



# SiC Materials

## Substrates & Epilayers

### Customizing the Center Piece of all SiC Devices

Fraunhofer IISB has more than 15 years of experience in SiC epigrowth and defect inspection. Today, we are running a joint lab with Aixtron on SiC epigrowth, equipped with the latest generation of Aixtron's planetary reactors as well as inspection and metrology tools. The reactors and tools are automated on cassette-to-cassette (C2C) base and allow for high through-put and fast feedback loops. We are offering epilayers, measurements, calibration standards, and know-how.

#### Epitaxy reactors

- AIXTRON G5 WW-C in 8x150 mm configuration
- AIXTRON G10 in 9x150 mm and 6x200 mm configurations
- Equipped with latest hardware innovations and process optimizations
- Nitrogen (N) and Aluminum (Al) doping in a wide range for n- and p-type epilayers, respectively
- Single epilayers as well as epilayer stacks from 0.5  $\mu\text{m}$  to more than 50  $\mu\text{m}$  thickness

*Worldwide unique for a research institution:  
AIXTRON planetary reactor system in Fraunhofer IISB's clean room for the deposition of SiC epitaxial layers on 150 and 200 mm substrates.*

*© Kurt Fuchs / Fraunhofer IISB*

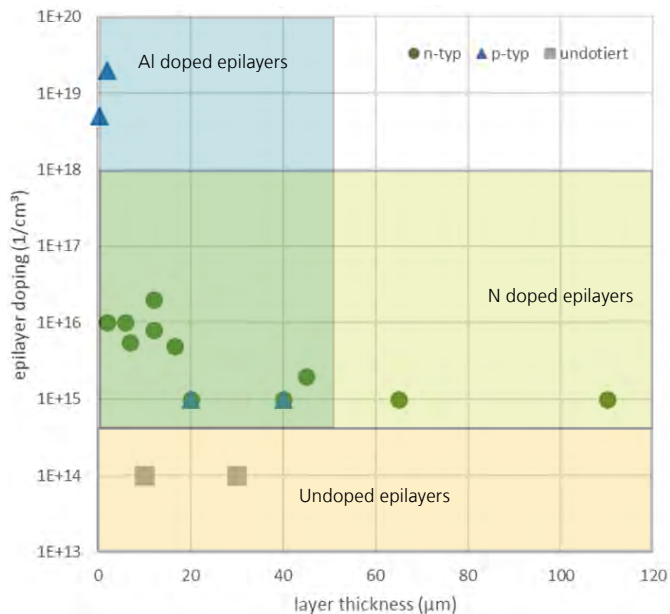
## Prototype foundry $\pi$ -Fab



Our stand-alone brand  $\pi$ -Fab - a prototyping service that includes a continuous SiC and silicon CMOS process line in an industry-compatible and ISO 9001 certified environment: [www.iisb.fraunhofer.de/pi-fab](http://www.iisb.fraunhofer.de/pi-fab).

### Epigrowth services

- Small series (TRL 8) epigrowth processes, e.g., for 1.200 V devices with excellent w2w, r2r uniformities, attractive delivery times
- Product samples (TRL 6) for small series devices such as UV sensors
- Research samples (TRL 4) and demonstrators (TRL 2) for research projects
- Uniformities decreasing with TRL



Doping vs. thickness diagram with epitaxial process windows for n-type, p-type and nominally undoped epilayers.

© Fraunhofer IISB

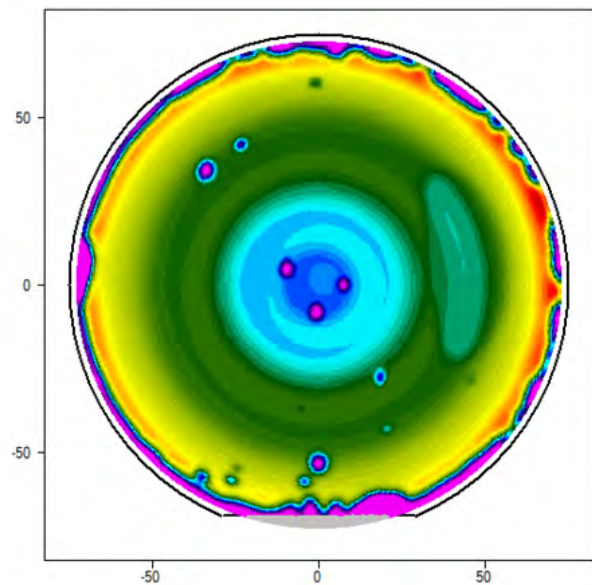
### Automated standard inspection & metrology tools

- All epiwafers pass through defect inspection and thickness / doping measurements
- Standard metrology tools are part of our ISO 9001:2015 certified environment » $\pi$ -Fab«
- Access to Lasertec SICA 88 for defect inspection in substrates and epilayers
- Semilab CnCV for doping concentrations and profiles

- Semilab EIR 2201 for epilayer thickness and uniformity
- Probers for doping concentrations and profiles (manual loading)

### Advanced inspection methods and tools

- X-ray topography (XRT) with Rigaku XRTmicron
- Carrier lifetime measurements by  $\mu$ -PCD method
- Physical modelling of effective carrier lifetimes (TAUSim)
- Point defect characterization by Deep Level Transient Spectroscopy (DLTS)
- Semilab CnCV for defect inspection by QUAD mappings



Quality, Uniformity And Defect (QUAD) mapping of a standard epiwafer based on surface voltage differences. Concentric doping and thickness profiles can be seen as well as extended defects (spots) and the substrate's facet.

© Fraunhofer IISB

### Contact

Dr. Birgit Kallinger  
 Group Manager SiC Epitaxy  
 Tel. +49 9131 761 273  
[birgit.kallinger@iisb.fraunhofer.de](mailto:birgit.kallinger@iisb.fraunhofer.de)

Fraunhofer IISB  
 Schottkystrasse 10  
 91058 Erlangen  
[www.iisb.fraunhofer.de](http://www.iisb.fraunhofer.de)

