

Press Release

2025-14-01



Leibniz Institute
for High
Performance
Microelectronics

Graphene research at IHP: Boosting Europe's microelectronics industry with the world's thinnest material

IHP plays a key role in the research and development of graphene-based technologies in cooperation with leading scientific institutions and companies in Europe.

Frankfurt (Oder). Graphene, the world's thinnest and strongest material, is a two-dimensional (2D) structure consisting of a single layer of carbon atoms arranged in a hexagonal lattice. Graphene is impermeable to molecules and has high electrical and thermal conductivity and has a much higher electrical and thermal conductivity compared to silicon. It is also a transparent conductor, uniquely combining electrical and optical properties. Its superior and outstanding ability to conduct electricity could revolutionize semiconductor technology, and its tunable optical properties confirm that graphene offers a comprehensive solution for photonic technology. The use of graphene in silicon photonics could form the basis of the next generation of data transmission technology. Because of these unique properties, graphene is of interest to many research institutions and industrial sectors and is a key research fields at IHP - Leibniz Institute for High Performance Microelectronics. As an active participant in the European Union's Graphene Flagship research program, IHP focuses on the development of graphene-based photonic platform and its fabrication on a standard 200 mm silicon pilot line. Within the Graphene Flagship program, IHP is actively involved in two ground-breaking research projects: 2D-PL and GATEPOST.

As part of the 2D Materials Pilot Line (2D-PL) project, IHP is working within a European consortium to establish a pilot fabrication line for two-dimensional materials, including graphene, to enable the development of integrated prototyping modules in photonics and electronics using these materials. The Institute contributes its experience in the integration of graphene with traditional semiconductors, which is a key step towards the commercialization of solutions based on 2D materials. Furthermore, it offers an experimental Multi-Project Wafer (MPW) service, providing researchers and companies with access to an advanced manufacturing platform, allowing them to integrate their designs on shared silicon wafers, what enables prototyping of graphene chips at significantly reduced cost.

GATEPOST - A Graphene-based All-Optical Technology Platform for Secure Internet of Things, coordinated by IHP, is one of two European projects currently dedicated to researching the combination of photonics and graphene. The aim of the project is to revolutionize data processing and security in the Internet of Things (IoT) through a novel approach based on graphene. The GATEPOST project aims at fabricating a novel graphene-based all-optical computing platform in the pilot line of IHP. Here the institute offers its unique expertise in the design, fabrication and testing of graphene photonic integrated circuits.

Through its involvement in the Graphene Flagship program, IHP is contributing to accelerating the integration of two-dimensional materials in the semiconductor industry and strengthening Europe's position as a leader in microelectronics and 2D materials. Dr Mindaugas Lukosius, leader of the research group at IHP and of the GATEPOST and 2D-PL projects, highlights the importance of IHP's activities: "The IHP Institute is a key player in graphene research, both at the basic research level and in projects focused on practical



Press Release



applications. Through our participation in the Graphene Flagship program and our MPW services, we support the rapid and cost-effective prototyping of innovative technological solutions.”

More information:

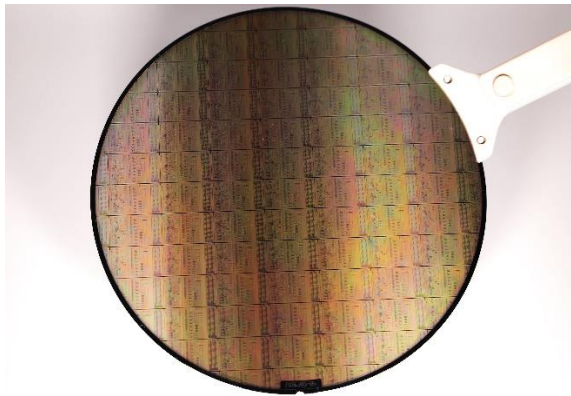
Graphene Flagship: <https://graphene-flagship.eu>

More on graphene: <https://graphene-flagship.eu/materials/graphene/>

GATEPOST: <https://graphene-flagship.eu/focus/electronics-photonics/gatepost/>

2D-PL: <https://graphene-flagship.eu/materials/news/2d-pl-funded-to-further-mature-2d-material-wafer-scale-integration/>

Leibniz Institute
for High
Performance
Microelectronics



200 mm Si wafer featuring Graphene Photonic Integrated Circuits (PICs) fabricated in the BiCMOS pilot line at IHP within the framework of GATEPOST project ©IHP

Contact:

Dr. Anna Sojka-Piotrowska

Marketing and Strategy

IHP GmbH – Leibniz Institute for High Performance Microelectronics/

Leibniz-Institut für innovative Mikroelektronik

Im Technologiepark 25

15236 Frankfurt (Oder)

Fon: +49 335 5625 409

E-Mail: sojka@ihp-microelectronics.com

About IHP:

The IHP is an institute of the Leibniz Association and conducts research and development of silicon-based systems and ultrahigh frequency circuits and technologies including new materials. It develops innovative solutions for application areas such as wireless and broadband communication, security, medical technology, industry 4.0, automotive industry, and aerospace. The IHP employs approximately 400 people. It operates a pilot line for technological developments and the preparation of high-speed circuits with 0.13/0.25 μm SiGe BiCMOS technologies, located in a 1500 m² DIN EN ISO 14644-1 3 certified clean room.

www.ihp-microelectronics.com

