

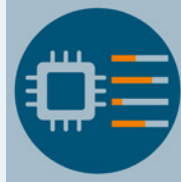
R&D services along the III-V semiconductor value chain

Together with national and international partners from science and industry, Fraunhofer IAF plays a leading role in the research and development of customized III-V semiconductor devices for various applications. Thanks to the expertise of its researchers, its large network, and its unique research infrastructure, the institute covers the entire value chain: from design, epitaxy, processing, characterization, and module development up to system applications.

In addition, Fraunhofer IAF has decades of experience in running complex international research projects and collaborations with customers from industry and small and medium-sized enterprises. This enables an equally efficient and flexible cooperation in the application-oriented research and development of innovative technologies as well as in the customized implementation of orders.

Would you like to learn more about our R&D services along the III-V semiconductor value chain? We will be happy to present our work and various cooperation opportunities to you in person.

Simulation
and design



Epitaxy



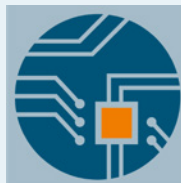
Process
technology



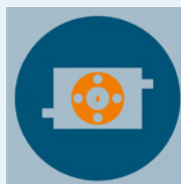
Characteri-
zation



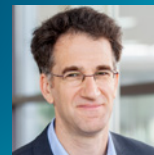
Components



Modules



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Process technology for electronic and optoelectronic devices

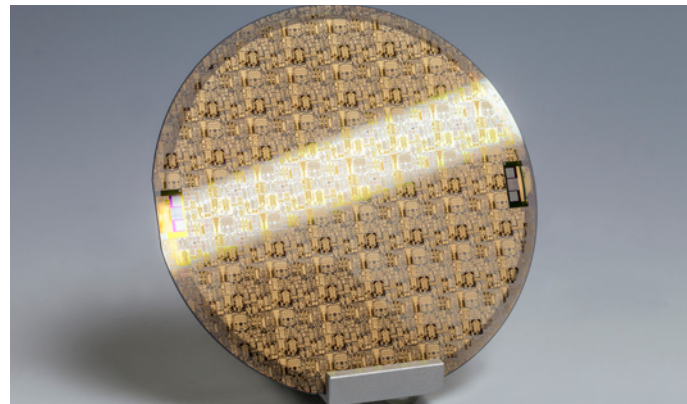
Multi-project wafer and dedicated wafer runs

Technology runs for III-V semiconductor components

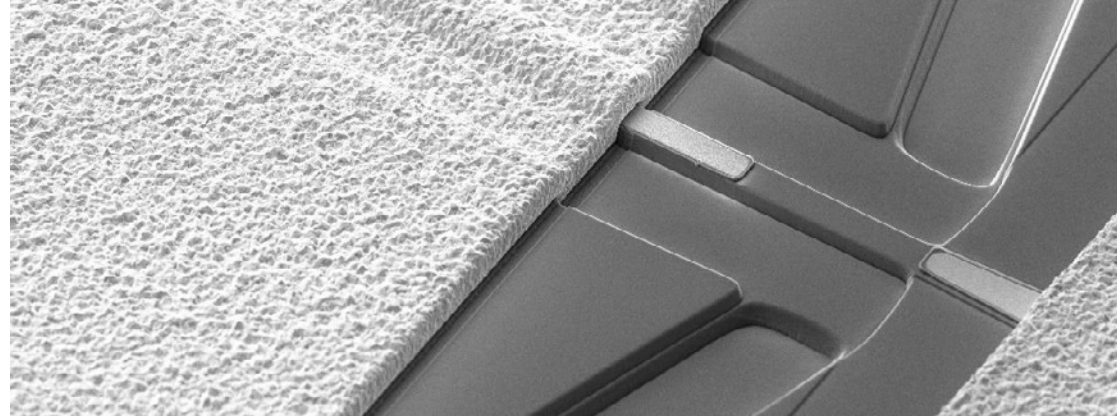
We process transistors and integrated circuits as well as electronic and optoelectronic components based on III-V semiconductors.

On the basis of its epitaxial and technological possibilities, Fraunhofer IAF offers (multi-project) wafer runs (MPW), entire mask processing and the realization of electronic and optoelectronic components for external customers. Both frontside and backside processing is possible. The runs are offered regularly every four to six months.

We have a state-of-the-art clean room for processing of cutting-edge III-V semiconductor devices with e-beam lithography, optical stepper and laser lithography as well as deposition and etching of various dielectrics and metals. In order to maintain and expand our excellent processing capacities, we invest in new equipment every year.



GaN-on-SiC wafer, processed at Fraunhofer IAF



REM picture of a tapered laser structure focusing the transition from ridge to taper

Selection of technology services

InGaAs HEMT technologies

- 50-35-20 nm InGaAs metamorphic HEMT (mHEMT)
- mHEMT-on-Insulator technology under development
- Design, fabrication, characterization and assembly of monolithic microwave integrated circuits (MMICs) for frequencies up to 700 GHz
- State-of-the-art noise figure performance
- Extremely high bandwidth
- Multifunctional MMICs
- On-chip broadband antennas
- Performance enhancement with cryogenic operation

GaN-on-SiC technologies

- Fabrication of HEMT devices from 0.5 μm down to 50 nm gate length
- Highest output power
- Frequency range up to 200 GHz
- Highest power conversion efficiency
- Proven reliability and robustness
- Integrated passive devices

GaN-on-Si technologies

- GaN-based power ICs
- Half-bridges, gate drivers
- On-chip sensors

GaAs and InP based lasers

- Double trench or buried het processing:
 - Broad area lasers
 - Ridge-waveguide lasers
 - Tapered lasers and amplifiers
- Customized faced coating (NIR/IR) including characterization

IR and UV photodetector technologies

- Mono- and bispectral detectors from MWIR (3–5 μm) up to LWIR (8–12 μm), with InAs/GaSb or InAs/InAsSb T2SL
- Single-photon avalanche diodes (SPAD) based on InGaAs/InP
- UV-C detector matrices in the solar-blind range below 280 nm with AlGaN



Our 1,000 m² clean room enables us to offer customized wafer processing, process development, and small batch production.«

Dr. Patrick Waltereit
Head of Department Technology



At Fraunhofer IAF, researchers use up-to-date equipment for realizing cutting-edge III-V semiconductor devices