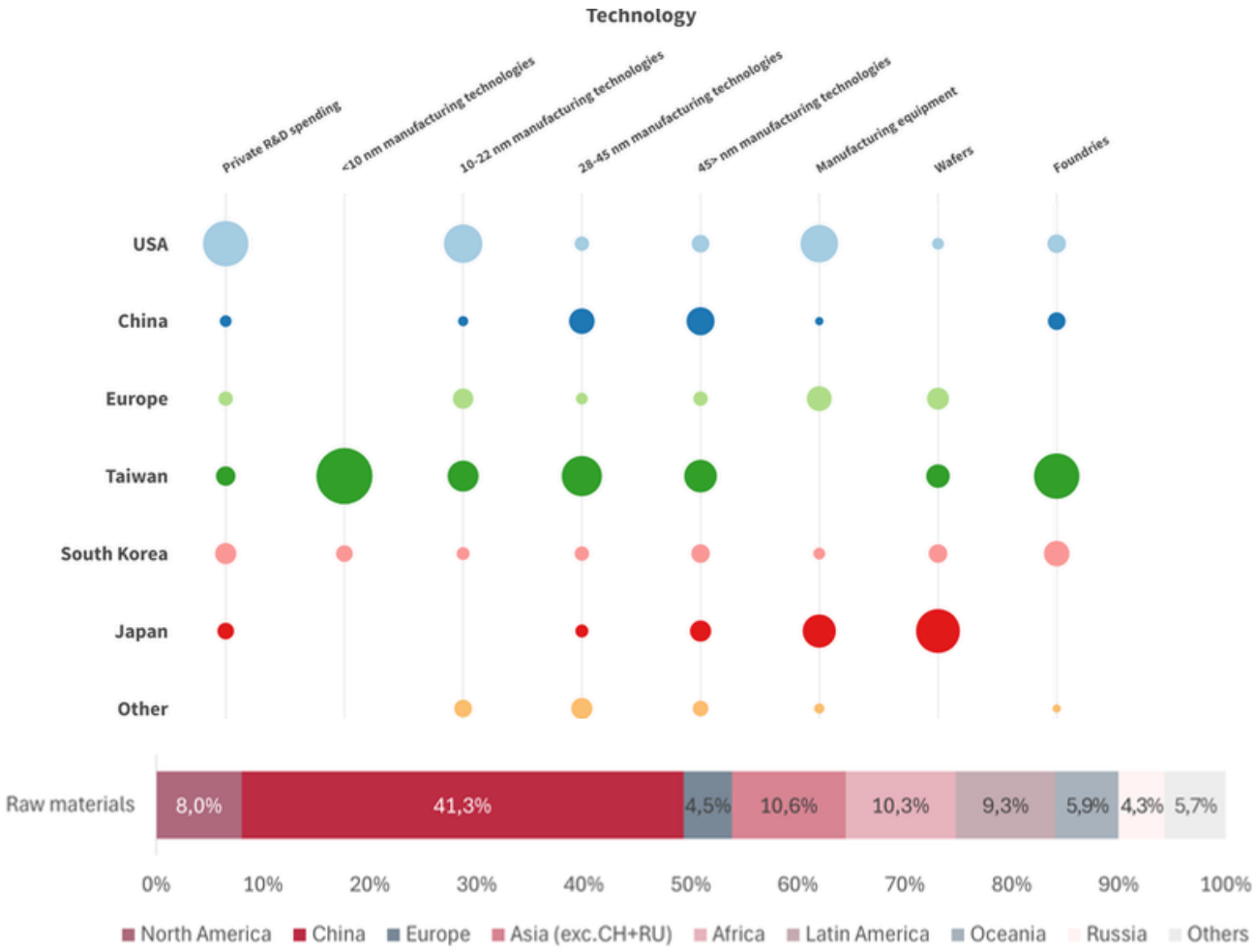
As a result, **different countries or even regions hold leading positions in specific supply chain segments.** Currently, only about 10% of global semiconductor production takes place in Europe, and it is primarily limited to manufacturing chips using 22-nanometer technology or larger. Only two companies in East Asia, Taiwan's TSMC and South Korea's Samsung, are capable of producing the most advanced chips using 2 to 7-nanometer technology. However, the equipment necessary for this production is manufactured exclusively in Europe by the company in the Netherlands. These interdependencies within the international supply chain are in great deal and numerous.

> *No country is self-sufficient when it comes to semiconductors due to the complexity, geographic specializations and deep interdependencies characterizing the supply chain. [...] Figure 1 above and figure 2 on the next page for instance indicate that the US dominates global private R&D spending, Taiwan the foundries and most advanced manufacturing technology, Japan wafer fabrication, and China raw material inputs. Chip making, from design to production, assembly, testing and packaging is comprised of over 1 000 steps using around 300 materials including silicon wafers, gases, and chemicals. Large semiconductor producers rely on up to 16 000 suppliers worldwide. A supply chain crosses the border 70 times before reaching an end user and over 50 choke points where one region holds more than 65 % of the global market share. This makes the supply chain vulnerable to disruptions such as natural disasters, infrastructure failures and geopolitical tensions* - as outlined in the 2024 report by ESPAS analysts for the EU [2].

[1] The position of the EU in the semiconductor value chain: evidence on trade, foreign acquisitions, and ownership. 2024, Joint Research center, Andrea Ciani, Michela Nardo
[2] Global Semiconductor Trends and the Future of EU Chip Capabilities, European Strategy and Policy Analysis System (ESPAS), 2024

GLOBAL SUPPLY CHAIN FOR SEMICONDUCTORS PRODUCTION

Regions share in specific segments of the semiconductor production supply chain



Source: Global Semiconductor Trends and the Future of EU Chip Capabilities, European Strategy and Policy Analysis System (ESPAS), 2024

Data on the supply chain confirms that European semiconductor-producing companies heavily rely on suppliers and customers based outside the EU. Research conducted in 2023 by the Joint Research center indicates that, on average, **nearly 80% of suppliers active in the European semiconductor supply chain have their headquarters outside the EU.** Moreover, EU companies involved in the semiconductor industry supply chain have, on average, only 37% of their clients within the EU. Among these 80% of suppliers outside the EU, the majority are based in the United States (36%), followed by Taiwan (12%), China (11%), South Korea (10%), and Japan (9%). **Awareness of these facts was one of the motivations behind the European Chips Act initiative.** [1]

[1] The position of the EU in the semiconductor value chain: evidence on trade, foreign acquisitions, and ownership. 2024, Joint Research center, Andrea Ciani, Michela Nardo

SEMICONDUCTORS PRODUCTION **IN EUROPE / FRONT-END**

The entire process of semiconductor production can be divided into two distinct phases, called front-end and back-end. Both phases are marked by significantly different technological processes and require consideration of various factors when determining an optimal location for production sites. **Their unique requirements result in clear differences between the lists of countries and regions best suited for prosecuting such types of production.**

The **front-end** production involves the conversion of silicon into designed silicon wafers, which is a highly technical process requiring high capital expenditures. It also necessitates an appropriate number of highly qualified employees capable of operating highly advanced technical production processes.

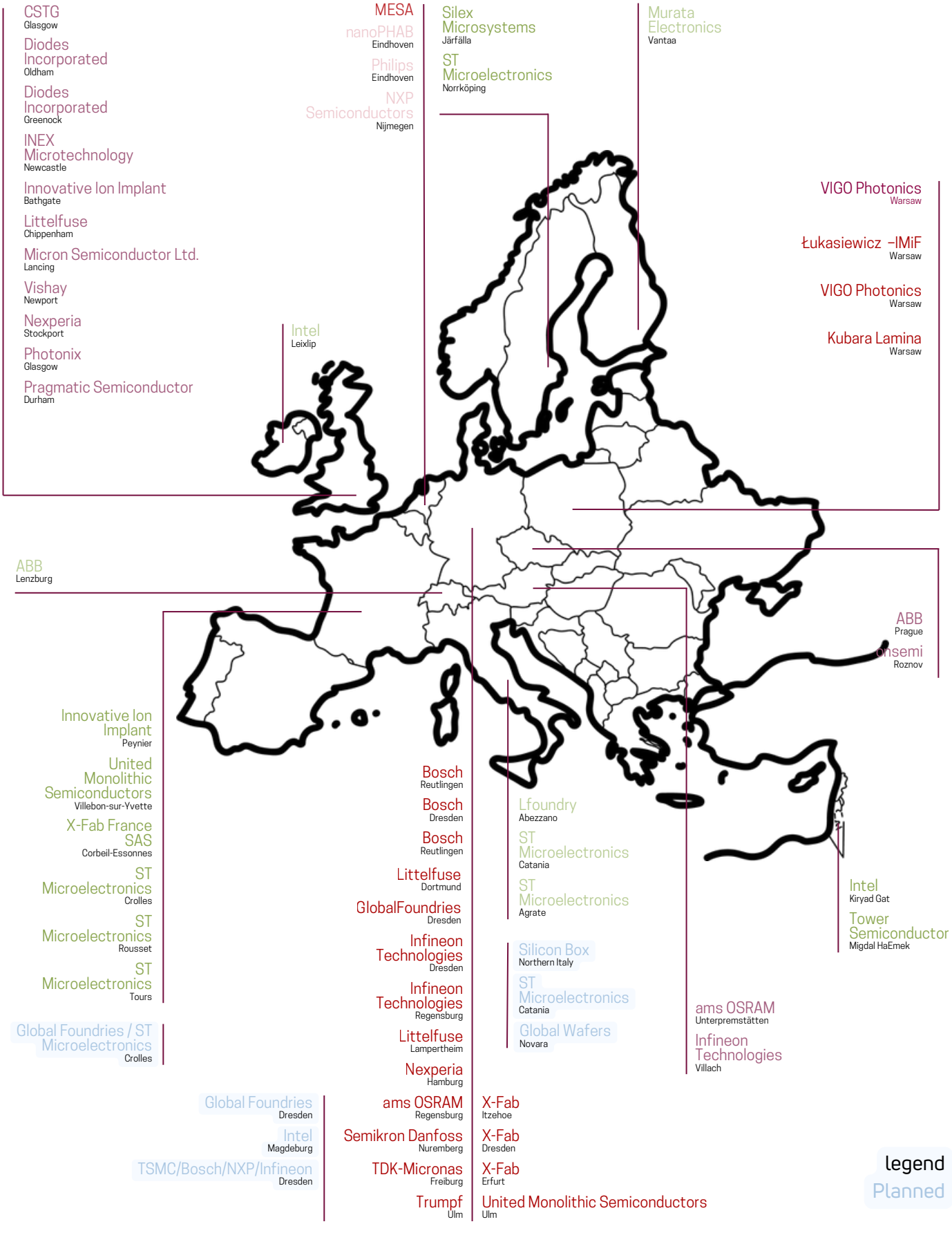
In contrast, the **back-end** production involves testing and packaging of integrated circuits from silicon wafers produced in the front-end process. The back-end production has made significant technological advancements in recent years (2.5D/3D packaging, automation), simultaneously reducing operational costs and pollution levels. Despite technological progress and automation, this phase remains less capital-intensive and imposes relatively fewer requirements in terms of intellectual property protection and the provision of highly qualified labor compared to front-end production. **From Poland's perspective, the back-end industry is a better fit for its already possessed experience and technological competencies acquired in the process of developing the electronic industry in Poland.**

Front-end in Europe

Approximately **55 facilities** involved in front-end processes are located in Europe. Some of these were established decades ago—the history of the oldest ones dates back to the 1950s—when Europe's share in global production was significantly larger than it is today. Currently, **Germany** has the most front-end facilities, with as many as 17, while slightly fewer (11) are located in the **United Kingdom.** Many of the lines located in Europe specialize in niche applications or perform research and development functions.

In the pan-European aspect, the **Saxony and the Czech Republic** regions deserve to be highlighted, especially in light of numerous announcements on production expansion in Dresden and Czech Republic. Dresden already hosts factories of **GlobalFoundries** (acquired from AMD), **Bosch, Infineon, and X-Fab,** while in the nearby Czech Republic, **ABB** and **Onsemi** have their plants. Following the semiconductor supply chain crisis caused by the coronavirus pandemic, there have been announcements from semiconductor manufacturers about constructing new plants, with **Dresden frequently mentioned as a potential location. This region could become the European center for semiconductor production in the future.**

EUROPEAN FRONT-END MANUFACTURING PLANT **LOCATIONS**



SEMICONDUCTORS PRODUCTION **IN EUROPE / BACK-END**

Back-end in Europe

The European sector of advanced technology end-of-line assembly constitutes only a marginal share of the global market. **In 2023, the volume of the EU advanced packaging market was estimated at €300 million, accounting for just 1.8% of global production.**

Key European sites with advanced packaging capabilities include Amkor in Portugal, Infineon in Germany, and STMicroelectronics in Malta. These facilities employ approximately 5,200 people combined, focusing on end-of-line assembly technologies such as Fan-Out (FO) and Flip Chip Ball Grid Array (FC BGA). Infineon's plant in Regensburg, Germany, employs 3,000 people and focuses on FO eWLB and embedded die technologies, however most of the company's back-end operations are located in Asia. STMicroelectronics has a plant in Kirkop, Malta, with 1,600 employees working on FC BGA technologies, and a smaller FO production facility near Naples, Italy. In addition, Amkor's plant in Porto, Portugal, employing 600 staff members, utilizes fan-out and wafer-level packaging (WLP) technologies.

Despite the presence of these plants, the EU's contribution to global advanced packaging remains limited. Nevertheless, there are credible prospects for improvement. For example, the joint investment by TSMC, NXP, Infineon, and Bosch in Dresden may include advanced end-of-line assembly technologies. Thales in France also operates advanced packaging operations for the aerospace and military industries, relying on FO and FC BGA technologies.

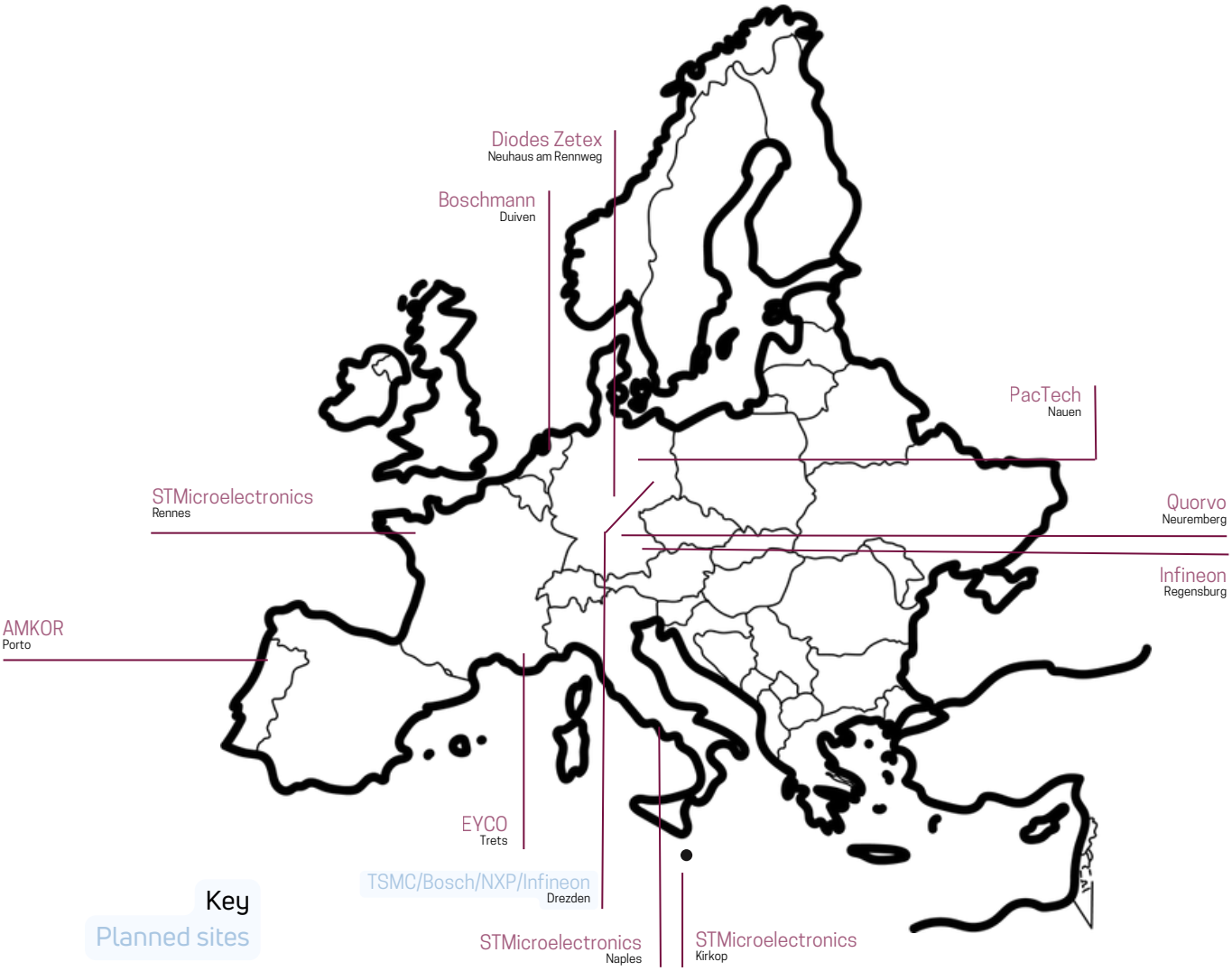
Global perspective

Advanced back-end technologies, referred to as **advanced packaging**, require specialized expertise across multiple tiers of the supply chain, thereby offering substantial growth potential. TSMC, the global leader in semiconductor contract manufacturing, derives approximately 20% of its revenue from OSAT activities and consistently makes significant investments in this domain. **The strategic growth potential of the OSAT market is underpinned by three key advantages: accelerated time-to-market for semiconductors, reduced development costs, and well-established customer relationships.**

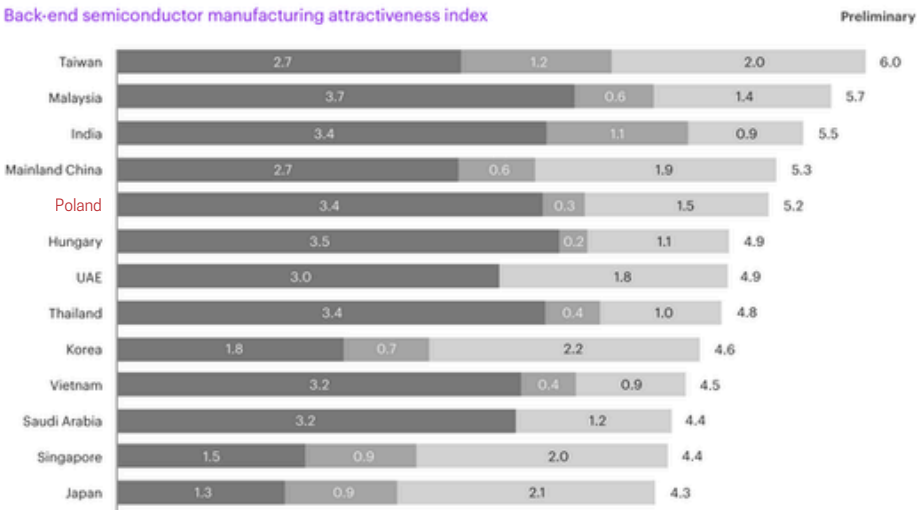
The market for advanced semiconductor integration technologies is expected to **grow at a compound annual growth rate (CAGR) of 11.4% from 2022 to 2035,** substantially outpacing the overall OSAT market. The market size is expected to expand from **€20 billion in 2022 to approximately €80 billion by 2035.**
This growth is driven by rising demand for high-performance computing, miniaturization of electronic devices, and continued advances in semiconductor technologies that require increasingly sophisticated final assembly solutions.

In terms of key applications, the advanced packaging market is dominated by consumer electronics such as smartphones and PCs, which account for 41% of total applications. The next largest segments are servers and telecommunications infrastructure, representing 21% and 12% respectively. The automotive sector, driven by technologies such as Flip Chip Ball Grid Array (FC BGA) and Fan-Out, accounts for 10% of the market. Other segments including automation, renewable energy, healthcare, aerospace and defense, and security collectively represent 16%.

EUROPEAN BACK-END MANUFACTURING SITES **LOCATIONS**



*Source: Securing the European Union's Electronics Ecosystem, IPC 2024



THE KEARNEY RANKING COUNTRIES' ATTRACTIVENESS FOR **BACK-END** MANUFACTURING LOCATION

*Source: Back-End Semiconductor Manufacturing Attractiveness Index, Kearney 2024

SEMICONDUCTORS PRODUCTION **IN EUROPE / BACK-END**

The Kearney Ranking

In September **2024**, **Kearney** analysts assessed 28 parameters determining countrys' attractiveness for investment, grouped into three main categories: **business environment** (30% weight), **capital incentives** (20%), and **operating costs and incentives** (50%). The figure on the next page presents the resulting ranking of countries and regions based on Kearney's analysis.

Poland ranks fifth in Kearney's index, the highest position among all the European countries. The global leaders in back-end manufacturing (known as the OSAT market) are Taiwan and mainland China, which together account for over 60% of the global market, followed by Malaysia and India. Among the world's ten largest OSAT providers, six are headquartered in Taiwan and three in mainland China.

According to Kearney, **the European Union is aiming to strengthen its local semiconductor manufacturing network by complementing front-end production facilities** in Germany, Ireland, and France **with back-end capabilities**. Poland is strategically well positioned in the OSAT landscape due to its relatively low operating costs. **In total, Poland received a score of 5.2 points from Kearney** (compared to 6.0 points for the top-ranked Taiwan), including a notable 3.4 points for its favorable economic environment.

Malaysia holds second place in the ranking and is seen as an independent and secure location for back-end operations. **Its strong 13% share of the global OSAT market is the result of long-standing government efforts to support a resilient and well-developed domestic semiconductor ecosystem**. Malaysia offers a particularly stable business environment compared to other emerging regions and provides a cost-effective and skilled labor force. A wide array of incentives, such as five-year tax holidays and exemptions from import duties on raw materials and components, also plays a key role.

In the Kearney ranking, Poland was ranked fifth in the world in attractiveness of locating **back-end** production

The European Back-End Industry Ecosystem

Europe is home to **back-end hardware and tool manufacturers** such as BESI (Netherlands) and Süss MicroTec (Germany). The EU consortium **Pack4EU** is proposing an investment plan for advanced end-of-line assembly technologies, including a pilot line financed by the European Chips Act, focusing on 3D packaging for RF. IMEC, Fraunhofer, and CEA Leti are among the participants in the project.

The Future of Back-End in Europe

The EU's advanced back-end technology industry is poised for growth, although significant challenges remain. As the IPC notes in its report, "Securing the European Union's Electronics Ecosystem", investments in new facilities and technologies appear crucial to maintaining and potentially increasing the EU's global market share. Strategic initiatives, collaborations, and continued investment in research and development will play a key role in shaping the future of advanced packaging in Europe.

THE SEMICONDUCTORS INDUSTRY IN **EUROPE /CHIPS ACT**

European **Chips Act 1.0**

Over the past decade, the global significance of the semiconductor industry has grown substantially. The COVID-19 pandemic further exposed strategic vulnerabilities in supply chains, underscoring the critical need for a strong domestic semiconductor industry. Both the United States and the European Union have recognized the imperative of increasing domestic chip production to safeguard economic and technological security. In response to these challenges, on **July 25, 2023,** the Council of the European Union approved the **European Chips Act**, which officially took effect on September 21, 2023. This initiative is part of a broader effort to advance digital innovation in Europe, with the goal of boosting semiconductor production and expanding the presence of European microprocessors in the global market.

It is worth noting that, despite its significant role in the manufacturing of electronic devices**, the European Union's share of the global semiconductor industry remains limited.** The European Chips Act sets ambitious objectives for the coming decade, **aiming to double the European Union's share of global semiconductor production from the current 10% to 20%.** However, global demand for chips is expected to double by 2030, meaning that even a substantial increase in semiconductor production within the EU will not be sufficient to meet future demand. Therefore, the European Union plans to allocate **€43 billion** in EU funding, providing financial support to the semiconductor sector through 2030.

The ECA itself is divided into **three main pillars. The first pillar** aims to facilitate the transfer of knowledge from laboratories to manufacturing facilities. Under this pillar, activities such as the establishment of advanced pilot production lines, the development of a cloud-based design platform, the creation of competence centres, the development of quantum chips, and the establishment of dedicated financial instruments will be supported. **The second** pillar of the European Chips Act encourages public and private investment in manufacturing facilities, while also supporting small and medium-sized enterprises (SMEs) by reducing the financial barriers associated with entering the semiconductor industry. However, already at the time of presenting the proposal for the ECA, the European Commission indicated that support could be granted only to facilities classified as 'first-of-a-kind'. **Under the third pillar,** the ECA establishes a coordination mechanism between the Member States and the European Commission in order to strengthen cooperation, monitor semiconductor supply, assess demand, anticipate shortages, and, where necessary, initiate corrective measures. The first step in this process was the launch of a semiconductor supply chain disruption reporting system on 18 April 2023.

Visualization of the TSMC factory in Dresden

European **Chips Act 2.0**

Leading European semiconductor companies, as well as equipment manufacturers such as Bosch, Infineon, NXP, STMicroelectronics, ASML, ASM, Carl Zeiss, and Air Liquide, have been involved in the development of Chips Act 2.0. The industry expects Chips Act 2.0 to provide a broader range of support than the previous program. ESIA and SEMI Europe are calling for the new funding to cover not only the **construction of integrated circuit factories but also design centers, material and equipment suppliers, and research and development initiatives. According to those preparing the updated program**, the European Union has strong competences in areas such as research and development and the manufacture of semiconductor manufacturing equipment, as evidenced by the market position of companies such as **ASML, ASM International, Carl Zeiss SMT and SUSS MicroTec.**

On **June 3**, 2026, the European Commission published proposals for "Chips Act 2.0." While this does not alter the fundamental objective adopted in 2023—strengthening the European semiconductor ecosystem—it significantly expands the scope of action by introducing instruments designed to support technology industrialization, market development for European solutions, and increased supply chain resilience.

Improving conditions for investment and competetiveness	• Strengthening research, innovation, and skills development **across the semiconductor ecosystem.** • **Accelerating permitting procedures,** with permits issued within a maximum of 12 months. • Introducing "**Grand Challenges**" to support the development of strategically important semiconductor technologies (e.g. AI). • Strengthening **cooperation with international partners** through strategic partnerships
Stimulating demand and industrial uptake	• **Strengthening ties** between integrated circuit **manufacturers and end-users** • Establishment of **Demand Accelerators**, ensuring product **alignment with industry and market needs.** • Mechanisms to ensure value creation for the EU through economic growth, job creation and skills development within the Union via **public procurement** in strategic areas. • Increasing the use of **public procurement for innovation** to boost demand • Creating **synergy** with the Act on the Development of **Cloud Computing and AI**
Strengthening supply-side measures	• Enabling financing for first-of-a-kind projects not yet present in the Union, covering the **entire semiconductor value chain**, from raw materials to packaging technologies; • Identification of strategic projects (Grand Challenges) • Establishing a framework for the creation of **regional centres of excellence**
Increasing resilience and reducing dependency	• Creation of a B2B **semiconductor supply chain platform** to support the industry in proactively improving resilience against supply disruptions; • Support for sectors at risk through risk **assessment mechanisms and mitigation measures** • Reducing reliance on external suppliers for **key semiconductor technologies**

THE SEMICONDUCTORS INDUSTRY IN **EUROPE**

2024 / 2025

INVESTMENT REVITALISATION IN EUROPE **2024-2025**

12.2025 X-fab
Fab4Micro, capital expendature unknown
Erfurt, Germany

10.2025 GlobalFoundries
SPRINT Project, **EUR 1.1 bilion**
Dresden, Germany

08.2025 NQCP, Riber
POEM Technology Center, capital expendature unknown
Copenhagen, Denmark

06.2025 TSMC
EU Design Center
Munich, Germany

02.2025, OSRAM
plant development, **EUR 0.57 billion**
Premstaetten, Austria

12.2024, pilot line APECS advanced packaging
Joint Chip Undertaking **EUR 0.73 bilion**
Berlin, Germany

12.2024, pilot line PIXEurope
Joint Chip Undertaking **EUR 0.4 bilion**
Barcelona, Spain

12.2024, pilot line FAMES Joint Chip
Undertaking **EUR 0.83 bilion**
Grenoble, France

06.2024, pilot line WBG materials
Joint Chip Undertaking **EUR 0.36 bilion**
Catania, Italy

05.2024, pilot line NanoIC, Joint Chip
Undertaking **EUR 2.5 bilion**
Leuven, Belgium

12.2024, Vishay
Newport Wafer Fab, **USD 0.18 bilion**
Newport, UK

10.2024 SK Hynix
R&D Center
Gdańsk, Poland

07.2024 Infineone Technologies
MEGAFAB-DD, **EUR 5 bilion**
Drezden, Germany

06.2024 onsemi
SiC plant expansion**, USD 1.64 billion**
Roznov, the Czech Republic

06.2024 ST Microelectronics, Silicon
Carbide Campus, **EUR 5 bilion**
Catania, Italy

06.2024 Global Wafers
FAB300, **EUR 0.45 bilion**
Novara, Italy

02.2024 VIGO Photonics
HyperPIC, **PLN 0.8 bilion**
Warsaw, Poland

08.2023 TSMC, Bosch, Infineon, NXP
ESMC, **EUR 10 bilion**
Drezden, Germany

THE SEMICONDUCTORS INDUSTRY IN **EUROPE / TRIANGLE**: WROCLAW - THE CZECH REPUBLIC -SAXONY

Silicon Saxony

Silicon Saxony is the largest microelectronics cluster in Europe and the fifth largest in the world. It contains three cities: the main one being **Dresden**, however, many interesting firms are also located in **Leipzig and Chemnitz.** As stated by Saxony Trade & Invest Corporation, there are 3,650 companies overall in Saxony, which employ over **81,000 employees.** (Of these, approximately 39,000 employees work in software development, primarily on a B2B basis). The cluster represents the **complete semiconductor supply chain**: from silicon wafers to integrated circuits and electronic systems. In addition to companies, the center is supported by universities and the German research institute **Fraunhofer**.

Silicon Saxony primarily comprises several facilities involved in **semiconductor manufacturing processes**. **GlobalFoundries**—a US-based company that emerged from AMD—has for years been developing its largest and most advanced European production plant in Dresden, utilizing 22 nm, 28 nm, 40 nm, and 55 nm technologies. The facility employs approximately **3,200 employees**. **XFab**, one of GlobalFoundries' competitors, also operates a plant in Dresden that manufactures using 350 nm technology. Bosch opened its semiconductor factory in June 2021; this **€1 billion** project represents the largest single investment in **Bosch's** more than 130-year history, and the facility is set to employ **700 people**. Japan's **Renesas** has also maintained a research and production unit there since 2019.

Beyond the presence of numerous leading companies, the cluster's future is also a focal point; investments exceeding **€23 billion** are planned for Silicon Saxony over the coming years. A key project is the joint venture between **TSMC, Bosch, NXP,** and **Infineon** (the ESMC project) to build a state-of-the-art semiconductor "gigafab" worth over **€10 billion**. The facility is scheduled for completion in 2027 and is expected to employ **2,000 people**. **Infineon** is constructing a modern semiconductor plant in Dresden known as the "Smart Power Fab", with an investment exceeding **€5 billion**. The factory is set to produce analog chips and power system components, with operations scheduled to begin in 2026. The project is slated to receive €1 billion in funding under the EU Chips Act.

illustraction source:
SAXONY! Germany with That Certain Something, Saxony Trade & Invest Corporation,

THE SEMICONDUCTORS INDUSTRY IN **EUROPE / TRIANGLE**: WROCLAW - THE CZECH REPUBLIC -SAXONY

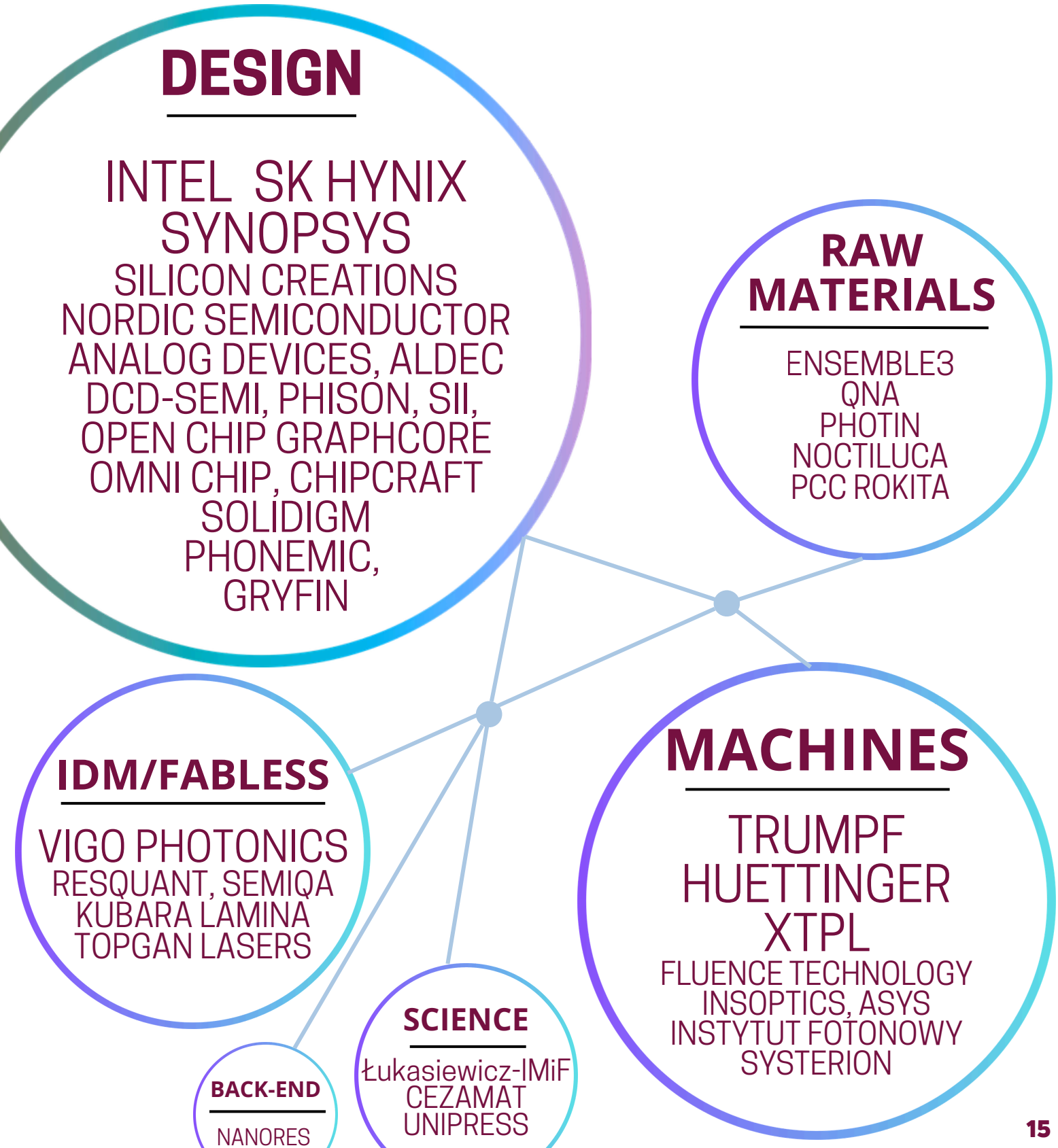
The semiconductor industry in the Czech Republic

According to CzechInvest, the organization responsible for attracting investment and fostering the country's economic development, there are approximately **80 companies** operating in the Czech Republic that are involved in the semiconductor supply chain. Collectively, these companies employ **11,000 people**. The Czech Republic's success in the semiconductor market is driven by the presence of several global manufacturers and the operation of three production facilities.

A key investor in the Czech Republic is **onsemi** (formerly known as **ON Semiconductor** and Motorola). The US company manufactures both semiconductor wafers and finished integrated circuits in Rožnov. It carries on the legacy of TESLA, a company originally established in Rožnov in 1949. In addition to its manufacturing plant, the company operates two design subsidiaries—**ON Design Czech** (Brno) and **SCG Czech Design Center** (Rožnov)—which design integrated circuits and develop software for big data processing and production automation. The Japanese company **Hitachi Energy** manufactures automotive-grade diodes, conventional and switching thyristors, transistors, and diodes designed for power supply systems (for power converters in rail vehicles, wind farms, energy transmission systems, and industrial applications). The company carries on the legacy of ČKD Polovodiče—an entity originally acquired by ABB and subsequently transferred to Hitachi Energy during a restructuring process. A back-end manufacturing facility belonging to the Czech-owned company **Argotech** also operates in the Czech Republic; this plant specializes in assembly, development, and engineering services in the fields of fiber optics, semiconductor photonics, microelectronics, and micromechanics.

Other global leaders in the semiconductor industry—such as Japan's **Renesas**, pan-European **STMicroelectronics**, and the Netherlands' **NXP**—also maintain design centers in the Czech Republic. Other players with design units there include the Swiss company ASICentrum and the Czech firm Codasip, which specializes in RISC-V architecture and which grew out of the expertise of researchers from the Brno University of Technology.

POLISH SEMICONDUCTORS ECOSYSTEM



POLISH SEMICONDUCTORS ECOSYSTEM

Intel Technology Poland		2 445
Trumpf Huettinger		1 524
SK hynix NAND		247
Synopsys Poland		234
VIGO Photonics		220
Kubara Lamina		121
Nordic Semiconductors		112
Silicon Creations		89
XTPL		76
Aldec-ADT		63
TOGETHER		**5 131**

Companies participating in the semiconductor supply chain employ over **5,000** people in Poland.
As many as **92%** of employees work for international companies.
The total turnover of the Polish ecosystem of semiconductor-related companies is approximately **PLN 3 billion.**

POLISH SEMICONDUCTORS ECOSYSTEM

MAJOR SEMICONDUCTOR INDUSTRY CENTERS IN POLAND

GDANSK
INTEL
SK HYNIX
SOLIDIGM
SYNOPSYS
SII
OPEN CHIP
GRAPHCORE
GRYFIN

TORUN
NOCTILUCA

POZNAN
INSOPTICS

ŁODZ
RESQUANT

LUBLIN
PHONEMIC

WARSAW
TRUMPF HUETTINGER
LUKASIEWICZ – IMiF
VIGO PHOTONICS
KUBARA LAMINA
OMNI CHIP
CHIPCRAFT
TELESYSTEM
TOPGAN LASERS
ENSEMBLE3
PHOTIN
CBRTP
FLUENCE
TECHNOLOGIES

WROCLAW
SEMIQA
XTPL
SYSTERION
NANORES
QNA

UPPER SILESIA
ALDEC-ADT
DCD-SEMI
PHISON
ASYS

CRACOW
ANALOG DEVICES
NORDIC SEMICONDUCTORS
SILICON CREATIONS
PHOTONIC INSTITUTE

EMPLOYMENT IN THE SEMICONDUCTOR INDUSTRY BY REGION

GDANSK
2,950

WARSAW
1,959

UPPER SILESIA
125

WROCLAW
106

CRACOW
219

POLAND COULD BECOME A SUPPORT BASE FOR EUROPE'S LEADING SEMICONDUCTOR MANUFACTURING HUB LOCATED AROUND **DRESDEN**.

WARSAW
Lukasiewicz – IMiF
VIGO Photonics
Kubara Lamina

GDANSK
Intel
SK Hynix

DRESDEN
Bosch
GlobalFoundries
Infineon Technologies
X-Fab

PRAGUE
ABB

ROZNOV
onsemi

legend
Planned

Global Foundries
TSMC/Bosch/NXP/Infineon

POLISH SEMICONDUCTORS ECOSYSTEM / KEY COMPANIES

Intel R&D Center in Gdańsk intel.com

Intel's research and development center in Gdańsk was established in **1993**. Today, the Gdańsk unit employs **2,500 permanent staff**, operates **38 laboratories**, and ooccupies more than **6,000 square** metres of space, recently expanded with the opening of a modern office building known as IGK-6 (Intel Gdansk Campus). **The Gdańsk campus is Intel's largest technology R&D center in Europe** and one of the largest facilities of its kind globally, with a **primary focus on software development.**
Initial efforts focused on developing device architectures for mobile networks. Gradually, the center expanded its scope to include areas such as PC and server software, Software-Defined Networking (SDN), graphics processors, USB, Wi-Fi, and Thunderbolt technologies, as well as audio and video processing. In recent years, the center has also developed 5G technologies, cloud solutions, Ethernet products, APIs, and AI machine learning technologies.

The new SK Hynix office is located in the same complex as the Solidigm and Intel centres and will work closely with its sister company. Furthermore, the Polish R&D centre will collaborate with SK Hynix Korea and the company's R&D centre in the United States.

DESIGN AND PROGRAMMING OF SEMICONDUCTOR DEVICES

Solidigm and SK Hynix
skhynix.com

Solidigm was established in 2021 following the acquisition of Intel's NAND and SSD business by the South Korean company **SK Hynix**. Solidigm is a global provider of innovative **NAND flash** memory solutions designed to unlock the vast potential of data, enabling customers to accelerate technological progress. The company focuses on delivering storage products that meet the needs of both consumer and enterprise markets. Solidigm's product portfolio also includes a range of SSDs that were previously part of Intel's product portfolio.
The company operates in 13 locations worldwide, including Gdańsk. The Polish branch supports the company's global efforts in storage technology development and is a key element of its growth strategy in Europe.
The memory design process begins at the semiconductor wafer level. The company focuses on developing memory characterized by high energy efficiency, improved thermal performance, enhanced durability, and greater reliability, enabling more data to be stored while reducing read errors throughout the product's lifespan. With the support of SK Hynix, Solidigm is able to rapidly achieve its technological and strategic goals. The company prioritizes innovation and the development of new technologies, allowing it to compete with major players in the semiconductor memory market. Solidigm is committed to developing products that not only meet current market demands but also pave the way for future innovations in data storage.

POLISH SEMICONDUCTORS ECOSYSTEM / KEY COMPANIES

TRUMPF Huettinger trumpf.com

TRUMPF Huettinger is a division of the TRUMPF Group's Electronics Sector and one of the key investors in Poland's electronics industry. In collaboration with **ASML**—a leader in semiconductor manufacturing equipment—and **Zeiss**, a prominent company in the field of optics, TRUMPF develops **laser systems that serve as the heart of semiconductor manufacturing machines.** With a history spanning over a century, the TRUMPF Group has been present in Poland since the early 2000s; in 2007, it acquired Advanced Converters (AC), a company founded by a group of scientists from the Warsaw University of Technology. According to the 2024/25 fiscal year report, TRUMPF Huettinger employs **1,390** people in Poland and generates revenues of **PLN 1.2 billion**.

Integrated circuits containing logic and memory components feature structures measured in nanometers and are manufactured using complex laser-based exposure processes. The traditional method employing ultraviolet laser beams from excimer lasers is increasingly proving insufficient. Smaller structures can only be created using even shorter wavelengths in the extreme ultraviolet (EUV) range. TRUMPF Huettinger in Poland develops high-power power supplies (**plasma generators**)—which precisely control the conditions for plasma ignition within vacuum chambers—as well as power supplies for TRUMPF lasers and machinery. Half of the production of these products in Poland serves the internal needs of the Group in Germany.

DEVICES

Employment: **1,524**
Turnover in 2024: **PLN 1.438 milion**

The other partners are leading global integrators of semiconductor manufacturing systems—such as **Applied Materials**, **Tokyo** Electron, and **Naura**—based in the USA, Japan, China, and South Korea. Plasma generators developed at the Group's Polish facilities are used in the production of advanced electronics (including semiconductors, coatings used in smartphones, and diamond drill bits) and photovoltaic panels, among other applications.

TRUMPF Huettinger plasma generators also play a pivotal role in the actual production of integrated circuits. The quality of the power supply determines the quality and precision of the generated plasma, which is subsequently used for doping (ion implantation), deposition (PECVD, ALD), or removal (plasma etching) of the various materials used to manufacture semiconductor integrated circuits.

Following the exposure and fabrication of circuitry on silicon wafers, the next challenge in the electronics manufacturing process chain is separating silicon wafers into individual semiconductor dies. To achieve the narrowest possible kerfs and high edge quality—while avoiding thermal damage to the sensitive integrated circuits—TRUMPF lasers with ultrashort pulses are used for the separation process.

TRUMPF TECHNOLOGIES


Source: Trumpf

Plasma Generators

High-frequency generators are particularly useful in etching and coating processes, such as plasma etching, reactive ion etching, ALD, and PECVD.

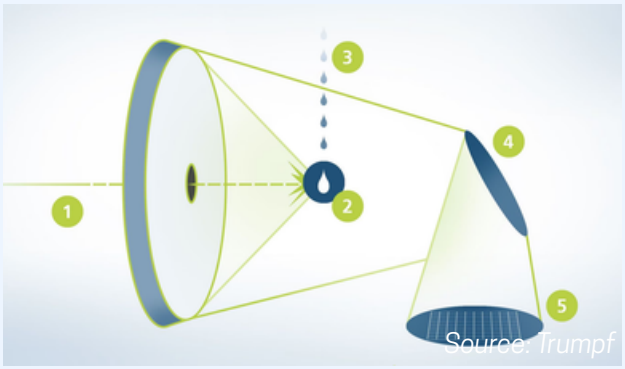
Source: Trumpf

Lasers

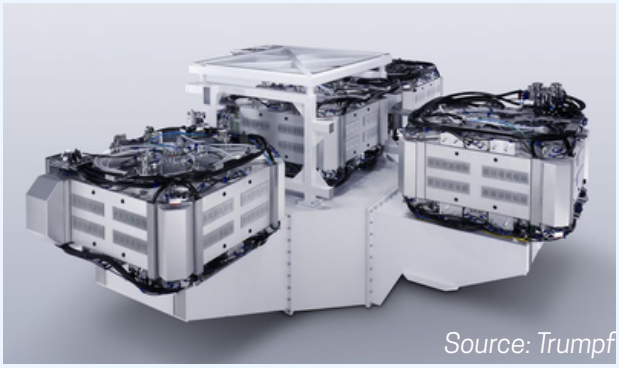
TRUMPF lasers operate at the micrometer scale and reliably maintain even the tightest tolerances. Short, high-intensity laser pulses cause direct material vaporization with virtually no impact on the surrounding area. This precision enables micro-cutting, micro-welding, laser structuring, and drilling (including silicon processing). Tiny components retain their shape and surfaces remain intact, making them suitable for applications such as microelectronics and semiconductor manufacturing.

EUV systems

A key requirement of EUV lithography is illuminating components with a stable 13.5-nanometer wavelength. The solution is a luminous plasma generated by laser radiation, which provides radiation at an extremely short wavelength. A supply system feeds tin droplets into a vacuum chamber (3), where the droplets (2) are illuminated by high-energy laser pulses (1)—50,000 times per second. The tin atoms undergo ionization, creating an intense plasma. A collector mirror gathers the EUV radiation emitted by the plasma in all directions. The light is collected into a beam and directed to the lithography system (4), where it illuminates a silicon wafer (5).[1][2]



Source: Trumpf


Source: Trumpf

[1] https://www.trumpf.com/pl_PL/rozwiazania/zastosowania/litografia-euv/
[2] https://www.trumpf.com/pl_PL/rozwiazania/zastosowania/litografia-euv/euv-drive-laser/

POLISH SEMICONDUCTORS ECOSYSTEM / KEY COMPANIES

VIGO Photonics

Vigo Photonics is a global leader in the market for mid-infrared photonic detectors. The detectors currently manufactured by the company are used in the world's leading research centers (measuring high-temperature plasma parameters in nuclear fusion research, ultrashort infrared laser and synchrotron pulses, and spectrometers for detecting trace concentrations of substances) and in the development of advanced applications such as: railway safety (rolling stock failure detection and fire detection systems), environmental protection (environmental monitoring), industrial applications (industrial temperature distribution scanners), military applications (missile guidance systems and threat warning systems), security (detection of explosives and hazardous substances, and passenger baggage screening systems), and the space industry (free-space optical communication and space-grade measurement devices).
VIGO Photonics has also added epitaxial semiconductor layers to its product portfolio. The epitaxial layers produced by VIGO Photonics - based on indium phosphide and gallium arsenide - serve as the foundation for manufacturing devices such as quantum cascade lasers, vertical-cavity surface-emitting lasers (VCSELs), and other infrared radiation sources, as well as microelectronic components (transistors, diodes).

All products are based on proprietary, unique technology. The company operates a complete, high-throughput production line for semiconductor devices —spanning the epitaxy of compound semiconductor materials (Groups II-VI, such as tellurium, cadmium, and mercury, and Groups III-V, such as indium, arsenic, gallium, and antimony) and the fabrication of detector and laser chips, through to micro-assembly and integration with electronics. VIGO also maintains its own state-of-the-art measurement laboratories, enabling rapid and precise measurements at every stage of production.

IDM

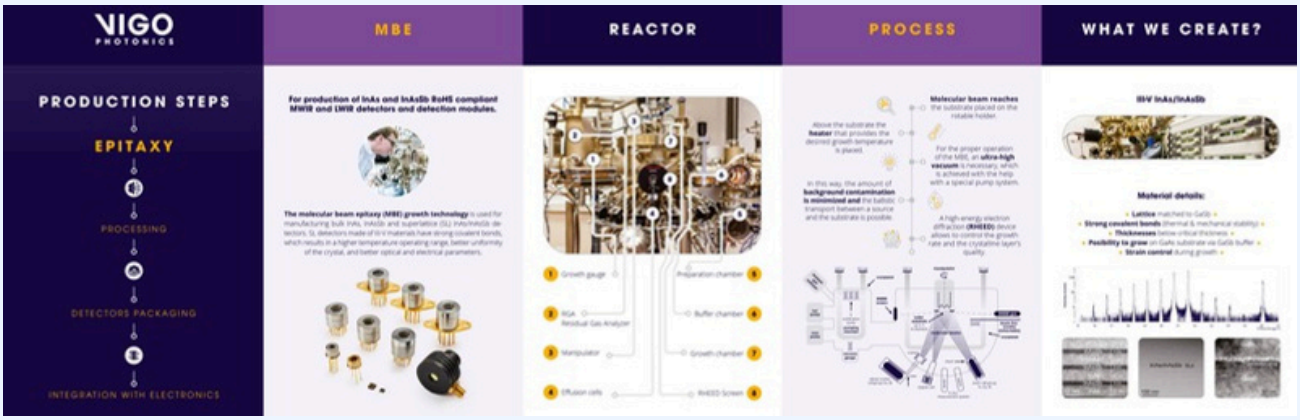
Employment: **250**
Turnover 2025: **93,1M PLN**

In February 2024, VIGO Photonics launched the **HyperPIC** project, valued at **PLN 878.6 million** (details on page 31). Other strategic initiatives include refining technologies for products based on mercury-cadmium-telluride (MCT), indium-antimonide and indium-arsenide detectors, and miniature infrared detection modules. Another initiative involving InGaAs aims to enter the market for short-wave infrared (SWIR) detectors, which have potential applications in consumer electronics. Furthermore, the company is developing technologies for the production of cooled and uncooled infrared detector arrays, the epitaxy of III-V semiconductor materials, the manufacturing of near-infrared sources (VCSEL lasers), and the production of epitaxial heterostructures using the MOCVD method.

On March 24, 2026, VIGO Photonics S.A. acquired the assets of **Infrared Associates, Inc**., a US-based competitor specializing in the design, manufacture, and sale of infrared detectors, with annual revenue of USD 8.7 million. The acquisition opens up international markets in Asia, Europe, and—above all—South America to VIGO Photonics.

Source: VIGO Photonics

VIGO PHOTONICS TECHNOLOGIES



POLISH SEMICONDUCTORS ECOSYSTEM / KEY COMPANIES

XTPL

XTPL is developing a **proprietary ultra-precise micro-printing technology based on an innovative printhead and dedicated nano-inks.** The solution enables the additive deposition of conductive materials with sub-micron precision, allowing for the creation of structures ranging from **1 to 100 µm** size. The technology finds application in sectors such as semiconductors, display manufacturing, biosensors, and advanced printed circuits.

XTPL technology offers an alternative to the photolithography that currently dominates the field. Instead of a multi-stage, costly subtractive process, the company provides a single-stage additive process that eliminates the need for masks, reduces material consumption, and enables work on irregular surfaces. This simplifies production and shortens implementation times.

The year 2025 proved to be a turning point for the company. XTPL deployed its technology in an industrial environment for the first time—at one of the world's largest FPD (Flat Panel Display) manufacturers in China. This marks the transition from the research and demonstration phase to implementation on the production lines of global manufacturers.

- *We have demonstrated that XTPL has successfully made the journey 'from lab to fab.' This is a breakthrough moment that confirms the maturity of our technology in the eyes of global electronics manufacturers* - **emphasizes Filip Granek, CEO of XTPL.**

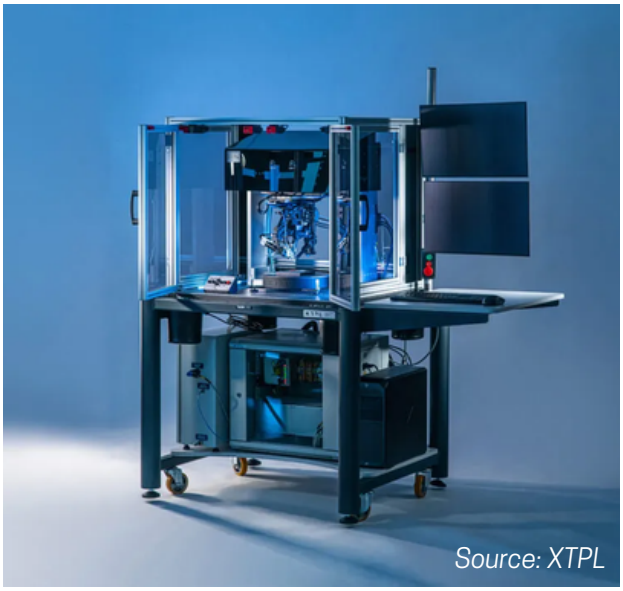
Financial results followed the technological breakthrough. The company achieved record-high revenues of PLN 15.6 million (+14% year-on-year). The commercial segment generated PLN 13.7 million, with a total of 13 Delta Printing Systems and 8 Ultra-Precise Dispensing modules delivered to customers.

DEVICES

Employment:	**76**
Turnover in 2025:	**15.6M PLN**

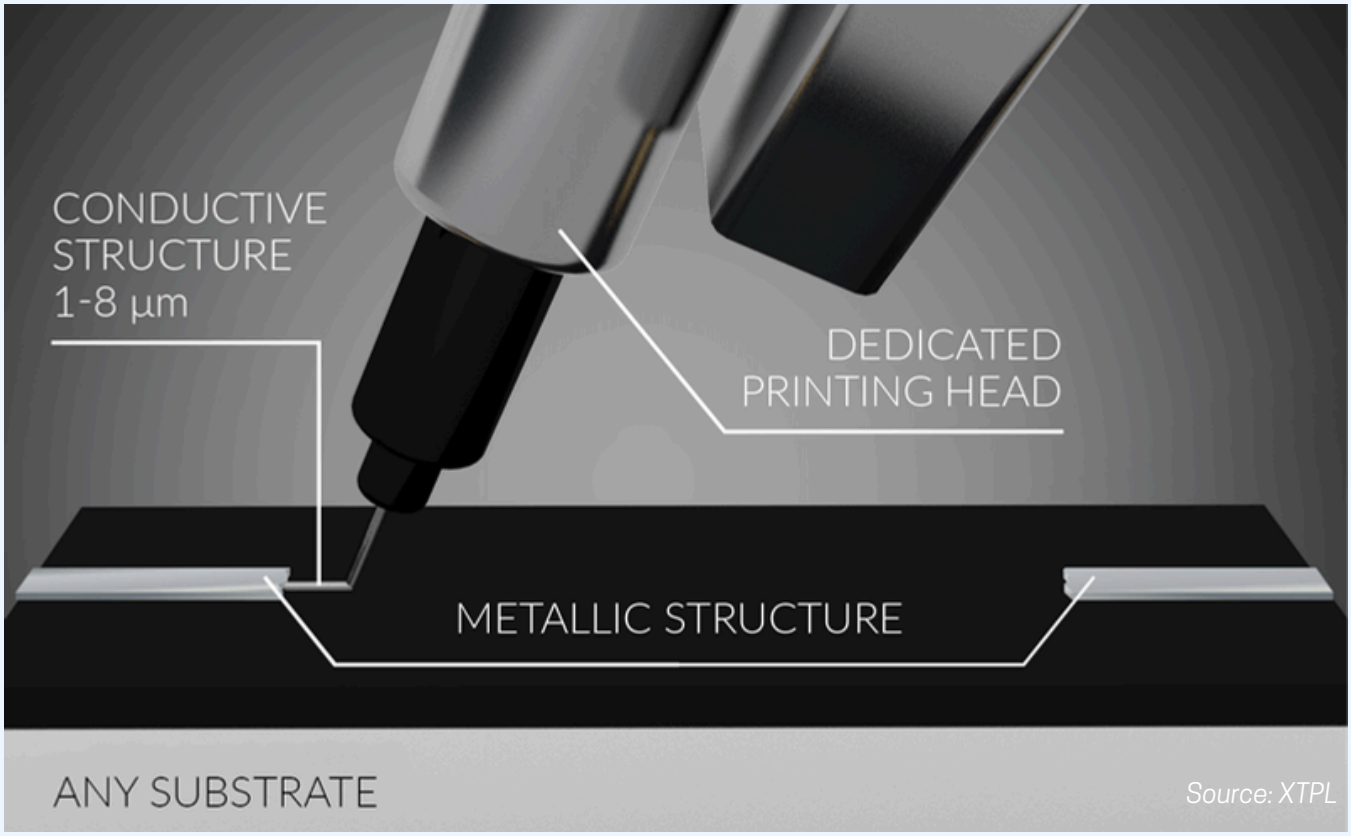
XTPL is currently developing three business lines: UPD modules implemented directly on production lines, Delta Printing System prototyping devices, and the High Performance Materials segment, which includes nano-inks. In parallel, the company is working on a fourth line - ODRA systems - designed for small-batch industrial production based on a high-mix, low-volume model. This solution aims to bridge the gap between prototyping and industrial implementation, thereby significantly boosting sales potential.

Scaling sales and implementing XTPL technology with additional global manufacturers remain the priorities for the coming years. The company is currently conducting several advanced evaluation projects with partners in Asia, Europe, and the USA, spanning sectors such as semiconductors and displays.

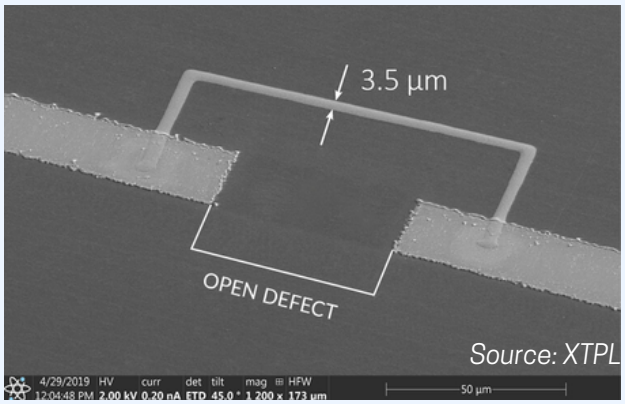


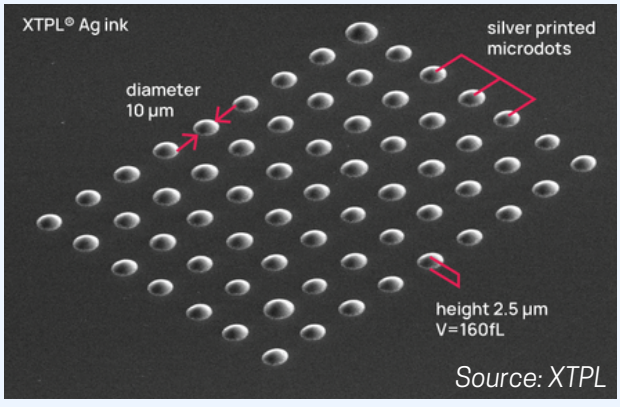
Source: XTPL

XTPL TECHNOLOGIES



A key achievement of XTPL is its innovative Ultra **Precise Deposition (UPD) technology. Equipped with a specialized nozzle,** the XTPL printhead deposits ink onto a substrate, enabling the creation of engineered structures with widths as small as **1 µm**. By comparison, most commercially available printing methods for electronic materials struggle to reach the 20 µm mark, with only a handful of manufacturers claiming capabilities in the 10 µm range. XTPL's solution is compatible with various types of substrates, including flexible and curved surfaces. UPD technology allows for the printing of diverse shapes, ranging from straight lines to complex patterns and micro-dots.





POLISH SEMICONDUCTORS ECOSYSTEM / KEY COMPANIES

Łukasiewicz – IMiF

The Institute of Microelectronics and Photonics is part of the **Łukasiewicz** Research Network - Europe's third-largest research network - which comprises **440** R&D laboratories and employs nearly **4,500** research and engineering-technical staff. Łukasiewicz – IMiF develops designs and manufacturing technologies for microelectronic and optoelectronic devices, including **microwave and photonic discrete devices, detectors and sensors, integrated circuits, microsystems and electronic components, microelectronic hybrid circuits, power devices, and diffractive elements.** Furthermore, the Institute develops manufacturing technologies for new materials - such as **gallium nitride, epitaxial and flake graphene, ceramic-metal composites, glasses, and advanced ceramics** - and tests their properties for industrial application. Solutions developed by Łukasiewicz – IMiF have found application in the energy, electronics, photonics, medical, aerospace, defense, space, and automotive industries, as well as in other industiral sectors.

The Institute is increasingly establishing its presence in the field of semiconductor devices of growing complexity. A case in point is the development of mid-infrared photodetector arrays operating in HOT conditions, involving a transition from discrete structures to array-based systems. Parallel efforts are underway to advance the technology readiness level, enable cryogenic operation, and enhance resolution. Another significant milestone was the launch of the EIC Pathfinder-funded bLOSSom project, which aims to develop energy-autonomous integrated photonic systems.

SCIENCE

Employment: **400**

The Łukasiewicz – Institute of Microelectronics and Photonics is also developing **VCSEL** (Vertical-Cavity Surface-Emitting Laser) technology - efficient, energy-saving sources of near-infrared radiation. These lasers have a wide range of applications, spanning short-range optical communication (used in data centers and optical interconnects), distance measurement and environmental scanning systems, and sources for gas detection systems. The VarSEL project, launched in 2025 and led by the Polish company **Airoptic**, aims to develop a new type of gas analyzer utilizing **VCSELs** with a novel, competitive design created at the Institute.

The Institute also carries out projects under the **EUREKA** program, including the **THOR** project - the development of a three-dimensional sensor head for magnetic field measurement at high temperatures and in neutron radiation environments for applications in thermonuclear reactors. The project's industrial partner is **Next Step Fusion** (Luxembourg).

At the same time, Łukasiewicz – IMiF focuses on international research and development cooperation - including **ITRI** (Taiwan) - in the field of GaN power devices, and actively participates in European industry associations such as AENEAS, EPoSS, SINANO, and INSIDE.

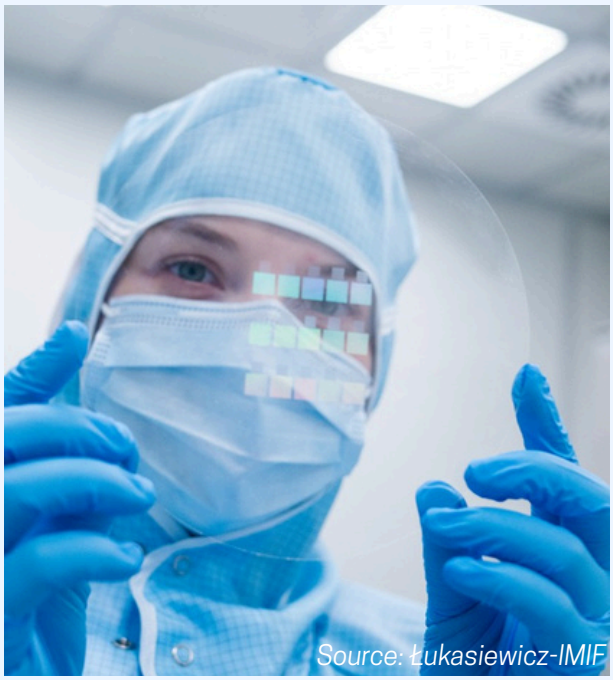
ŁUKASIEWICZ-IMIF TECHNOLOGIES

Four technological lines:

- **Line of optoelectronic components:** photolithography, etching, deposition of metallic/dielectric layers, die bonding, wire bonding, packaging in an inert gas atmosphere.
- **Line of silicon components:** process based on CMOS (3 µm design rules) and EBL (< 1 µm) technologies, comprising RCA cleaning, photolithography, thermal processes, plasma and wet etching, metal deposition and ion implantation, and micro-assembly operations; 1,200 m² cleanroom.
- **Wide-gap semiconductor component line:** A complete technological line located in clean technology rooms in ISO-5 and ISO-6 standards with an area of approx. 600 m2, designed for the production of semiconductor devices based on gallium nitride on various substrates (GaN, SiC, Si, sapphire) and for the deposition processes of various types of thin metallic, dielectric and semiconductor layers.
- **LTCC technology line:** This line supports a comprehensive approach to LTCC circuit manufacturing, encompassing ceramic tape processing, via formation, the application of conductive, resistive, and dielectric layers, lamination, final thermal processing, assembly, and final testing. The line enables the creation of three-dimensional structures formed from laminated ceramic sheets featuring printed functional layers.

Partners

- The Łukasiewicz – Institute of Microelectronics and Photonics is intensively developing cooperation with the semiconductor industry in the field of advanced characterization of materials and device structures, particularly using SIMS techniques.
- Collaboration with **TRUMPF Photonic Components GmbH** (now **Western Digital Europe**) involves VCSEL measurements at the epitaxial wafer level and on finished devices..
- Analyses of IGZO materials and TFT transistors are being conducted for **Pragmatic Semiconductors**.
- Research on SiC materials is being conducted in collaboration with **Infineon Austria**.
- Over the past year, a collaboration with **Apple** (Munich) was also initiated in the field of VCSEL and semiconductor diode measurements.



Source: Łukasiewicz-IMIF

POLISH SEMICONDUCTORS ECOSYSTEM / KEY COMPANIES

CEZAMAT

CEZAMAT is a multidisciplinary research, development, and technology commercialization center operating under the auspices of **the Warsaw University of Technology**. It comprises a complex of specialized laboratories dedicated to research on materials used in microelectronics, optoelectronics, nanoelectronics, and bioelectronics. In 2013, the European Union provided **€76.6 million** in funding for the project, the total cost of which amounted to **€90 million**. The cornerstone for CEZAMAT's current headquarters was laid in September 2014. Currently CEZAMAT leads five technology-focused teams:

SCIENCE

Employment: **170**

CEZAMAT in numbers

- 170 employees
- 48 Scientists
- 4 Professors
- 37 Doctors and Habilitated Doctors
- 19 000 m² laboratory space
- 4000 m² clean rooms (ISO 4–6)
- 5500 m² office space

- **The Semiconductor Technology Group** conducts research on semiconductor materials, devices, and systems based not only on silicon technology but also on GaN and SiC. Research activities focus on CMOS devices, MOS/MIM tunnel diodes, and memory technologies. Work also encompasses nanostructure technologies for microelectronic and photonic devices. The technological processes involved include surface preparation, thin-film deposition, patterning, layer property modification, and etching.
- **The Integrated Photonics Group** conducts development work covering the design, simulation, fabrication, and characterization of integrated photonic devices and circuits. The group develops integrated photonic components operating in the visible light range, fabricated on silicon nitride, indium phosphide, and SOI material platforms. The Integrated Photonics Group focuses on devices applicable to biosensors, environmental sensors, and scientific research. Its technological infrastructure enables the in-house fabrication of oxide and nitride layers. The use of electron-beam lithography in the fabrication process allows for the prototyping of photonic components and circuits without the need for photolithographic masks or distributed energy sources (e.g., light).
- **The Internet of Things IoT team**, in collaboration with **STMicroelectronics**, has developed a distributed monitoring system: a self-organizing network of communicating sensors.
- **The Micro-Energy Generators team** focuses on developing new techniques for harvesting energy from the environment (e.g., heat, vibrations, motion).
- **The Optical Structure Technology Group** specializes in precision optical elements fabricated using processes typical of semiconductor manufacturing lines: photolithography, electron-beam lithography, thin-film deposition, and ion etching. The group has also developed a technology for producing phase structures via grayscale electron-beam lithography, a process that enables the patterning of structures with variable heights in a single step. Their portfolio includes, among others, Fresnel lenses and kinoforms (with thicknesses of 0.5–3 μm and diameters in the millimeter range), reflection and transmission holograms with sub-micron pixel sizes, metastructures, diffraction gratings, and microlens arrays. Additionally, a method has been developed to fabricate transmissive X-ray diffraction structures—featuring dimensions below 50 nm—on silicon nitride membranes.

CEZAMAT TECHNOLOGIES

Key technologies:

- Semiconductor devices (Si, FD-SOI, III–V, utwardzane radiacyjnie)
- Photonic integrated circuits (PIC)
- Micro- and nano-optics
- MEMS i MOEMS systems
- Printed and flexible electronics
- Energy generation and storage
- Biotechnology and biomedical engineering

Applications

- Safe, radiation-resistant electronics
- Internet of Things (IoT) and autonomous sensor networks
- Medical diagnostics and telemedicine
- Space sector, defense, and critical infrastructure
- Environmental monitoring and energy systems

Partners

Source: CEZAMAT

POLISH SEMICONDUCTORS ECOSYSTEM / MAIN **PROJECTS**

BUSINESS

2026

04.2026 SemiQa establishes a partnership with PSMC to develop an integrated AI accelerator

03.2026 VIGO Photonics acquires American competitor InfraRed Associates

12.2025 establishment of the **Polski Krzem** (Polish Silicon) company in Gdańsk, aimed at designing a Polish processor

2025

11.2025 CRW Telesystem-Mesko and **the Łukasiewicz Research Network** have signed a partnership agreement on electronics and optoelectronics research programme

03.2025 Openchip announces the establishment of an R&D center in Gdańsk

10.2025 CRDTI announces an investment in the production of 8-inch gallium nitride wafers

2024

04.2025 Arteris set up a R&D unit in Cracow

03.2025 Semiqua company has been established

10.2024 SK Hynix announces the establishment of an R&D center in Gdańsk

02.2024 VIGO Photonics begins implementation of the HyperPIC project, valued at **0.8 mld PLN**

SCIENCE

04.2026 Łukasiewicz IMiF acquires a molecular beam epitaxy (MBE) reactor for III-V compound semiconductors

04.2026 CEZAMAT invests in a nanoimprint lithography system

03.2026 CEZAMAT signs a cooperation agreement with **CEA-Leti** as part of the FAMES program

11.2025 Wrocław University of Science and Technology announces the design for the Centre for Micro- and Nanoelectronics, Microsystems, and Micro- and Nanoengineering building

11.2025 Łukasiewicz IMiF announces the inauguration of the Polish Node of the European Wide Bandgap Semiconductors Pilot Line

11.2025 CEZAMAT invests in an atomic force microscope and a contact profilometer

10.2025 Łukasiewicz IMiF launches the Polish Node of the European Wide Bandgap Semiconductors Pilot Line

12.2024 CEZAMAT in the **PIXEurope** pilot line project, Joint Chip Undertaking **0.4 mld EUR**

12.2024 CEZAMAT in the **FAMES** Joint Chip Undertaking pilot line project **0.83 mld EUR**

06.2024 Łukasiewicz IMiF joins the **WBG materials** pilot line project under the Chips Joint Undertaking

05.2024 Establishment of **the Microelectronics and Photonics Competence Centre** under the National Recovery Plan (KPO) by a consortium comprising **Łukasiewicz-IMiF, Łukasiewicz-ITR,** and **CEZAMAT PW**

POLISH SEMICONDUCTORS ECOSYSTEM / MAIN **PROJECTS**

VIGO Photonics: project HyperPIC

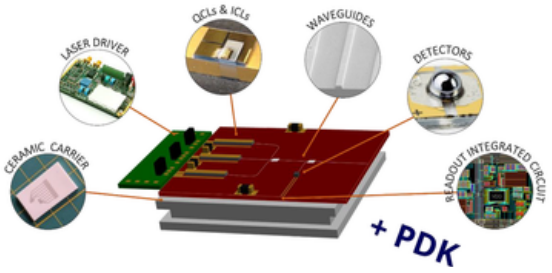
In February 2024, the **HyperPIC** project -valued at **PLN 878.6 million** - was included on the list of initiatives selected for EU funding amounting to **PLN 453.7 million.** The project aims to develop and implement integrated photonic circuit technology for mid-infrared detection (**MIRPIC**), build a complete production line for photonic integrated circuits, and establish a full supply chain for these components. The project entails developing new technologies and incurring significant investment and operational costs, as well as expenditures related to the commercialization of new products in a dynamic market.

Since 2020, VIGO has been developing photonic integrated circuit (PIC) technology as part of the MIRPIC project, a joint undertaking with the Warsaw University of Technology and the Łukasiewicz – Institute of Microelectronics and Photonics (IMiF). Research conducted to date has enabled the identification and resolution of fundamental technological challenges regarding component fabrication and integration, as well as the development of a set of basic functional building blocks for the technology. Future R&D efforts will focus primarily on extending the spectral operating range of the passive and active components within the PIC, optimizing fabrication technologies for mid-infrared waveguides, light sources, and detectors as well as advancing heterogeneous integration and packaging technologies. The development of technology demonstrators - specialized circuits designed for specific applications in sensing, telecommunications, and other fields, developed and manufactured at VIGO Photonics - also plays a vital role in the HyperPIC project.

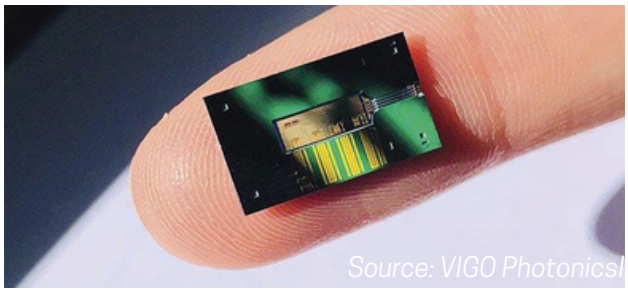
The mid-infrared market is virtually uncovered and represents a major business opportunity for VIGO Photonics; through the implementation of this project, the company **aims to become the world's first manufacturer of mid-infrared photonic integrated circuits (MIRPICs)**. Potential customers include manufacturers of medical electronics and pollution monitoring equipment, operators of critical infrastructure, and players in the IoT, automotive, and mobile device sectors.

The implementation of the HyperPIC project is planned for the years 2023–2030 and consists of two phases:

- R&D phases (**2023–2027**) – the value of this phase is **PLN 150,7 mln**
- the First Industrial Deployment phase (**2023–2030**), comprising investments in a new production line and the introduction of new products into production. The value of the second phase is **PLN 727.9 million**.



Construction of the VIGO Photonics PIC module



*Thanks to the development of photonic integrated circuits (**PICs**), the integration of photonics with CMOS platforms, and the implementation of advanced micro-optical packaging, size, weight, and power consumption will be significantly reduced, while functionality and scalability are enhanced.*

POLISH SEMICONDUCTORS ECOSYSTEM / MAIN **PROJECTS**

Fames

Warsaw University of Technology, acting through the **CEZAMAT** Institute of Microelectronics and Optoelectronics (IMiO), is a member of the **FAMES Pilot Line** consortium led by CEA-Leti, which comprises four host centers (CEA-Leti, Tyndall, VTT, and SAL). The total value of the project is estimated at **€830 million**, with **€8 million** allocated to Poland.

FAMES is the first fully operational pilot line launched under the European Chips JU (part of the European Chips Act). Its goal is to develop advanced, ultra-energy-efficient semiconductor technologies that are crucial for sustainable digital infrastructure, artificial intelligence, the Internet of Things (IoT), 6G communications, and next-generation electronic systems. The pilot line serves as a joint European industrial-research platform where companies (ranging from start-ups to large corporations), research institutes, and universities can design, prototype, test, and validate new integrated circuits at a near-industrial scale - faster and with lower risk - prior to mass production. The FAMES line focuses on **FD-SOI** (Fully Depleted Silicon-on-Insulator) technology. The project involves the development of five complementary technology groups: two new generations of FD-SOI nodes (10 nm and 7 nm), non-volatile semiconductor memories (OxRAM, FeRAM, MRAM, and FeFET), radio-frequency components (switches, filters, and capacitors), two 3D integration pathways (heterogeneous and sequential), and micro-inductors for DC-DC converters used in power management integrated circuits (PMICs).

Within the framework of **FAMES**, **the Warsaw University of Technology** focuses on two complementary areas: **integrated circuit design** - including the development of Process Design Kits (PDKs) - and **work on non-volatile semiconductor memory** of the **OxRAM** (**Oxide-based Resistive RAM**) type.

PW is participating in the development and characterization of OxRAM memory. Based on this technology, two demonstrator chips will be designed, extending the scope of FAMES to application areas of strategic importance: an AI accelerator utilizing OxRAM device arrays, and a hardware security demonstrator that leverages the stochastic properties of OxRAM to create True Random Number Generators (TRNGs) and Physical Unclonable Functions (PUFs)—components that form the foundation for the authentication and protection of modern electronics.

One outcome of the high regard for CEZAMAT's contribution to the FAMES program was the signing of a long-term R&D cooperation agreement with **CEA-Leti** in **March 2026**. The collaboration will focus on the joint development and implementation of FD-SOI technology and the development of radiation-hardened (rad-hard) technologies at CEZAMAT, cooperation on advanced microelectronic solutions implemented at CEA-Leti, the development of IoT technologies, and strengthening the position of FD-SOI within the European ecosystem.

POLISH SEMICONDUCTORS ECOSYSTEM / MAIN **PROJECTS**

PIXEurope

Warsaw University of Technology (the Institute of Microelectronics and Optoelectronics and **CEZAMAT**) has joined the consortium for the international PIXEurope project, which **aims to create the first open ecosystem for photonic integrated circuits (PICs)**. Led by the Institute of Photonic Sciences (ICFO), the PIXEurope consortium comprises 20 partners. This initiative is part of the European Chips Act and is implemented under the CHIPS Joint Undertaking program. The total value of the project is **€400 million.**

The line serves as a common European platform enabling companies - ranging from startups to large corporations - to design, prototype, test, and validate photonic circuits faster and with reduced risk, prior to the launch of full-scale production. It will be Europe's first fully integrated, distributed pilot line linking the entire PIC value chain - from design and fabrication to integration, packaging, and testing - across multiple coordinated European centers operating within a unified and standardized framework.

Poland participates in PIXEurope through the Warsaw University of Technology (WUT), contributing via the Institute of Microelectronics and Optoelectronics and the Centre for Advanced Materials and Technologies (CEZAMAT)—the country's largest high-tech research infrastructure.

As part of the Pilot Line, the **Warsaw University of Technology** focuses on **mid-infrared (mid-IR) photonic integration technologies** - an emerging field of strategic importance for sensing, industrial and environmental monitoring, free-space optical communication, and security applications. The university's contribution encompasses the development of a Ge-on-Si (germanium-on-silicon) photonic platform and a dedicated Process Design Kit (PDK) for mid-IR photonic integrated circuits (PICs). The Warsaw University of Technology is also responsible for developing a mid-IR sensing demonstrator, thereby extending the scope of PIXEurope into application areas beyond communications and computing. Work on hybrid integration—including the use of phase-change materials—further expands the Polish contribution to the initiative's functional capabilities.

Source: CEZAMAT

POLISH SEMICONDUCTORS ECOSYSTEM / MAIN **PROJECTS**

Chips Act - WBG Materials

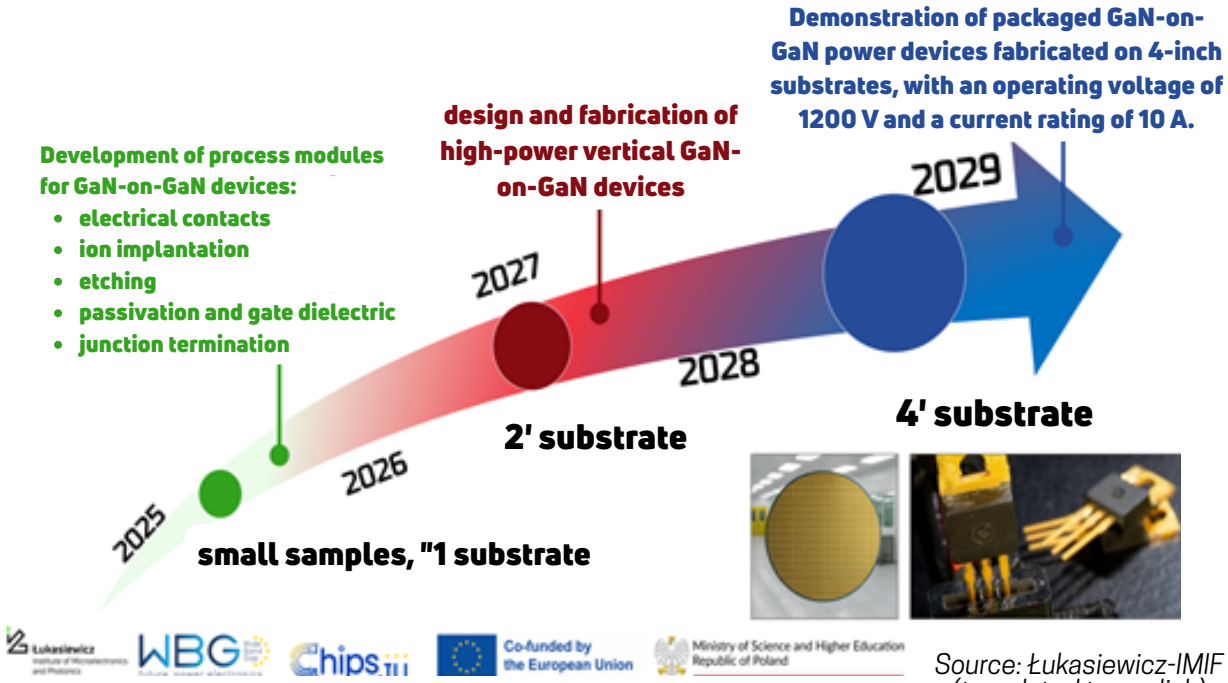
In April 2024, the **Chips Joint Undertaking,** operating under the European Chips Act, selected a team comprising **UNIPRESS** and **Łukasiewicz – IMiF** to implement one of four European pilot lines for advanced semiconductor technologies.

WBG Materials program will enable the development of innovative materials and device fabrication technologies based on wide-bandgap semiconductors - such as gallium nitride (GaN), silicon carbide (SiC), and gallium oxide (Ga2O3)—which are key components for applications in industry, automotive, renewable energy, consumer electronics, and defense.

The project aims to launch a pilot line and develop 10 nm and 7 nm **FD-SOI** technologies. As the only technology of its kind developed entirely within the European Union, it is of strategic importance for the advancement of semiconductor technology in Europe. Construction of the line has begun in 2025, and Łukasiewicz – IMiF and IWC PAN will receive **€50 million** to achieve the project's objectives, as part of an international consortium comprising 22 research institutions and universities from Italy, Sweden, Finland, Austria, Germany, France, and Poland.

Polish research and development entities - Łukasiewicz – IMiF and IWC PAS - **are responsible for developing techniques for growing GaN substrates and epitaxial layers, as well as technologies for manufacturing GaN- and Ga_2O_3-based devices.** Through its participation in the project, and by investing in cleanroom infrastructure expansion and the purchase of specialized equipment, Łukasiewicz – IMiF is establishing a dedicated production line for prototyping GaN-on-GaN power devices on 2-inch and 4-inch substrates.

Roadmap for vertical GaN devices at Łukasiewicz-IMIF



Source: Łukasiewicz-IMIF (translated to english)

POLISH SEMICONDUCTORS ECOSYSTEM / MAIN **PROJECTS**

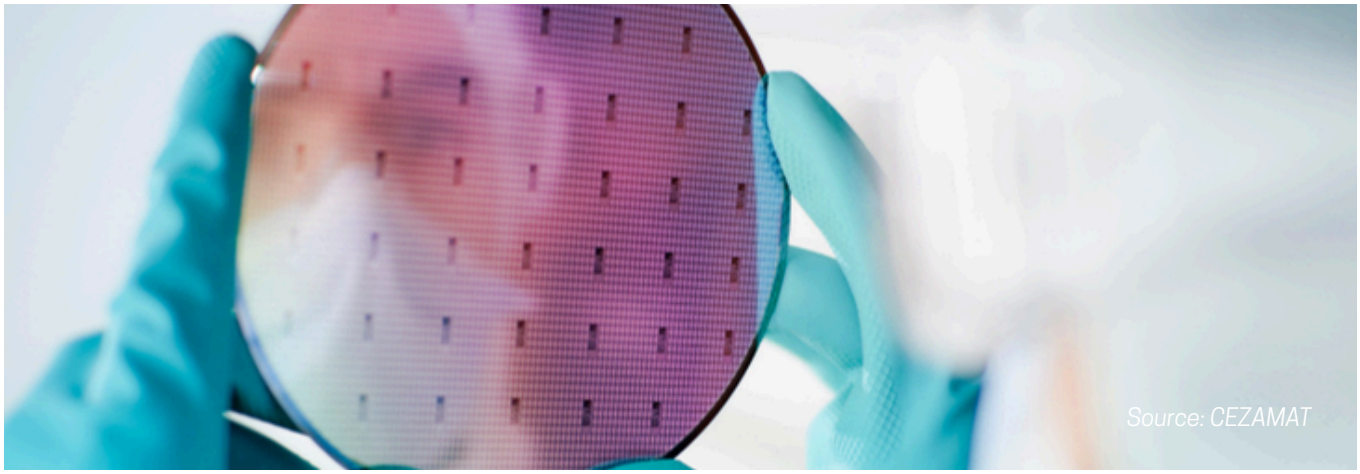
Centrum Kompetencji Mikroelektroniki i Fotoniki

The Microelectronics and Photonics Competence Centre, announced in **May 2024**, will be a joint venture between three research entities - funded by the National Recovery and Resilience Plan **(KPO): the Łukasiewicz – Institute of Microelectronics and Photonics (lead partner), the Łukasiewicz – Tele and Radio Research Institute,** and **CEZAMAT WUT.** The project is valued at **PLN 519.7 million**, with EU funding amounting to **PLN 370.0 million**, and is scheduled for completion by **2027**. One of the objectives is to establish new laboratories that, by leveraging unique expertise in the design and fabrication of both materials and devices, will drive a massive technological leap in Poland. Covering the entire spectrum from epitaxial layer growth technology to finished, innovative devices, the project will enable research using state-of-the-art equipment. Furthermore, advanced measurement systems will facilitate even more comprehensive characterization of materials and structures at the nanoscale.

As part of the project implemented by **CEZAMAT**, the Warsaw University of Technology will purchase and commission new technological, diagnostic, and measurement equipment for its existing laboratories. The equipment available at CEZAMAT, combined with the new units to be acquired, **will create a unique, nationwide technological line** for the **fabrication of photonic integrated circuits and microelectronic devices.** It will be the only facility in this part of Europe fully adapted for **200 mm** substrates. The investment cost for CEZAMAT will exceed **PLN 97 million**, with **PLN 70 million** provided in funding.

As part of the project carried out by the Ł**ukasiewicz – Tele and Radio Research Institute (ITR)**—with a total value of **PLN 25.6 million** (including **PLN 16.7 million in EU funding**)—the Institute will establish a Printed Circuit and Electronic Assembly Laboratory. The laboratory's research activities will focus on developing new solutions regarding design, material selection, and the optimization of technological and manufacturing processes for printed circuits, as well as the assembly and disassembly of electronic assemblies.

As part of the investment, the **Łukasiewicz – Institute of Microelectronics and Photonics** will build or modernize laboratories dedicated to Functional Materials, GaN Devices and Micro-assembly, Infrared Photonics, and Integrated Circuit and Electronic System Design, as well as the Graphene and Innovative Nanotechnology Center Laboratory and the Special Glass and Optical Fibers Laboratory. By early 2025, the first pieces of equipment purchased under the project had already arrived at the Łukasiewicz IMiF Smart Materials Laboratory.


Source: CEZAMAT

POLISH SEMICONDUCTORS ECOSYSTEM / INDEX

DESIGN AND PROGRAMMING OF SEMICONDUCTOR DEVICES

Sii sii.pl

For 20 years, Sii Polska has been developing semiconductor-related expertise across the industry's entire value chain, delivering solutions in product development, software engineering, quality assurance, and operations optimization. The company operates in technological domains such as firmware and BIOS platforms, DevSecOps, graphics drivers and displays, networking and Ethernet devices, storage and non-volatile memory, FPGAs, laboratory technical support, and AI in production integration processes.

With a team of over **7,300** specialists, Sii Polska combines extensive experience in engineering, research and development (R&D), and dedicated IT support to deliver projects for more than **200 clients worldwide**—including semiconductor manufacturers, fabless companies, hardware vendors, and technology innovators in the high-tech sector.

Sii Polska is frequently chosen by hardware manufacturers seeking support for integrating hardware with software and for delivering complex firmware and application solutions that quickly and effectively enhance the value of existing products.

Source: Łukasiewicz-IMiF

Analog Devices analog.com

The Cracow-based Analog Devices company commenced operations in 2017. In addition to commercial activities, the company designs semiconductor integrated circuits, specializing in products based on converters featuring varying degrees of built-in programmability. All technologies designed or developed by the Polish entity are exported to Analog Devices Int. The company employs 18 people in Kraków.

Nordic Semiconductors nordicsemi.com

Established in 2014, Nordic Semiconductor's Cracow-based company focuses on research and development in wireless technologies—specifically Bluetooth Low Energy (BLE) and other Internet of Things (IoT) solutions. Globally, the company designs and manufactures integrated circuits, modules, and embedded systems, with a focus on low-power technologies. The Kraków software development center employs 112 people.

Grifin Microelectronics grifinmicro.com

Grifin Microelectronics is a rapidly growing company specializing in the design of advanced integrated circuits. The company designs complete integrated circuits for applications across the consumer, industrial, medical, and automotive sectors. Its team consists of experienced engineers and specialists who are passionate about creating cutting-edge technologies.

Phison / Wilk Elektronik j.v.

In September 2024, **Wilk Elektronik**—Europe's only manufacturer of DRAM computer memory—announced a strategic partnership with Taiwan's **Phison Electronics**, a leader in the production of NAND flash controllers and NAND storage solutions. The two companies plan to establish a specialized R&D team tasked primarily with developing firmware for SSDs and flash memory products. They are also considering collaboration on aiDAPTIV+ technology, a proprietary solution from the Taiwanese company; this technology could enable the creation of local computing centers and data optimization without the need to transfer data to the cloud.

POLISH SEMICONDUCTORS ECOSYSTEM / INDEX

DESIGN AND PROGRAMMING OF SEMICONDUCTOR DEVICES

Cadence cadence.com

Cadence Design Systems specializes in **electronic design automation** (EDA) solutions, engineering software, and intellectual property used in the design of semiconductor circuits and electronic systems. The company's products and technologies support the **design of integrated circuits**, printed circuit boards, and System-on-Chip (SoC) systems in applications in sectors such as communications, data processing, automotive, and artificial intelligence.

Cadence has been operating in Poland since **2013**, developing engineering and R&D activities within a global network of technology centers. The Polish branch is headquartered in **Katowice**, with design activities also conducted in **Warsaw**. A total of **100 engineers** are employed in the Polish branches.

Cadence's Polish teams focus on design of **high-performance communication interfaces** used in modern semiconductor systems. This includes, among others, the following: IP solutions for standards such as PCI Express (PCIe), USB, Ethernet, and new protocols used in AI accelerator systems, such as UALink. Cadence's portfolio includes both the controller and PHY layers, as well as a broad set of Verification IP (VIP) tools and components, enabling comprehensive verification of protocols and functionalities at the IP, SoC, and system levels.

A significant element of the engineering activities carried out in Poland is the development of design methodologies and technologies supporting the design and verification of integrated circuits, particularly in the area of advanced digital and analog systems. The scope of work includes, among others, the development of simulation environments, virtual platforms, hardware emulators, and verification tools used throughout the entire design cycle – from the IP level to complex systems.

Additionally, Cadence's operations in Poland include developing competencies related to **multi-chip architectures** (chiplet-based design), which are a key development direction for the semiconductor industry. The company provides solutions supporting chiplet integration, including die-to-die (D2D) interfaces and communication standards (e.g., UCIe), as well as design and verification tools enabling the construction of scalable systems for high-performance computing and artificial intelligence applications. The company's operations in Poland are part of the semiconductor industry's fabless design segment, which encompasses the design, verification, and development of integrated circuit technologies without in-house production.

Arteris arteris.com

In April **2025**, Arteris announced the opening of a new research and development center and customer support center in **Krakow**. Arteris is a leading provider of IP systems that accelerate the development of SoCs for modern electronic systems. Arteris's network-on-a-chip (NoC) solutions and system-on-a-chip integration automation technology deliver higher product performance with lower power consumption and faster time-to-market.

Arteris serves over 200 customers worldwide, comprising teams in 11 countries. The work carried out at the company's Krakow branch supports the development of **IP technology for networking functional blocks in integrated circuits and software for automating SoC integration in the semiconductor industry**. The Polish branch of Arteris is developing a partnership with the AGH University of Science and Technology in Krakow, one of the leading academic institutions in Poland.

POLISH SEMICONDUCTORS ECOSYSTEM / INDEX

ChipCraft chipcraft-ic.com

ChipCraft is a Polish fabless design company founded in 2016 by engineers from the Warsaw University of Technology. It specializes in the design of analog and digital integrated circuits and their key functional blocks, offering comprehensive support for the development of custom semiconductor solutions.
ChipCraft's flagship product is **NaviSoC**, a fully integrated **GNSS** receiver combined with an application processor on a single semiconductor die; designed for the mass market, it offers high resistance to jamming and spoofing. The NaviSoC system-on-chip is intended for solutions requiring high positioning precision, high reliability and security, compact size, and low power consumption. NaviSoC is suitable for a wide range of applications, including location-based services (LBS), IoT, lane-level navigation, unmanned aerial vehicles (UAVs) and autonomous vehicles, high-value asset tracking, time synchronization, precision agriculture, as well as surveying and terrain mapping.

ChipCraft has developed a family of Polish **RISC-V** processors from the ground up, ensuring full control over the source code and eliminating the risk of so-called backdoors. The processor achieves operating frequencies of up to 1.5 GHz using 7 nm FinFET ASAP7 technology. Full control over the source code eliminates the risk of unwanted functions, which is crucial for high-security applications, including in the defense sector.

ChipCraft offers design and industrialization services for specialized integrated circuits. Its highly experienced, multidisciplinary team of engineers comprises system and processor designers - including processor microarchitecture specialists - analog and digital VLSI designers, verification specialists, and embedded software developers, as well as experts in satellite navigation and signal processing.

DESIGN AND PROGRAMMING OF SEMICONDUCTOR DEVICES

Phonemic phonemic.pl

Based in Lublin, the company carries out **RTL and firmware design** and verification for **FPGAs** and specialized integrated circuits, covering applications such as digital signal processing (5G, LTE), cryptography, and system-level design and integration.
Among other activities, the company specializes in developing IP cores tailored to specific client needs-spanning everything from the mathematical and algorithmic levels to microarchitecture—as well as researching hardware architectures and developing algorithms. Phonemic has created a range of proprietary IP cores, including arithmetic cores (FFT, cryptography, FIR filters), complex radio processing cores (DPD, CFR), and sophisticated voice interface solutions (VAD).

Silicon Creations siliconcr.com

The Polish branch of an Atlanta-based American company founded in **2006**. Silicon Creations is a designer of silicon-based IP solutions, with offices in the USA and Poland and sales operations worldwide. The company specializes in the design of **clocking circuits (PLLs), oscillators, low-power and high-performance multi-protocol SerDes communication blocks, and high-speed LVDS I/O circuits.** Its components are used in smartphones and other portable devices, consumer electronics, processors, networking equipment, automotive systems, IoT, and medical devices. Silicon Creations designs semiconductors that are mass-produced using technologies ranging from 3 nm to 180 nm.

POLISH SEMICONDUCTORS ECOSYSTEM / INDEX

DESIGN AND PROGRAMMING OF SEMICONDUCTOR DEVICES

Openchip openchip.com

Openchip specializes in designing acceleration systems for high-performance computing (HPC) and System-on-Chip (SoC) solutions based on the RISC-V architecture. The company's technologies are applied in fields such as genomics, astrophysics, the energy sector, and aviation. Openchip is headquartered in Barcelona and also operates a unit in Italy. **In March 2025, the company announced the opening of a new R&D center in Gdańsk**, which will focus on developing advanced processors and accelerators for data centers and HPC, compliant with European energy efficiency standards. The company's accelerators will be designed using silicon node technologies and the open RISC-V instruction set architecture. Openchip expanded its workforce to **several dozen** employees during 2025.

OmniChip omni-chip.com

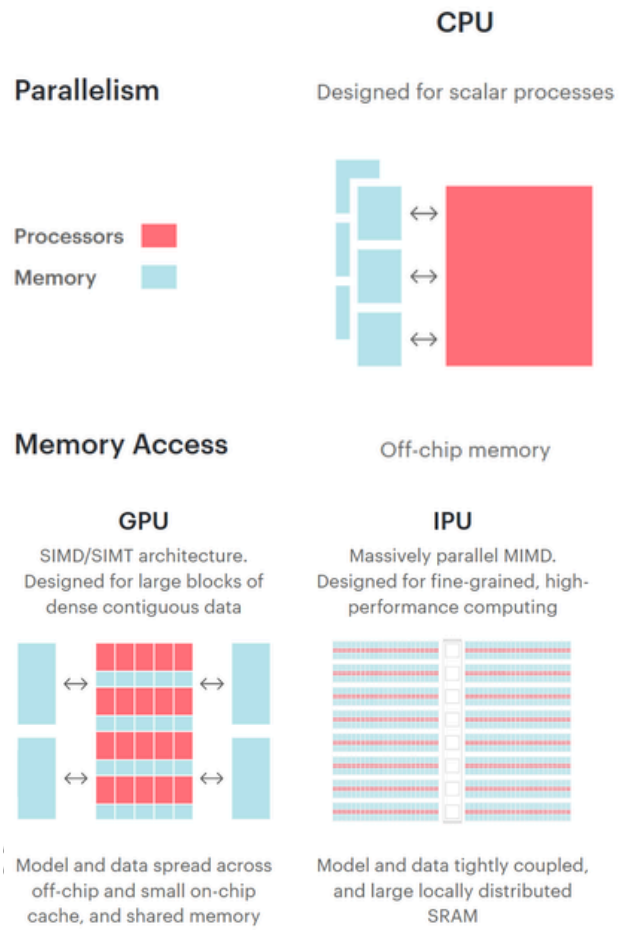
The company designs integrated circuits under contract for semiconductor companies and develops products and IP blocks for its own product line. In 2022, it conducted research as part of the Realholo project—funded by Horizon 2020—which involved implementing and verifying the digital component of an integrated circuit designed for 3D holographic displays. OmniChip also developed a platform supporting the **NFC** protocol. The Warsaw-based company's activities include **architectural analysis and design, IP design, system verification, and FPGA prototyping**.

ALDEC-ADT aldec.com

Founded in 1998, ALDEC-ADT develops advanced software for **FPGA** and **ASIC** design. The company's flagship products are Active-HDL and Riviera-PRO—integrated design environments for digital systems utilizing hardware description languages such as VHDL, Verilog HDL, SystemVerilog, and SystemC. The Polish branch serves as the EDA software development center for the entire corporation.

Graphcore graphcore.ai

Founded in Bristol in 2016 and part of SoftBank Group since 2024, Graphcore manufactures AI computing systems powered by the Intelligence Processing Unit (IPU). This state-of-the-art processor was designed by the company to meet the unique computational demands of AI. The IPU enables AI researchers to explore entirely new areas of study that were previously inaccessible with existing technologies. Graphcore systems are used in AI applications across a wide range of industries, including pharmaceuticals, financial services, automotive, and consumer internet services. **Graphcore's new branch in Gdańsk will serve as its research and development center**. Currently employing **22 people**, the company plans rapid expansion for the Polish unit.



Source: Graphcore

POLISH SEMICONDUCTORS ECOSYSTEM / INDEX

DESIGN AND PROGRAMMING OF SEMICONDUCTOR DEVICES

Synopsys synopsys.com

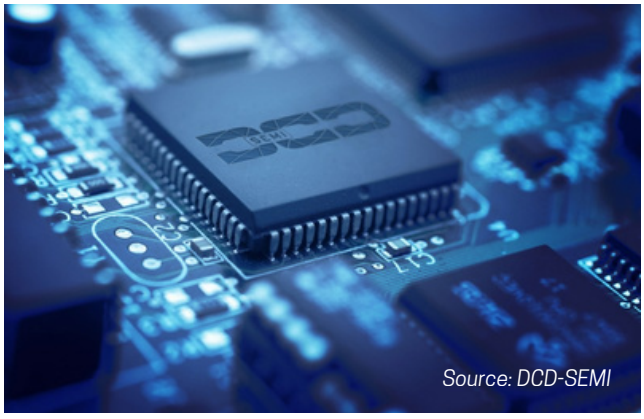
Synopsys is an American corporation that supports manufacturers of integrated circuits and electronic devices by providing electronic design automation (**EDA**) software, **pre-designed design blocks known as IP cores, and hardware and software for prototyping and testing**. Synopsys's solutions cover the design and verification of semiconductor chips, encompassing both hardware and software aspects. Founded in 1987, the company currently employs over 20,000 people. Its **Gdańsk** branch employs approximately **200 engineers** who design integrated circuits (focusing on analog design and physical layout—the arrangement of transistors) and support the development of prototyping systems and EDA tools. Engineers in Gdańsk work on technologies including the 2nm node.

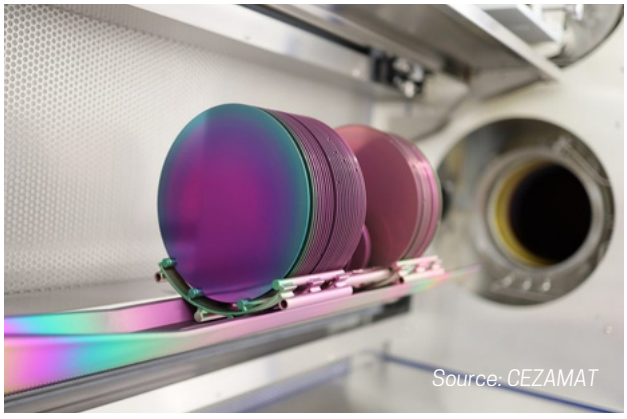
DCD-SEMI dcd.pl

Digital Core Design was founded in 1999 in **Bytom** by graduates of the Silesian University of Technology. From the very beginning, the company has focused on designing specialized integrated circuits (IP cores and SoCs) used in virtually every sector of the economy—ranging from consumer electronics, mobile technology, and the automotive industry to the military and aerospace sectors. Over its **25 years** of operation, DCD has designed more than 100 different types of architectures, which have been incorporated into at least one billion electronic devices worldwide.

The company's workforce includes both engineers with decades of experience and talented university graduates who are gaining unique skills—unmatched on a national scale—and enriching them with their own innovative ideas. Thanks to this blend of experience and fresh perspective, Digital Core Design has built its brand on the global IT market over the course of more than two decades, supplying solutions to companies such as VW, Toyota, Sony, Raytheon, Osram, Bosch, ABB, Siemens, Micron, and Honeywell. The company's major achievements include:

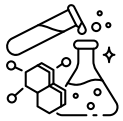
- the first **CAN XL** interface in Poland dedicated to automotive applications (data transmission speeds of up to 20 Mbps; additional capability for Functional Safety implementation),
- **32-bit and 64-bit RISC-V** processors, along with a suite of peripherals and extensions (DCD is a member of RISC-V International, an organization bringing together companies developing the RISC-V standard),
- t**he world's fastest 8051-family processor**, which—thanks to its immensely popular architecture—is used in applications such as IoT, IIoT, and consumer electronics (the DQ80251 delivers over 75 times the performance of the Intel-originated standard and, with its extensive set of peripherals, is an excellent choice for power- and performance-optimized designs).
- the 100% secure Polish cryptographic system **Crypt-One**, offering hardware-based cryptography and so-called lightweight cryptography,
- A comprehensive portfolio of peripherals—such as USB, I2C, I3C, SPI, and UART—compatible with both DCD chips and third-party devices.


Source: DCD-SEMI


Source: CEZAMAT

POLISH SEMICONDUCTORS ECOSYSTEM / INDEX

MATERIALS



QNA Technology

qnatechnology.com

QNA Technology focuses on developing the technology and production procedures for semiconductor nanomaterials (so-called quantum dots), which are free from heavy metals and used in display manufacturing. The company distinguishes itself through an approach that encompasses the entire value chain – from material synthesis and functionalization to industrial implementation.

A key element of the offering consists of semiconductor inks based on **quantum dots**, which enable the printing of structures on various types of substrates, including flexible and transparent ones. A quantum dot itself is a semiconductor nanocrystal measuring just a few nanometers; it is composed of a core responsible for light emission, a protective shell, and an organic layer that ensures compatibility with the intended application environment.

The company's flagship product is **PureBlue.dots**—blue quantum dots developed for QDEL technology applications. In **2025**, the company completed the validation of its pilot quantum dot synthesis line, marking the achievement of technological readiness and the ability to supply materials at a scale sufficient for testing and short production runs. Concurrently, the company launched its own application laboratory to develop QDEL diodes, thereby supporting clients in optimizing device parameters and accelerating the transition to commercialization.

QNA Technology's strategy entails the continued expansion of its materials portfolio. In 2025, work began on the **Zn(Mg)O** nanomaterial, which is intended to complement quantum dots in display structures while simultaneously opening up new application possibilities in other areas of advanced technology.

The company is also intensifying its market diversification efforts. Alongside the display sector, new applications are being explored, including in the field of packaging authentication. An agreement to this effect has been signed with the US company **Reborn Materials.**

Noctiluca

noctiluca.com

Noctiluca develops and manufactures **advanced chemical compounds** (high-performance materials) that **serve as the key luminescence-generating component of OLED displays** and **light sources**.

Their parameters determine the efficiency of converting electric current into light, the quality of the image displayed in OLED technology, color saturation, and brightness. These compounds emit light via thermally activated delayed fluorescence (TADF) for use in 3rd and 4th generation OLED technologies. Noctiluca also develops specialized support materials specifically designed for these materials, which constitute the majority of the emissive layer of an OLED display, offering its customers a turnkey solution consisting of an emitter, sensitizer, and hosts. The entire process is encapsulated within the OLED structure, which then forms a panel and, subsequently, a display matrix, generating the image visible to the user.

The company cooperates with global players in the display market, including LG Display, TCL, ITRI and Inuru, and its solutions are tested by most of the largest OLED panel manufacturers.

2025 proved to be a breakthrough year for Noctiluca. The company moved from laboratory development to industrial validation of its flagship NCEIL material with tier-1 display manufacturers. Tests demonstrated a more than 100 percent improvement in blue OLED pixel lifespan—a parameter considered one of the industry's greatest challenges.

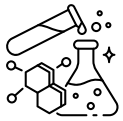
Technological advancements are reflected in financial results. In 2025, the company's revenues increased to **PLN 3.64 million** (**+48% year-on-year**), with a simultaneous improvement in EBITDA.

Noctiluca's strategy assumes further expansion of its materials portfolio. In addition to emitters, additional components for the emissive layer are being developed, allowing the company to strengthen its position as a comprehensive materials supplier for OLED manufacturers. Simultaneously, the company is investing in developing its own engineering expertise and research and production facilities.

The next step is to transition to full qualification of materials for mass production. The company is currently conducting several parallel commercialization projects, which, if successful, could translate into a significant increase in the scale of its operations in the coming years.

POLISH SEMICONDUCTORS EKOSYSTEM / INDEX

MATERIALS



PCC Rokita

PCC Rokita has developed a technology for producing **phosphorus oxychloride (POCl3)** of very high purity, making it suitable for use in demanding industries such as electronics and fiber optics. The POCl3 Solar Grade product is a response to the growing market demand for solar cells and n- and p-type semiconductor devices.

Phosphorus oxychloride's growing popularity in the production of n- and p-type emitters and semiconductors is due to its ease of application on process lines, good process control, good storage stability, homogeneity, and high yield. Solar Grade POCl3 is characterized by a very low metal content, the sum of which does not exceed 1 ppm, resulting in a product with a purity class of 99.9999% (6N).

PCC Rokita SA offers POCl3 Solar Grade in specialized 1-liter containers that are prepared for direct use in semiconductor production and are suitable for use in atmospheric and low-pressure diffusion furnaces.

Nanoxo

nanoxo.eu

Nanoxo is a Polish chemical company specializing in the design and manufacture of **advanced functional materials** with a wide range of industrial applications. The company's operations are based on the expertise of its research and development team and an approach that closely links materials design with their validation and implementation.

A key area of development currently involves **heavy metal-free quantum dots, particularly zinc oxide-based nanoparticles**. In parallel, the company is developing technologies in the field of organometallic chemistry, planning to expand its portfolio with new materials that meet the needs of dynamically developing industrial sectors.

Photonics Innovation

photin.eu

The company, using the trade name Photin, provides **thin-film semiconductor** fabrication services using MOCVD technology. The company produces indium phosphide in small batches, offering clients worldwide research and development services and small-scale production of complex semiconductor devices (InP, GaAs, GaSb, InAs).

ENSEMBLE³

ensemble3.eu

The company was founded in 2020 with Łukasiewicz-IMiF as its sole shareholder. Employing nearly **100 staff**, the company serves as a center of excellence in **nanophotonics, advanced materials, and modern crystal growth technologies**. Just a year after its founding, it secured significant funding under the Teaming for Excellence program (Horizon 2020), strengthening its position in the field of modern technologies.

The project involved renowned institutions such as the University of Warsaw and the Łukasiewicz Institute of Microelectronics and Photonics, as well as the Karlsruhe Institute of Technology, Sapienza University of Rome and the nanoGUNE Institute from San Sebastian, Spain.

ENSEMBLE3 works on the development of innovative material technologies and modern materials with **unique electromagnetic properties** that can find applications in fields such as photonics, optoelectronics, telecommunications, solar energy conversion, medicine and aviation.

The company produces **AIIIBV single crystals**: gallium arsenide (GaAs), indium arsenide (InAs), gallium phosphide (GaP), indium phosphide (InP), and gallium antimonide (GaSb). These materials are used in the production of microwave integrated circuits, various types of diodes (including LEDs), infrared radiation detectors, photodetectors, and more. ENSEMBLE3 also produces silicon carbide (SiC), several types of thermoelectric materials, and oxides for use in optics and optoelectronics.

In recent years, the company has been steadily strengthening its position in the European semiconductor supply chain. In 2024, it gained market attention as the only European Union producer of **gallium antimonide (GaSb)**, a material of strategic importance for infrared detection and defense applications, among other applications.

The Centre also develops competences in the commercialization of technology and cooperation with industry, offering infrastructure and know-how for both experienced research teams and young innovators working on new material solutions.

POLISH SEMICONDUCTORS ECOSYSTEM / INDEX

IDM

Kubara Lamina kubaralamina.com

Kubara Lamina's manufacturing operations are based on two main pillars: **high-power semiconductor** production and microwave production. The company produces high-power diodes and thyristors, amplitrons, absorbers, magnetrons, and short-circuits. The company's products are used in the power electronics and military industries, primarily in the construction of radar equipment. Currently, in collaboration with the Military University of Technology, the Polish Air Force Institute of Technology, Siltec, and ZM Tarnów, Kubara Lamina is developing a new type of weapon designed to eliminate unmanned aerial vehicles.

TopGaN topganlasers.com

Founded in 2001, TopGaN was the second company in Europe to demonstrate **violet laser diodes** and has since pioneered numerous innovative technologies in the field of **nitride-based emitters**. TopGaN manufactures advanced GaN visible and UV emitters operating in the spectral range of 395-461 nm, including wavelength-tunable laser diodes (external-cavity laser diodes), semiconductor optical amplifiers, superluminescent diodes, and custom photonic integrated circuits.

The company's recent achievements include the optimization of the design of violet lasers in the 415-435 nm wavelength range. Additionally, by modifying the assembly process and epitaxy structure, the lifetime of 421 nm lasers was achieved over 10,000. hours, which is a critical parameter of these devices on the industrial market. The company is also a participant in the European TEAM TECH program, the aim of which is to produce a monolithic, two-dimensional semiconductor system of laser diodes using a system of GaN materials.

ResQuant resquant.com

ResQuant is a Polish deep-tech company based in Łódź, specializing in hardware **implementations of post-quantum cryptography (PQC)** standards. Founded in 2020, ResQuant designs **cryptographic coprocessors**—hardware modules responsible for generating and storing keys and performing encryption operations. These are offered in a licensed model (IP core), allowing integrated circuit manufacturers to easily integrate them into their products.

The company is collaborating with partners such as AROBS Polska, Creotech Instruments, the Quantum Technology Cluster, ChipCraft, Cybernetica, and the Institute of Communications. ResQuant plans to begin producing prototypes using **22nm technology at GlobalFoundries' factories in Dresden**.

The company's main products include:

-**IP Core Licenses for PQC** – proprietary hardware accelerator implementations for post-quantum algorithms such as Dilithium, Kyber, SHAKE, AES, XMSS and SPHINCS+, available in variants optimized for area, power consumption and speed.

- **FPGA with PQC** – off-the-shelf devices with a pre-integrated NIST-compliant cryptography stack, enabling hands-on testing in mission-critical environments.

- **System-on-a-Chip PQC** – currently in the research and development phase, with its own secure hardware environment intended for the IoT, military, automotive and ICT markets, designed and manufactured in the European Union.

POLISH SEMICONDUCTORS ECOSYSTEM / INDEX

IDM

CRW Telesystem Mesko

telesystem.eu

The company specializes in R&D and manufacturing for the defense industry. It develops, implements, and manufactures optoelectronic and electronic assemblies for portable anti-aircraft and anti-tank systems. It is the creator and manufacturer of globally unique **InSb** and **PbS photodetectors**, specialized optics, and modern hybrid preamplifiers. The company has developed and implemented a number of critical production technologies, including technologies for the **precision assembly of optical elements and technologies for the production of high-detection photodetectors** (D*>10^10 (cm*Hz^0.5/W)).
Recently, the company has been significantly expanding its production and engineering capabilities. One of its most important projects is the construction of a new facility worth approximately PLN 150 million. The investment includes both infrastructure and technological equipment, which will expand its capabilities in the design, testing, production, and integration of advanced electronic and optoelectronic systems, as well as the assembly of precision electronics. The new infrastructure accelerates product implementation and increases production scale. This is a response to growing demand from the Polish Armed Forces and international customers.
In parallel, the company is developing the Piorun system in two ways: modernizing the current version and working on its successor (Piorun 2). Key development directions include improving guidance algorithms, modernizing control systems, increasing jamming resistance, and adapting the systems to current battlefield requirements.
Another important area of activity is the development of laser guidance technology for precision-guided munitions (including the APR 155 and APR 120) and anti-tank systems such as the Pirat missile.
The company is also developing international cooperation in the field of optoelectronics, integrating advanced surveillance systems with command and control systems. These solutions enhance users' reconnaissance capabilities and situational awareness.

SemiQa

semiqua.com

SemiQa is a pioneer in the design of **accelerators for artificial intelligence** (including graphics processing units). Its flagship SoC projects utilizing **Analog Neural Networks** include the ANN1000 for autonomous systems (e.g., drones and targeting) and the ANN2000 for computing applications in data centers. Analog Neural Network technology processes signals continuously in analog form, eliminating the drawbacks of traditional digital systems. This allows the offered systems to operate significantly faster than those available on the market while consuming significantly less power. The company is part of the prestigious **NVIDIA Inception** program and global incubators, including Japan's **KGAP+** and Taiwan's **Garage+**. The company won the prestigious Taiwanese competition in the IC Design for AI category, organized by the Taipei Computer Association. SemiQa, leveraging the support of the Taiwanese government, **plans to open a Taiwanese branch** no later than the second half of 2026.

Source: CEZAMAT

POLISH SEMICONDUCTORS ECOSYSTEM / INDEX

EQUIPMENT

Insoptics insoptics.com

Insoptics manufactures and develops **spectroscopic devices for monitoring plasma processes** such as thin film deposition, plasma etching, PECVD, atmospheric plasma, etc. Insoptics offers products such as devices such as monochromators, spectrometers, and spectrographs.

Instytut Fotonowy fotonowy.pl

The company develops prototypes and unique custom devices for use in **semiconductor research and development processes.** The company designs semiconductor characterization instruments, photoelectrochemistry and electrochemistry devices and accessories, various types of spectrometers, specialized light sources, and more.

Systerion systerion.com

Systerion develops innovative **nanopositioning** and **nanoalignment** equipment designed for ultra-high precision tasks in the most demanding industrial environments. Nanoalignment systems are optimized for industries requiring extreme precision, including **semiconductor manufacturing, optical systems, and advanced manufacturing.** Systerion systems deliver the highest accuracy, ensuring precise alignment on the nanometer scale. Systerion's nanopositioning solutions are designed to achieve sub-nanometer accuracy even in the most demanding industrial environments. Designed for stability and repeatability, the systems support high-precision processes where even the smallest deviation can impact performance.

ASYS Poland asys-micro.de

ASYS Polska is a subsidiary of a German company that has been producing **industrial robots for the semiconductor industry** for over 15 years. These robots meet the highest cleanliness standards, even operating in vacuum conditions. The company supplies robots to companies such as ASML, VDL Groep, and Bosch Polska. In January 2024, ASYS Polska announced it would invest PLN 20 million to expand its plant with a new hall and robot production equipment.

BACK-END

NanoresLAB nanores.ventures

NanoresLAB is a **nanotechnology laboratory** that supports its clients from the semiconductor industry using tools such as SEM (Scanning Electron Microscopy), FIB (Focused Ion Beam), TEM (Transmission Electron Microscopy), EDS (Energy Dispersive Spectroscopy), CT (Computerized Tomography) and femtosecond laser.

NanoresLAB's unique competence is the ability to **examine entire semiconductor** components, starting from a rough tomographic scan (e.g. to locate potential defects), through cutting using special mechanical saws and a femtosecond laser, making microsections and optical microscopy, to descending to the inspection of single-nanometer-thick layers using SEM/FIB sections and transmission microscopy.

Topography and morphology measurements of semiconductor structures such as nanowires, heterostructures, distributed Bragg reflectors, quantum wells, etc., are based on ultra-high-resolution scanning electron microscopy (SEM), combined with energy-dispersive spectroscopy (EDS) for elemental analysis and focused ion beam (FIB) for cross-sectional analysis and wafer preparation using transmission electron microscopy (TEM). These techniques enable microscopic inspection of semiconductor structures, ensuring compliance with quality standards and helping engineers understand material behavior and optimize performance. Detecting defects or anomalies early in the process can prevent costly errors later.

The research aims to improve or modify chip connections to correct design errors or test proposed changes before commissioning the costly production of another wafer. The company's clients include universities and institutes, startups, mid-sized companies, and international corporations from various European countries. NanoresLAB has completed over **1,000 projects** and research assignments for over **250 clients** from more than a dozen European countries and around the world.

POLISH SEMICONDUCTORS ECOSYSTEM / INDEX

EQUIPMENT

Fluence Technology fluence.technology

Fluence Technology Sp. z o.o. is a Polish technology company founded in **2016**, specializing in the design and production of femtosecond lasers. The company operates under a model that integrates research and development with industrial implementation, focusing on solutions for advanced manufacturing, materials micromachining, and scientific and medical applications.

The key technology being developed by the company is femtosecond lasers based on fiber-optic architecture (all-fiber). The use of passive mode interference and the elimination of degradation-prone components (e.g., SESAM) allows for high operational stability and resistance to vibration, shock, and changing environmental conditions. Fluence solutions are characterized by reduced maintenance requirements and long service life.

The company develops its own ultrafast oscillators (including 1030 nm), which form the basis of its systems. These products are tested for operation over a wide temperature range and resistance to mechanical stress, enabling their use in industrial environments.

The company's founders hail from academia. They have been working on femtosecond laser technology since the early 2000s. In subsequent stages of development, the company was supported by public funds (including the National Centre for Research and Development) and investment capital.

In recent years, the company has transformed from a design and prototyping model to an organization focused on scaling production. The industrial segment now accounts for the majority of sales, and the company is developing structures that enable serial production of devices and handle larger order volumes.

Fluence Technology consistently expands its export business. Key markets include East Asia (China, South Korea, Japan, Taiwan) and North America, where the semiconductor and electronics industries are concentrated. The company's products are used in applications such as microelectronics, consumer electronics component manufacturing, and systems requiring high-precision material processing.

The company's strategy assumes further scaling of operations, development of its product portfolio, and building a competitive position against global laser technology suppliers. The development of applications in the medical sector and strengthening its competencies in advanced industrial technologies also remain key elements.

SCIENCE

Unipress unipress.waw.pl

The Institute of High Pressure Physics of the Polish Academy of Sciences, also known as Unipress, is a leading research center in the fields of semiconductor physics and technology, as well as materials science. The institute is particularly recognized worldwide for its unique knowledge and expertise in the **crystallization of bulk gallium nitride (GaN) crystals**. Research conducted at the Institute encompasses the physics and epitaxy of nitride semiconductors, the fabrication of biomaterials, soft matter and glass research, THz radiation physics, and other areas. Unipress develops and manufactures high-pressure devices for research laboratories worldwide.

Unipress's MBE Epitaxy Laboratory (NL-14) specializes in the development of blue light-emitting diodes (LEDs) and laser diodes (LDs) fabricated using nitrogen plasma-assisted molecular beam epitaxy (PAMBE). The team produces long-wavelength light emitters, theoretically modeling quantum structures, and optimizing the optical and electrical parameters of devices fabricated on gallium nitride (GaN) substrates.

ELECTRONICS INDUSTRY **IN POLAND**

EMS segment

It is frequently stated that Poland is a manufacturing support of Europe. In the case of the electronics industry, this statement is most certainly true.
Western companies quickly recognized Poland's immense potential, sparking a wave of investments that continues to this day. One of the initial investments was a factory manufacturing **Philips** TV sets, present in Kwidzyn since mid 90s. In 2004, the plant was acquired by EMS producer, **Jabil Circuit**, which, along with **Lacroix Electronics**, operating since 1998, and **Flex**, present in Poland since 2000, laid the foundations for a modern **EMS industry in Poland**.

Currently, the EMS industry in Poland consists of about **90** entities, including about **60** with Polish capital, which currently gives Poland, according to the estimates of **in4ma** and **tek.info.pl**, about **7.5%** of European EMS production [1]. Poland is the **fifth largest EMS center in Europe** in terms of production volume. [2]

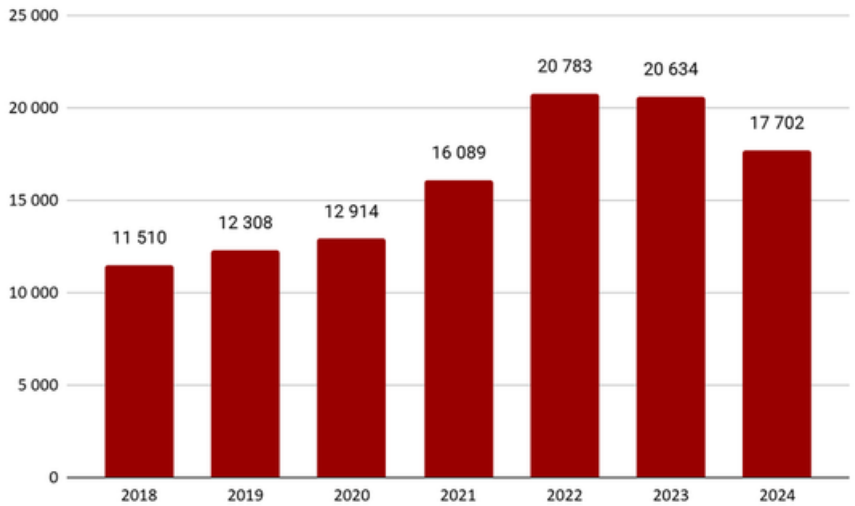
KEY **EMS** INVESTORS

Assel
Bitron
C-MAC / Vector Blue Hub
Darekon
E.G.O.
Elhurt EMS
Fideltronik
Flex
Hanza
InterPhone Service
Jabil
Kimball
Kitron
Lacroix Electronics
Norautron Electronics
Nordes
Scanfil Poland
Tabemax
TS Tronic
Universal Scientific Industrial

EMS INDUSTRY IN POLAND

- Share of **European EMS production: 7.5%**
- Poland is the **fifth** largest market in Europe
- The industry consists of approximately **90 entities**
- About **85%** of the industry's turnover comes from **international companies**
- The industry is largely concentrated in the **north of Poland**
- In the last few years, the vast majority of international EMS operating in Poland have made **large investments** in production capacity, preparing Polish units for further growth

EMS INDUSTRY TURNOVER **2018-2024** [PLN MILLION][1]



Source: tek.info.pl

[1]tek.info.pl/article/4946
[2] tek.info.pl/article/868

ELECTRONICS INDUSTRY **IN POLAND**

OEM segment

Of course, it wasn't just EMS companies that invested, but also **OEMs**. In the 1990s and 2000s, consumer electronics companies such as Philips and a group of TV manufacturers: **LG**, **Sharp**, **TCL**, and **TVP** found favorable conditions for growth in Poland. Examples of successful investments also include **TRUMPF Huettinger**, **JOYNEXT**, **Diehl**, **TechniSat**, and many others.

The development of foreign OEMs also led to the development of domestic companies, of which there are about 300 operating in Poland, and nearly 40 of them achieved a turnover exceeding EUR 25 million per year. [1]

KEY **OEM** INVESTORS

Aptiv
Compal
Diehl
Glamox
Nice
Heesung Electronics
Ifm ecolink
ismaControlli
Joynext
LG Electronics
LG Innotek
Lumel SA
Mobase Electronics
Scanreco
Sharp
Signify
TCL
Technisat Digital
TPV Displays
Trumpf Huettinger
Voestalpine Signaling
Woodward

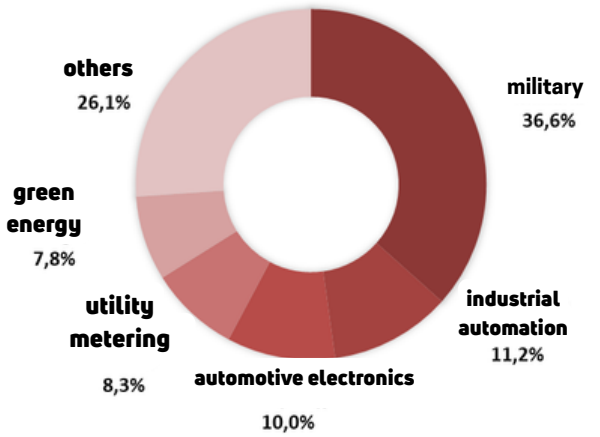
OEM INVESTORS

- In 2024, the turnover of the largest OEM investors reached **PLN 37.3 billion**
- In recent years, many investments in Poland concerned the production of TV sets - this industry still accounts for **38.0%** of the total OEM turnover in Poland
- Among the largest OEM investments, the most active are investors from the **US**, **Korea**, and **China**. Among European countries, companies from **Germany** and **Italy** lead the way

DOMESTIC OEM

- In 2018, the turnover of TOP100 OEMs with Polish capital amounted to **PLN 8.6 billion**, while in 2024 it increased to **PLN 17.1 billion**
- In 2024, the turnover of TOP100 Polish OEM companies increased by 19.5%
- In 2024, **military electronics** accounted for **36.6%** of the turnover of TOP100 OEMs
- Apart from the military, significant sectors include industrial electronics, automotive, utility metering and green energy
- From 2018 onwards, green energy is the fastest growing major industry
- The annual turnover of **42** OEM companies exceeds **PLN 100 million**
- The turnover of three of them, WB Electronics (military), Bury (automotive) and Apator (metering) exceeds **PLN 1 billion**
- In recent years, many Polish OEM companies have been appreciated by global players and have become targets for takeovers

DISTRIBUTION OF POLISH OEM PRODUCTION BY INDUSTRY (2004)[1]



Source: tek.info.pl

[1] tek.info.pl/article/4980

R&D centers

The nature of production in Poland has changed dramatically since the '90s. Initially, it often involved the simplest, strictly mechanical assembly. With constant skills' improvement, Polish factories were entrusted with increasingly complex tasks, including the full NPI and PCBA processes. **However, in recent years, a new trend become noticeable: more and more research and development centers are being established in Poland.** These either complement run in Poland for many years processes (such as Jabil's R&D center in Wrocław or Nippon Seiki's unit in Gdańsk) or are entirely new entities. **From designing electronic systems to manufacturing semiconductors, it's just one step in the electronics industry supply chain, and this sector could become the natural support base for the emerging semiconductor industry.**

Poland has been particularly favored by the **automotive industry**, which established here its design centers. One of the first and largest at the same time is the R&D unit of the American company **Aptiv** in Kraków, employing around 2,500 engineers. This center works on technologies such as gesture recognition, wireless communication, driver monitoring systems, autonomous driving, and several others. It's also worthwhile to mention that some of these technologies are subsequently produced at the manufacturing facility in Gdańsk.

The German conglomerate **ZF** has established a similar model of presence in Poland, combining production and research functions. ZF owns three research units and two PCBA plants in Poland, working on active safety systems and autonomous driving technologies, with some of these systems being manufactured in specialized plants in Częstochowa and Wrocław. Another important example is **Nippon Seiki** concern, which develops head-up displays (HUD) in Gdańsk and manufactures them in a new factory near Łódź.[1] The automotive industry, of course, does not exhaust the topic of R&D centers' presence in Poland, as there are dozens of them in the country. Among the facilities established in recent years are highly advanced units from companies specializing in measurement equipment (**Rigaku, Pendulum Instruments, Bustec**), industrial applications (**ifm ecolink, voestalpine Signalling, Honeywell**), and many others. Also, we shall not forget the R&D centers belonging to Polish OEM companies, with a count of over hundred units, often employing dozens of people.

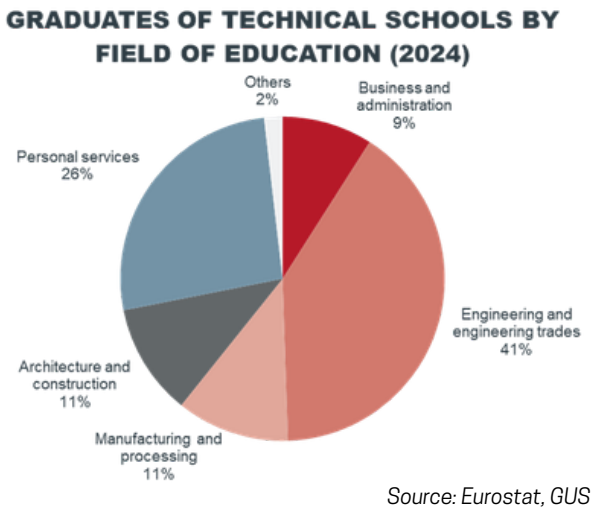
FOREIGN INVESTORS **R&D** UNITS

ABB
ADVA Optical
Aptiv
Arobs
Becker Avionics
BorgWarner
Bosch
Bustec
CAREL
DGS Diagnostics
Diehl
DIP Draexlmaier
Dynamic Precision
Ericsson
Etteplan
Fluke
Gebauer & Griller
Gigaset
Glamox
Honeywell
IAV
ifm ecolink
ismaControlli
Jabil
Kongsberg Maritime
LTTS
Lumel
Monroe
Nexteer
Nice
Nippon Seiki
Nokia
Pendulum Instruments
Renau
Rigaku
Samsung
Taoglas
Trumpf Huettinger
Verkada
voestalpine Signalling
VOLVO
VW
ZF

WORKFORCE FOR SEMICONDUCTOR PRODUCTION

The fact that Poland currently lacks adequate human resources is the most frequently cited obstacle to the development of the semiconductor industry in Poland. Universities are not training staff for this industry because they have no one to train them for, investors are not coming because there are no staff: the vicious circle is complete. However, the arrival of new investments will most likely break this cycle. A very important comment, coming from a global perspective, also comes from **SEMI**. This is the perspective of a large business with unlimited possibilities and vast experience:

"We can achieve the greatest innovation by employing people with diverse experience, from various fields—chemistry, physics, microelectronics—to solve problems, as well as a wide range of specialties that might not seem closely related to semiconductors," ***Max Dropiński*** *from* ***SEMI*** *said in an interview for tek.info.pl. "Progress in front-end and back-end processes is very rapid, and what you can learn at university today will be different in five years. Only when we employ people with diverse experience and train them within our manufacturing processes do we create a team capable of developing the technologies of the future.*



Source: Eurostat, GUS

It's more about basic experience and attitude: it's not critical that a specific field—for example, microelectronics—is super-developed or that there are tons of candidates who have graduated from that field. This is helpful, but not essential [1]".

Secondary education

The Central Statistical Office (GUS) shows that technical schools remain one of the largest segments of post-primary education: in the 2024/2025 school year, there were **687.7** thousand students in technical schools [1]. In the same report, the GUS indicates that among technical school graduates in the 2023/2024 school year, the most important field groups included the engineering and technical subgroup, with a share of **22.7%**, and information and communication technologies, with a share of **22.2%**.

Based on data from the Central Statistical Office, the number of technical school graduates can be estimated: in the 2023/24 school year, out of 320.6 thousand upper secondary school graduates, technical school graduates constituted 35.8%, i.e. approximately 114.8 thousand. The share of the engineering and technical subgroup is 22.7%, i.e. approximately 26.0 thousand people.

The technical professions closest to the semiconductor sector include electronics technicians, mechatronics technicians, automation technicians, electrical technicians, and robotics technicians. The number of graduates in the narrow pool of electrical-electronics-mechatronics professions is estimated at **6,000-7,400**.

The core competencies of technician graduates are specific to semiconductor production, but require additional specialization in areas such as ESD, process cleanliness, statistical process control, preventive maintenance, quality documentation, shift work and chemical safety [2].

[1] https://tek.info.pl/article/3847
[2] developed by Nexttechnology.io for PAIH

WORKFORCE FOR SEMICONDUCTOR PRODUCTION

THE POTENTIAL OF HIGHER EDUCATION IN **STEM** FIELDS IN POLAND

Gdańsk University of Technology
Faculty of Electronics, Telecommunications and Computer Science

Gdynia Maritime University
Faculty of Electronics

Koszalin University of Technology
Faculty of Electronics and Computer Science

Poznań University of Technology
Faculty of Electronics and Telecommunications

Wrocław University of Science and Technology
Faculty of Electronics, Photonics and Microsystems
Faculty of Computer Science and Telecommunications
Faculty of Fundamental Problems of Technology

Kielce University of Technology
Faculty of Electrical Engineering, Automation and Computer Science

AGH University of Science and Technology
Faculty of Computer Science, Electronics and Telecommunications

Krakow University of Technology
Faculty of Electrical and Computer Engineering

Silesian University of Technology
Faculty of Electrical Engineering
Faculty of Automation, Electronics and Computer Science

Białystok University of Technology
Faculty of electronics

Military University of Technology
Faculty of Electronics
Faculty of Optoelectronics

Warsaw University of Technology
Faculty of Electronics and Information Technology

Bydgoszcz University of Technology
Faculty of Telecommunications, Computer Science and Electrical Engineering

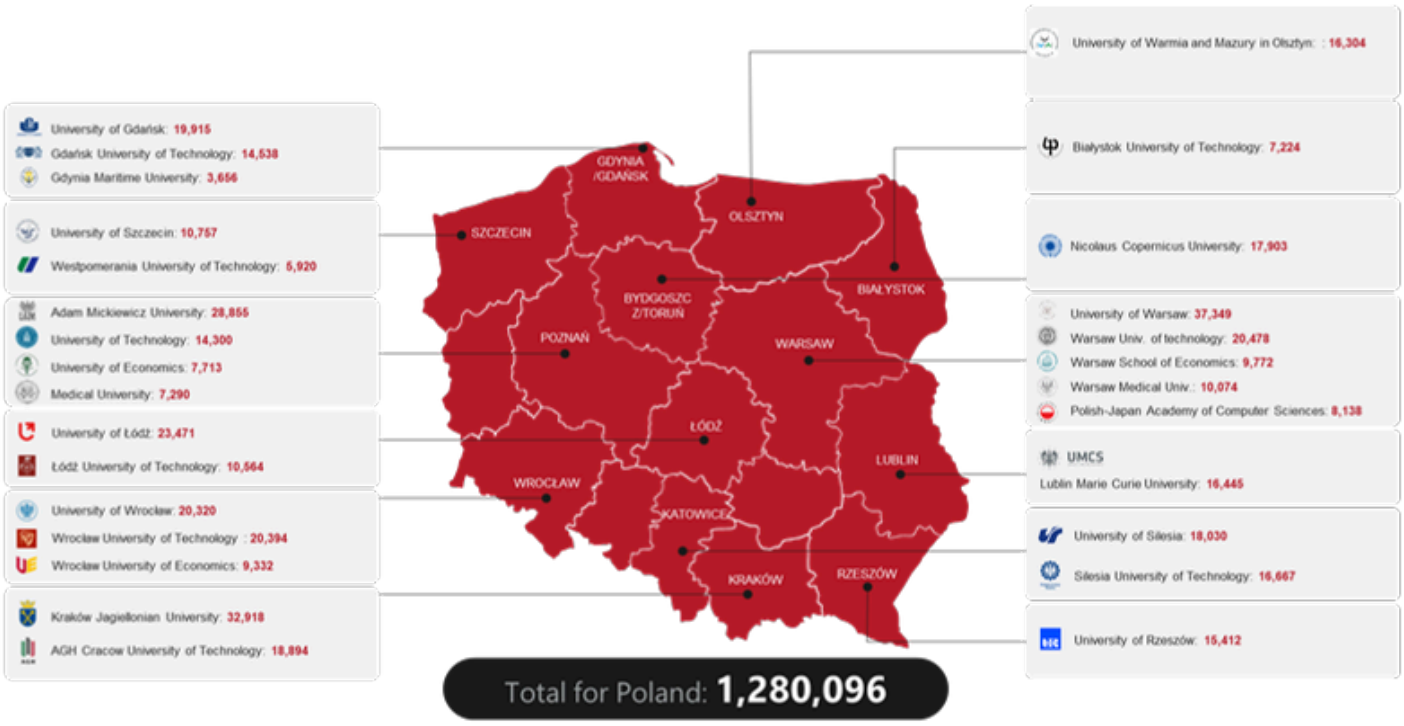
Lodz University of Technology
Faculty of Electrical, Electronic, Computer and Automation Engineering

Lublin University of Technology
Faculty of Electrical Engineering and Computer Science

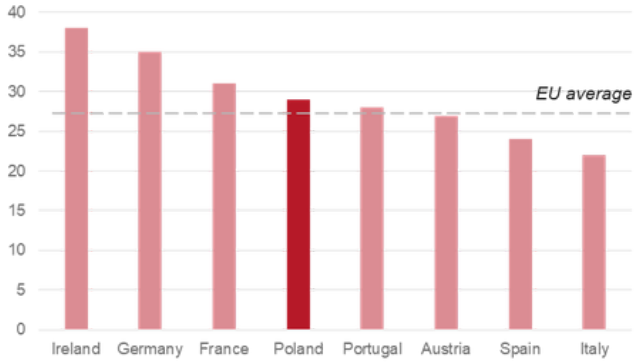
Rzeszów University of Technology
Faculty of Electrical Engineering and Computer Science

WORKFORCE FOR SEMICONDUCTOR PRODUCTION

SELECTED **UNIVERSITIES**

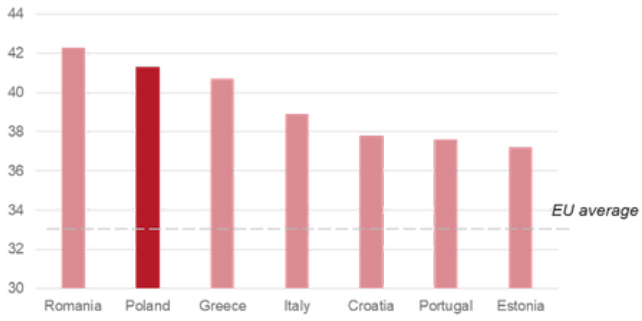


STEM graduates per 1000 residents aged 20-29 (2023)



fourth place in Europe in terms of STEM graduates

women among STEM graduates



second place in Europe in terms of the share of women among STEM graduates

POLISH **LAW** AND SUPPORT FORMS FOR INVESTORS

The government program aimed at boosting investments that enhance the innovation and competitiveness of the Polish economy shall be a subject of semiconductor sector revitalization. This project, titled '**Program for Supporting Investments of Significant Importance to the Polish Economy for 2011-2030**', was initiated by the **Ministry of Development and Technology**. Within its framework, the program offers funding in a form of **grants** for both large-scale strategic investments and medium-sized innovative projects. Rewarded are initiatives that adopt modern technologies and plan research and development activities, which directly contribute to the development of the semiconductor sector.

A significant step towards strengthening the Polish semiconductor sector is also the '**National Framework for Supporting Strategic Semiconductor Investments**' project, proposed by the Ministry of Digital Affairs with an intended **$1.5 billion** budget. The program's objectives cover the entire semiconductor value chain—from design phases to production capacities. The goal is to support projects developing semiconductor manufacturing in Poland with an emphasis on investments enhancing the EU's economy competitiveness, supporting sustainable economic growth, and creating new jobs. To obtain assistance, the **investor must invest at least PLN 850 million** in an integrated production facility or an open EU factory within a maximum of **20 years**, and create and maintain at least **100 new jobs** throughout the entire project duration. Furthermore, the program requires investors to collaborate with research and academic institutions.

On February 6, 2025, the Ministry of Digital Affairs presented **Poland's development strategy for the semiconductor industry**. The government's strategy is based on seven pillars designed to create favorable conditions for the development of the semiconductor industry in Poland: **infrastructure** (investments in modern laboratories, production plants, and research and development centers), **state support** (supporting Polish innovation, initiating projects, implementing new technologies, and developing exports), **international cooperation** (building partnerships with global industry leaders), **investment and financing** (raising funds and providing funding for domestic projects and attracting large international investors), **human resources training and education** (developing human resources in the semiconductor sector), **water and energy availability** (ensuring the necessary resources for production), and **the availability of chemicals and raw materials** (stabilizing the supply chain of key materials).

POLISH **LAW** AND SUPPORT FORMS FOR INVESTORS

Both the European Chips Act and manufacturers like Intel are focused on selecting locations that not only provide **access to a skilled workforce** but also benefit from **environmentally friendly and economically viable energy sources.** Poland is undertaking various initiatives to reduce the environmental impact of its energy sector, with the development of renewable energy sources being a key factor. By 2030, more than half of the country's electricity is expected to come from renewable sources, primarily from PV and wind energy. According to the strategy developed in **PEP2040**, reducing the emissions of the energy sector will lead to increased competitiveness of the economy.

The global semiconductor market has experienced significant disruptions due to the COVID-19 pandemic and the war in Ukraine. The resulting reconfiguration of the global semiconductor market opens up opportunities for the entire Europe, including Poland - there has been a diversification in shifting semiconductor production from the Far East to other locations, primarily in the USA and Europe. This goes beyond mere plans or announcements. We are talking about actual programs that financially support the development of large research institutes and semiconductor companies. These initiatives, backed by specific budgets, are being implemented both in Europe and the United States. This trend is already irreversible and appears highly favorable from Polish and European perspectives. Secondly, looking at economic indicators, we are in a phase of gradually emerging from the crisis. If no further unforeseen events occur, we should see moderate but dynamic growth - says DSc Mariusz Sochacki, professor at the Institute of Microelectronics and Optoelectronics at Warsaw University of Technology, in an interview with tek.info.pl [1].

- When engaging in semiconductor production, it is also essential to prioritize collaboration. This opportunity has become more evident than ever, as U.S. restrictions on Chinese participation in the supply chain have created additional space. For example, GlobalFoundries has developed numerous joint ventures worldwide—such as with Qualcomm in New York and STMicroelectronics in France—to reduce investment expenditure and rapidly scale up chip production. Chip manufacturers should similarly pursue joint ventures within the European Union. Ones, that facilitate quicker establishment of new sites with lower financial outlays than operating independently, notes Łukasz Wiśniewski, a consultant from Kearney's Warsaw Office [2].

A detailed description of the state administration's support for the semiconductor sector is included in the supplement **PAIH Support for Entrepreneurs in the Semiconductor Sector** (page 56), instruments stimulating scientific research are included in the **NCBR Support Offer** (page 60)

[1] Source: *https://tek.info.pl/article/3716/wyzwania_i_osiagniecia_polskiego_przemyslu_polprzewodnikowego*
[2] Kearney on the semiconductor market: Europe enters the fray. 2023, Kearney

SWOT ANALYSIS

OPPORTUNITIES	THREATS
• The European Chips Act stimulates semiconductor industry growth across Europe. Chip Act 2 is to come soon • The COVID-19 pandemic has triggered a noticeable trend of shifting production closer to Europe (nearshoring) • Positive experience of foreign investors in other electronic market segments • High level of International connections in the supply chain • Geographical proximity of European semiconductor supply chain factories • Established of relations with Taiwanese partners: SEMI, TeaLa, TAIROA, and Taiwania Capital	• Competition from Western European countries • Other Central and Eastern European countries increasing role on the international stage • Dominance of certain countries at specific stages of the supply chain, hindering the development of other countries • Investors' fears of war with Russia • Poor knowledge of the potential of the Polish semiconductor industry and Polish technologies in the world
STRENGHTS	**WEAKNESSES**
• The presence of several companies in the semiconductor industry's supply chain, including key investors (Intel, SK Hynix, Trumpf Huettinger) • Well-developed electronics market segments: OEM and EMS • Well-developed sectors supporting semiconductor development: military, dual-use production automation, and software. • High level of higher education and faculty • Well-developed system of government incentives for investors; support from the Polish Investment and Trade Agency (PAIH) and the Polish Agency for Enterprise Development (PARP)	• Small number of higher education programs, including elements preparing students for work in the semiconductor industry • Limited financial resources of Polish companies compared to the capital needs of the semiconductor industry • Small number of skilled workforce ready to work in semiconductor production • Lack of a well-developed supply ecosystem for semiconductors in Poland • Low participation of Polish companies in the global semiconductor supply chain • Lack of trade organization dedicated for semicon ecosystem integration

PAIH SUPPORT FOR INVESTORS FROM THE SEMICONDUCTOR SECTOR

Europejski akt o półprzewodnikach

The **European Semiconductor Act** aims to support investment in semiconductor production, development of advanced technologies, and promotion of research and innovation in this field. This act aims to help European companies gain a competitive position in the global market. Poland responded by adopting a National Framework, under which a **semiconductor company can obtain support for a project aimed at establishing an integrated production facility or an open-source factory in the EU**, as defined in the European Act. The maximum allowable support for a project is determined based on the identified financing gap in relation to project costs. The investor must commit to investing at least **PLN 850 million** over the project implementation period, which cannot exceed **20 years**, and to create at least **100 new jobs** and maintaining them until the project's completion. The Polish Investment and Trade Agency (PAIH) provides information on this form of public aid, supports investors in the process of assessing project eligibility, and assists in preparing application documentation. The current national framework sets the budget until 2026.

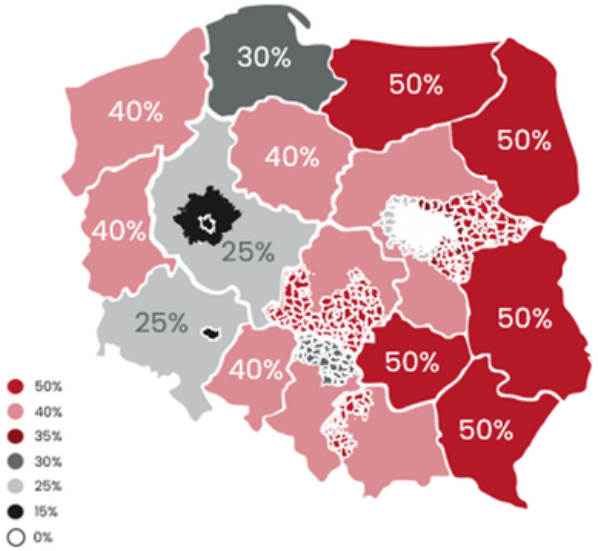
REGIONAL SUPPORT

Government support for investors in Poland is typically provided through regional state aid, primarily through two instruments: **corporate income tax (CIT) exemptions** within the Polish Investment Zone and **cash grants** awarded under the government's subsidy program. The total amount of support available to an investor is limited by the maximum regional aid intensity applicable at the project's location, as defined in the regional aid map for **2022–2027.**

CIT EXEMPTIONS

Currently, it is possible to benefit from income tax exemptions throughout Poland where regional aid is available. The period for which the support decision is issued depends on the intensity of public aid for the given investment location and can be **12, 14, or 15 years**. The decision is issued on behalf of the minister responsible for economic affairs by the Special Economic Zone managing the given area.

REGIONAL AID INTENSITY MAP



PAIH SUPPORT FOR INVESTORS FROM THE SEMICONDUCTOR SECTOR

GOVERNMENT SUBSIDIES

Government subsidies in Poland are awarded under the **2011–2030** Investment Support Programme, administered by the Ministry of Development and Technology. Support is provided in the form of a direct cash grant based on a bilateral agreement between the investor and the Ministry.

However, according to official information published by the Ministry of Development and Technology, the budget allocated for the current program has been exhausted. Therefore, new applications exceeding the available budget cannot receive funding under the current program. Under the current program, all grant agreements must be signed by the end of June 2026. At the same time, the Ministry is working on a new cash grant program, and applications submitted but not reviewed before the end of the current program may be considered under the new program if they meet its future criteria.

TAX EXEMPTIONS

Tax relief for entrepreneurs is a special entitlement that allows for a reduction in the amount of taxes that businesses would otherwise have to pay. These reliefs allow companies to save money, increasing profitability and opportunities to invest in company development.

- **R&D relief** is an incentive supporting entrepreneurs conducting research and development activities. It allows for the deduction of eligible costs related to R&D activities from the tax base of business income (PIT) or from tax-deductible costs other than capital gains income (CIT). This relief allows costs incurred for R&D activities to be counted twice when calculating the income tax due.
- **The relief for innovative employees** complements the R&D relief. If the eligible costs of R&D activities exceed the entrepreneur's income for a given tax year, the entrepreneur can reduce the PIT advances due on salaries paid to innovative employees by the amount of these costs.
- **The robotization tax relief** allows entrepreneurs to deduct from their income tax base an additional 50% deduction for costs related to robotization investments.
- **The prototype tax relief** supports investors in the pre-mass production phase by allowing them to deduct from their tax base the costs of trial production of a new product and the costs of introducing the new product to the market.

POLAND - TAIWAN RELATIONS

The year **2022** proved to be a **breakthrough** for PAIH and its cooperation with Taiwan. PAIH actively sought Intel's $4.6 billion investment in an advanced chip integration and testing center by promoting Poland as a potential location for semiconductor investments. In the same year, the agency established close cooperation with Taiwan, initiated during the first visit to Poland by Taiwanese investment fund **Taiwania Capital**. The fund played a significant role in promoting Poland in Taiwan, and the cooperation between PAIH and Taiwania Capital enabled Taiwanese partners to familiarize themselves with the potential of the Polish market and Polish companies in the initial period. In September 2022, PAIH hosted the **first Taiwanese semiconductor research and development mission in Warsaw and Wrocław.** During this mission, a Polish-Taiwanese **intergovernmental group for semiconductors was established** at the Ministry of Development and Technology (MRiT), which meets annually to summarize the cooperation. From 2022, PAIH consistently continues to promote the Polish semiconductor ecosystem and is in talks with potential investors in Taiwan. In 2023, the agency launched its flagship promotional campaign in Taipei: the **Polish National Pavilion** at the **Semicon Taiwan** trade fair. Since then, the Polish Pavilion, along with the accompanying event, the **Poland-Taiwan Business Forum**, has become an annual tradition, bringing Poland closer to potential Taiwanese partners. Thanks to this PAIH initiative, a number of contacts were established in the business and government communities, which laid the foundations for current bilateral cooperation and significantly improved Poland's recognition among Taiwanese. In 2024, new entities were established, such as Semicon Supply Poland, the Polish-Taiwanese Chamber of Commerce and Industry, and the Taiwanese-Polish Chamber of Commerce (TAIPO), which joined in supporting the partnership with Taiwan. In **September 2026**, During the SEMICON Taiwan trade fair, PAIH will once again promote Poland as a strategic partner for Taiwan in Central Europe.

TSMC's decision to invest in Europe significantly strengthened mutual interest between Poland and Taiwan. The location of the chip factory in Dresden – just **100 kilometers from the Polish border** – created new opportunities for cooperation for Polish and Taiwanese companies.

In **March 2025, TEEMA**, the largest organization representing the Taiwanese electronics industry, visited **Katowice** and **Wrocław**. In a special report published by TEEMA after the 2025 visit, Poland was recognized as an integral part of the European '*semiconductor triangle*,' playing a strategic role in the ICT ecosystem and becoming a key future center for the Taiwanese semiconductor and ICT industries.

The **ICT triangle concept** (Katowice-Wrocław-Łódź) translated into concrete decisions and projects a year later.

*In **March 2026**, **TEEMA** confirmed its interest in establishing a Technology Park in Poland, and in **May 2026**, **Foxconn** announced a Polish-Taiwanese partnership with **ElectroMobility Poland**. The joint project aims to create a production and development hub for the electromobility industry in Jaworzno, including the development of a portfolio of electric vehicles.*

Author: Agnieszka Szweda, PAIH

POLAND - TAIWAN RELATIONS

March 2026: TEEMA plans to establish a technology park in Poland with the participation of Taiwanese electronics companies**.**

July 2025: Pomerania Development Agency (ARP) and **TAIPO** signed a letter of intent to assess the possibility of creating a dedicated industrial park in Pomerania for Taiwanese companies from the high-tech, electronics, and semiconductor sectors.

June 2025: The Polish Investment and Trade Agency (PAIH) represented Poland at **Silicon Saxony Day** in Dresden, encouraging companies present at the event, including **TSMC**, to establish cooperation with the Polish industry.

September 2024: Wilk Elektronik and **Phison Electronics** signed a Memorandum of Understanding (MoU) to establish a joint venture focused on developing firmware for SSDs and flash memory.

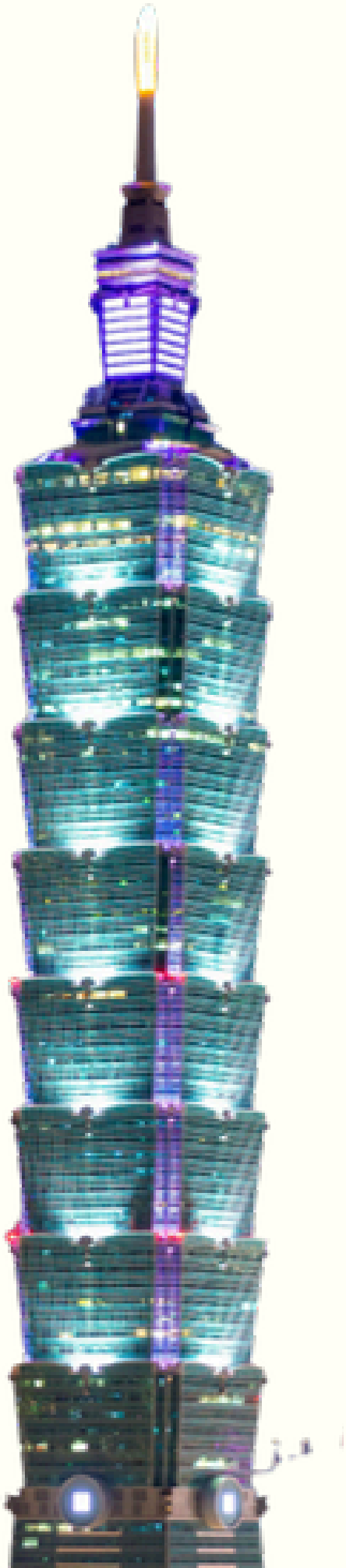
May 2024: The Polish Investment and Trade Agency (PAIH), in cooperation with TeaLA (a Taiwanese organization of TSMC suppliers), organized the Economic Forum *Polish Chemistry for Semiconductors* in Taipei.

April 2024: Advantech announced the opening of a new logistics hub in Poland, supporting the Taiwanese company's European operations.

July 2023: Exatel S.A. and **Chunghwa Telecom Company** signed a Memorandum of Understanding (MoU) to implement joint projects in the fields of cybersecurity, research, and development (R&D), and SDN technologies.

June 2022: Taiwania Capital made its first buisness trip to Poland, marking the beginning of its cooperation with PAIH to explore the potential of the Polish market for Taiwan.

September 2020: Universal Scientific Instruments, part of the Taiwanese ASE Group, acquired the Polish PCBA plant of Chung-Hong near Wrocław.



May 2026: Foxconn, acting through its subsidiary Foxtron, becomes a strategic partner of ElectroMobility Poland to create a hub for the e-mobility industry.

September 2025: Polish National Pavilion at Semicon Taiwan 2025. The third edition of the Poland–Taiwan Business Forum organised by PAIH in cooperation with SEMI.

July 2025: The largest-ever Polish trade mission to Taiwan led by Deputy Minister of Economic Development and Technology Michał Jaros. During the visit, seven economic cooperation agreements were signed and meetings with **TSMC** and **Foxconn** were held.

March 2025: An official TEEMA mission visited Poland (Katowice and Wrocław), launching in Taiwan the promotion of the ICT Triangle – Łódź, Katowice, and Wrocław – and highlighting its importance in building a supply chain for TSMC.

September 2024: Polish National Pavilion at **Semicon Taiwan 2024.**

July 2024: **Compal Electronics** announced plans to open a new automotive electronics production plant in Czeladź worth PLN 60 million. The project was acquired and supported at all stages by the Polish Investment and Trade Agency (PAIH).

September 2023: 1st Polish National Pavilion at **Semicon Taiwan 2023**.

September 2022: Signing of a memorandum of understanding (MoU) on cooperation in the field of semiconductors between Poland and Taiwan and establishment of the Taiwan–Poland working group on semiconductors.

July 2022 – **XTPL** receivd its first order from Taiwan for the supply of a printing module, part of a prototype device for **advanced packaging** in the semiconductor industry.

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NCBR SUPPORT OFFER

The National Centre for Research and Development (NCBR) has been actively supporting the advancement of semiconductor technologies for many years by funding research and development projects under both national and international programs. Its international portfolio features numerous initiatives in the field of semiconductor technologies in which Polish researchers have secured funding.

1.Initiatives under Horizon Europe and Horizon 2020 include:

- **The Chips Joint Undertaking** and its predecessors: the ENIAC and ARTEMIS Joint Undertakings, the ECSEL Joint Undertaking (Electronic Components and Systems for European Leadership), and the Key Digital Technologies Joint Undertaking (KDT JU).
- The **Eurostars** initiative, part of the European Partnership for Innovative SMEs, in which NCBR acts as the national program operator.

2.ERA-NET programs supporting the development of a European research network:

- **M-ERA.NET** – a European network funding research in materials science and engineering, in which the National Centre for Research and Development (NCBR) has participated since 2015.
- **ERA-NET Photonics Based Sensing Cofund** – an international research funding program focusing on projects in the field of photonics, with particular emphasis on photonics-based sensors, active from 2016 to 2021.
- **ERA-NET QuantEra Cofund in Quantum Technologies** – an international program supporting research and innovation in quantum technologies in Europe.
- **ERA-NET MNT** (European Research Area Network on Materials and Nano-Technologies) – a network of organizations funding research in materials science and engineering, including nanotechnology, active from 2004 to 2011.
- **ERA-NET MATERA (Materials)** – a network of organizations financing research in materials engineering and materials science, in which NCBR participated from 2020 to 2021.

3.Other initiatives:

- **EIG CONCERT-Japan** – an international initiative supporting scientific and technological cooperation between Europe and Japan.
- **V4-Japan and V4-Korea** – cooperation between research funding institutions from the Visegrad Group countries and Japan/Korea.
- **EUREKA** – an international initiative aimed at enhancing the innovation, productivity, and competitiveness of European industry.

4.Bilateral Cooperation

The National Centre for Research and Development (NCBR) has implemented projects in semiconductor technologies and electronics with partners from various countries. Of particular importance is the cooperation program with **Taiwan**, the global leader in semiconductor production. It is one of the longest-standing and most consistently conducted bilateral programs in NCBR's portfolio.

NCBR SUPPORT OFFER

In 2025, the thirteenth edition of the call for international R&D projects, coordinated by NCBR and Taiwan's National Science and Technology Council (NSTC), was announced. Over the 13 years of collaboration, 12 bilateral calls for research projects have been launched and completed. These calls have resulted in **72 projects carried out by Polish–Taiwanese consortia** of research institutions and enterprises, including at least six in the field of semiconductors, with funding exceeding **PLN 5 million**. The total amount of NCBR funding under Polish–Taiwanese cooperation exceeds **PLN 31 million**.

As part of the cooperation agreement, NCBR and NSTC also organize annual scientific seminars combined with study visits, held alternately in Poland and Taiwan. To date, eleven such seminars have taken place, each attended by a selected group of researchers from both countries. During the visits, participants had the opportunity to explore research centers and scientific institutions in the host country and gain insights into ongoing research. Each visit concludes with a seminar dedicated to priority research topics identified for bilateral collaboration.

In 2023, a seminar on semiconductors was held, hosted by the Taiwanese side, represented by TSRI (Taiwan Semiconductor Research Institute), part of the National Applied Research Laboratories (NarLabs), Taiwan's leading network of research institutes. The visit was academically coordinated by Dr. Mei Yu Chang from the NARLabs International Affairs Office, and Dr. Chang-Hong Shen, Deputy Director of TSRI. On the Polish side, the academic coordinator was Prof. Izabella Grzegory, PhD, DSc, Deputy Director for Scientific Affairs at the Institute of High Pressure Physics, Polish Academy of Sciences. Five distinguished Polish researchers in physics, optoelectronics, and semiconductor technology also participated in the seminar.

The topic of semiconductors appears in many national initiatives supported by the National Centre for Research and Development (NCBR). While not always directly targeting a specific technology, semiconductors often fall within broader categories such as materials science, digital technologies, or microelectronics. Examples include strategic R&D programs like **TECHMATSTRATEG** and **INFOSTRATEG**, which support technological innovation in advanced electronics and digital security.
Among the competitions funded by European programs, three initiatives stand out:

- Important Projects of Common European Interest (**IPCEI**) – Microelectronics/Communication Technologies (ME/CT) is a competition under Measure 2.10 FENG, aimed at companies implementing IPCEI projects. It covers microelectronics and communication technologies. In 2024, NCBR signed an agreement with semiconductor industry leader Vigo Photonics S.A., enabling the implementation of the "HyperPIC – Photonic Integrated Circuits for Mid-Infrared Applications" project. The project received funding exceeding PLN 440 million, with a total value of over PLN 853 million. HyperPIC is a multi-year investment program that will advance the Polish photonics technology cluster, create numerous jobs both directly and within the partner ecosystem, attract engineering talent to Poland, and introduce globally innovative products for AI, IoT, Industry 4.0, and Agriculture 4.0.
- European Funds for a Modern Economy (**FENG**) supports research, development, and implementation projects under Measure FENG.01.01 in advanced technologies, including electronics, microelectronics, and semiconductors.
- **STEP** – Strategic Technologies for Europe Platform is implemented under Measure FENG.05.01. Its R&D track promotes projects in deep tech, digital technologies, and strategic components, which may include semiconductors as a key element of the EU's technological sovereignty.

AUTHORS

The report was prepared by the team of the **tek.info.pl,** portal dedicated to people professionally involved in the design and production of electronics

We invite you to the cyclical electronics industry meeting **TEK.day**, **24 września 2026, Gdańsk / marzec 2027, Wrocław**

We invite you to a meeting for electronics designers, **Hardware Forum, May 2027, Łódź**

The achievements of the Polish semiconductor sector will be presented by PAIH at the Semicon Taiwan fair at the national stand, **September 2-4, 2026**