SIRD SiC 200

PRODUCT OVERVIEW

OPTIMIZED FOR SILICON CARBIDE

SIRD (Scanning Infrared Depolarization) is a system for the fast, contactless and non-destructive recognition and visualization of stress fields, defects and buried structures in semiconductor wafers. It utilizes the photoelastic effect, which causes a change in the polarization state of the probing laser if there is stress inside the material.

PVA TePla

ABOUT THE SYSTEM

SIRD
SCANNING INFRARED DEPOLARIZATION

Every defect carries a characteristic stress field. SIRD makes it visible – optically, contactless and non-destructive – so deviations are caught early in the process chain.

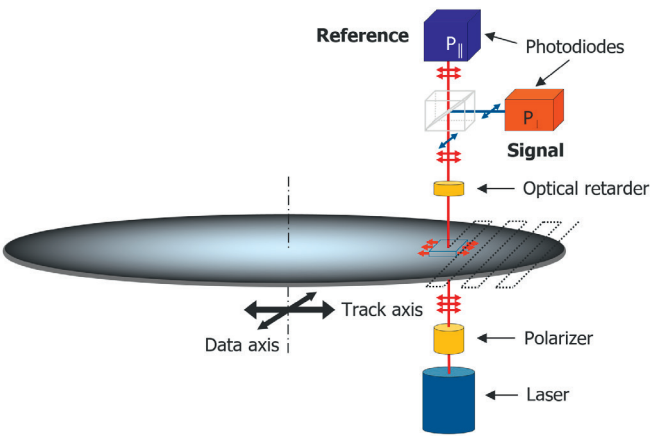
SIRD is a transmission dark-field plane polariscope. A linearly polarized laser beam penetrates the wafer: in a perfect, stress-free crystal its polarization remains unchanged, whereas global stresses and local defects cause depolarization through stress-induced birefringence. SIRD analysis converts the depolarization signal into quantitative shear stress values using material-specific coefficients — with a sensitivity of at least 0.1 kPa and a lateral resolution of ~100 µm in SiC, Si, GaN, GaAs, InP, AlN, Al2O3 and more. Intelligent software detects, classifies and bins defects automatically. Recipe-based operation and integration of SECS/GEM communication with OHT handling enable operator-free, 24/7 monitoring in fully automated fabs.

Stress Measurement
Quantitative stress measurement on wafer level

Wide doping ranges
Doping levels with resistivities down to 5.1 mOhm·cm are possible

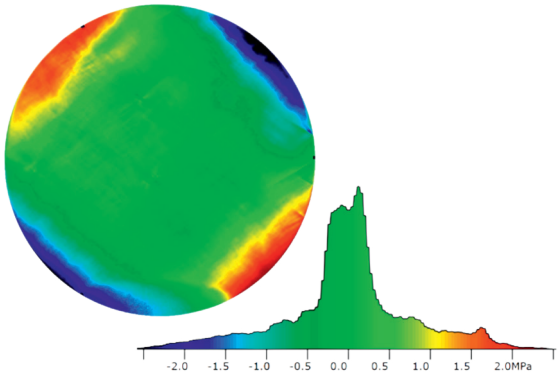
Automation
Fully automated with recipe-based measurement and analysis, and SECS / GEM and OHT available

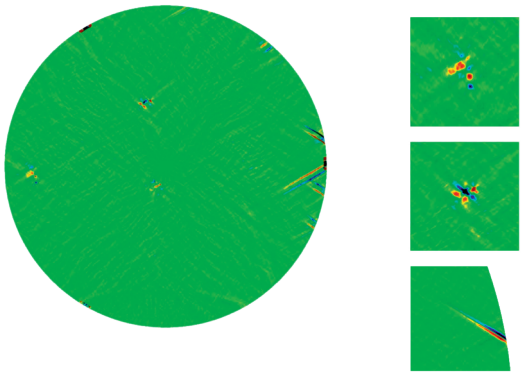
Various semiconductor materials
Si, SiC, GaN, GaAs, InP, AlN, etc.



APPLICATION EXAMPLES

STRESS MADE VISIBLE
DEFECTS REVEALED





The 6” SiC seed with an off-cut angle of 4° shows a rotational global stress field likely resulting from the growth and cooling process. The shear stress reaches a maximum of up to ±2 MPa at the outer edge, while the inner area is mostly free of largely extended stress fields.

At the 6 o’clock position there is a semi-circular discontinuity in shear stress caused by the facet of the wafer. Monitoring the stress will give valuable insights into the growth process and can help to improve substrate quality and yield. Several smaller stress signatures can be identified which indicate defects or defect clusters. SIRD is able to detect them by their characteristic stress fields. Filtering global stresses makes the defect signatures more visible and allows for automated detection and characterization of each individual defect.

After filtering, defect clusters likely from threading dislocations but also slip line systems at the wafer edge are clearly visible. SIRD SiC 200 automatically measures and analyzes substrates and offers fully customizable reporting functions for each wafer.

TECHNICAL PARAMETERS

SPECIFICATIONS	
Type	Transmission dark-field plane polariscope
Principle	Stress-induced optical birefringence
Stress Sensitivity	≥ 0.1 kPa in-plane shear stress
Lateral Resolution	~ 50 µm
Throughput	Up to 15 WPH
Substrate Shape and Dimension	2” to 8”, any non-circular shape ≤ 200 mm × 200 mm
Substrate Materials	SiC, GaN, Si, Al_2O_3, GaAs, InP, AlN, etc.
Wafer Handling	Manual or Automated Wafer Handling
Inline Qualification	OHT available (compliant with SEMI E300, E84, and E87)
Measurement and Analysis Software	Recipe-based automated measurement and data analysis, automatic report generation, and numerical data export via SECS / GEM

PVA TePla AG | Metrology & Plasma Solutions
Im Westpark 10–12 | 35435 Wettenberg

+49 (0)641 686 90-0
laser.mps@pvatepla.com
www.pvatepla.com