

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



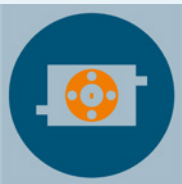
Characterization



Components



Modules



Contact



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Characterization

Analysis of wafers,
heterostructures, and devices

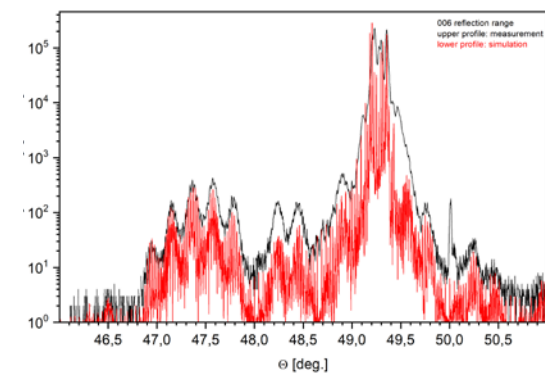
Characterization of III-V materials and devices

We measure III-V heterostructures, wafers, devices, and modules.

Fraunhofer IAF offers a wide range of characterization tools as a service to help customers in all stages of III-V semiconductor development: from basic wafer level and heterostructure measurements (PL-mappings, HRXRD, REM, FIB, and more) to full electro-optical characterization of III-V lasers and laser modules including solder joint inspection and lifetime tests.

Numerous analytical methods for the chemical and structural characterization of bulk semiconductors, semiconductor heterostructures, and thin-film systems are available at Fraunhofer IAF. Optical analysis techniques for III-V based devices supplement the portfolio.

We are pleased to give you an overview of our services.



Measurement of a GaSb-based III-V heterostructure with high-resolution X-ray diffractometry (HRXRD)

Wafer characterization

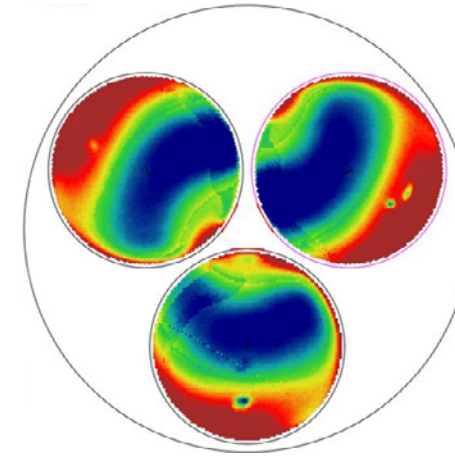
- Bow and warp measurement
- Hall and CV measurement
- Reflectivity, transmission and absorption measurement
- Sheet resistance mapping
- Optical surface detection mapping

Material analysis for semiconductor layers and heterostructures

- High-resolution X-ray diffractometry (HRXRD) on thin layers
- X-ray reflectometry (XRR)
- X-ray topography (XRT)
- X-ray μ -computer tomography (X-ray microscopy)
- Secondary Ion Mass Spectrometry (SIMS)
- Photoluminescence characterization of 2–8" III-V wafers
 - Wavelength range UVC–LWIR
 - RT and LT measurements
- Electroluminescence measurements for QCL heterostructures
- AFM, REM, FIB, EDX

Interface characterization

- Solder joint inspection
- Ultrasonic microscopy
- X-ray imaging



Photoluminescence wafer mapping

Optical characterization

- UV-VIS-IR Spectroscopy
 - 200 nm–25 μ m
 - Transmission, reflection
 - RT and LT measurements
- Birefringence imaging
 - Retardance down to 0.1 nm
 - Image size 7–60 mm
- Thermography
- Ellipsometry
- Optical microscopy

Electro-optical characterization

- P-U-I
- Spectra
- Beam quality and far field
- Tuning behavior
- Lifetime analysis



The wide range of different characterization methods at Fraunhofer IAF enables us to meet the specific requirements of our partners.«

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Optical retardation of a wafer