PVA TePla
Metrology & Plasma Solutions

Scanning Infrared Depolarization System (SIRD)

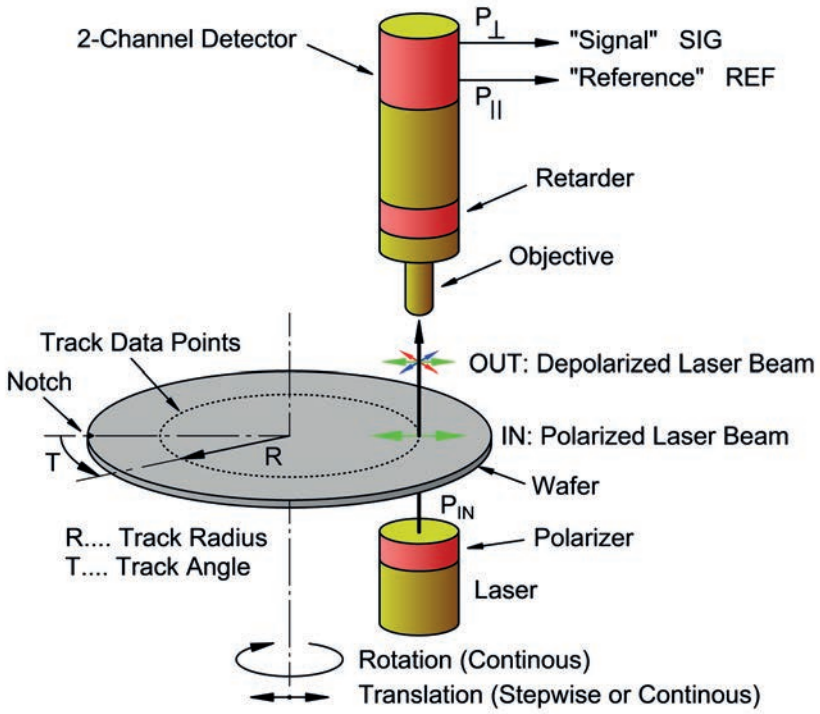
Transmission dark-field plane polariscope

DATASHEET

PVA TePla
Metrology & Plasma Solutions

SIRD in brief

The **SIRD** is a system for the fast, nondestructive and contactless recognition and visualization of stress fields, defects and buried structures in semiconductor wafers.

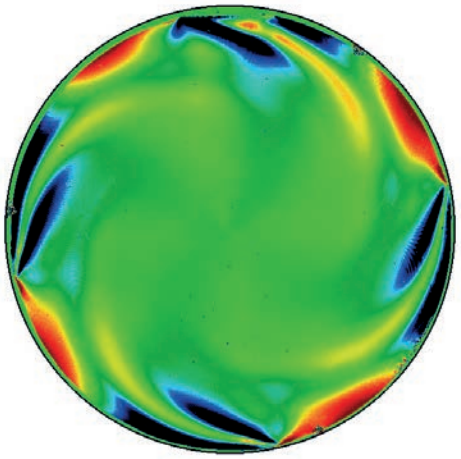


System values

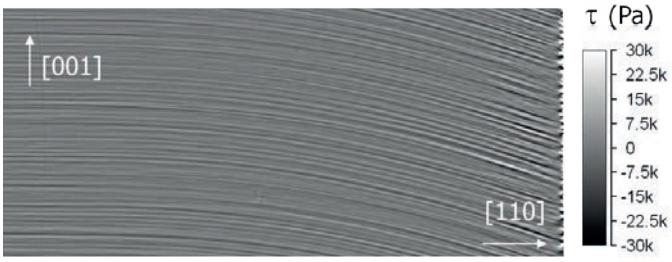
type	transmission darkfield plane polariscope
principle	stress-induced optical birefringence
stress sensitivity	in-plane shear stress **≥ 0.1 kPa**
lateral resolution	**≥ 100 µm** (optional 50 µm)
maximum speed of scanning	**1 cm^2 s^{-1}**
maximum wafer diameter	**450 mm**
wafer material	Si ($\rho \geq$ 6 x 10-3 Ω cm), GaAs, InP, GaN, SiC
wafer handling	manual or automated (FOUP)
in-line qualification	YES
software	working-off of wafer packages, customer-tailored recipes, automated defect counting and quantification

SIRD applied for crystal growth optimization

(100) Si



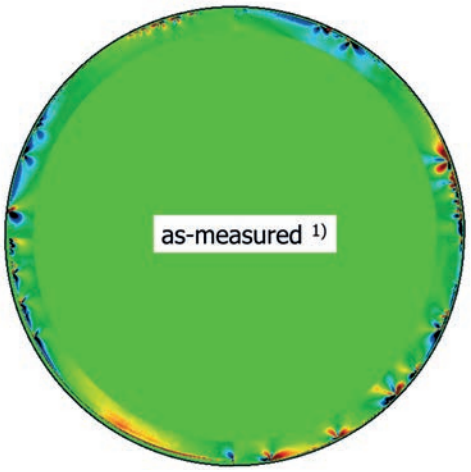
Wafer showing a ring-like global stress field superimposed by eddies arising from the melt-crucible rotation.

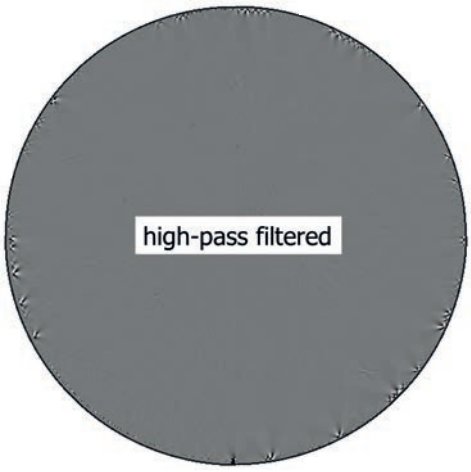


High-resolved shear stress map showing growth striations which represent a concave phase boundary on a slice cut in growth direction. Native birefringence and global fields have been eliminated by high-pass filtering.

SIRD for wafer edge qualification

(100) Si





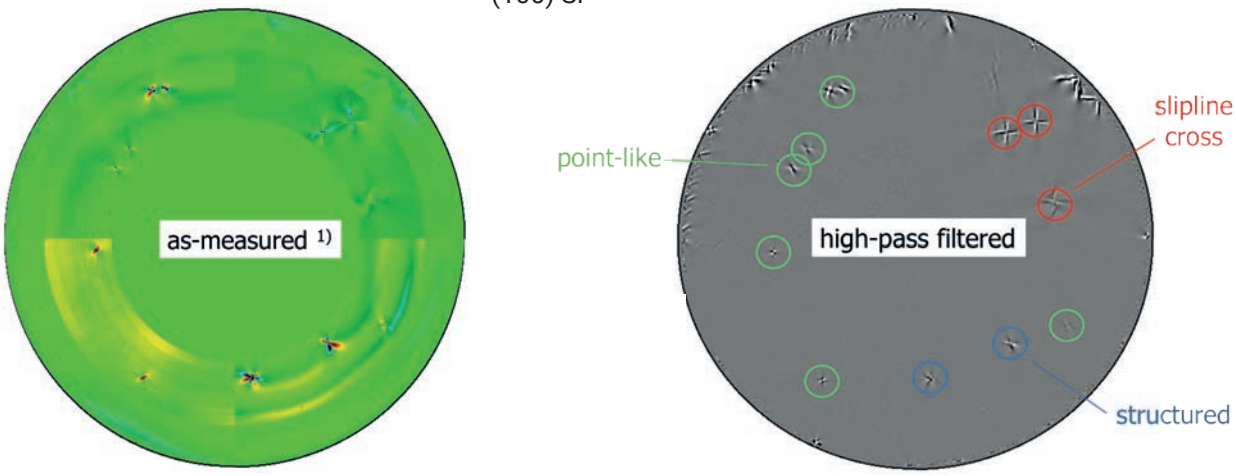
[1)] but composed and shadowed

High-pass filtering eliminates global fields for better visualization of local stress indications, e. g. near edge defects.

SIRD analysis software allows for automated counting **(near edge defect analysis)**.

SIRD applied for pinmark classification

(100) Si



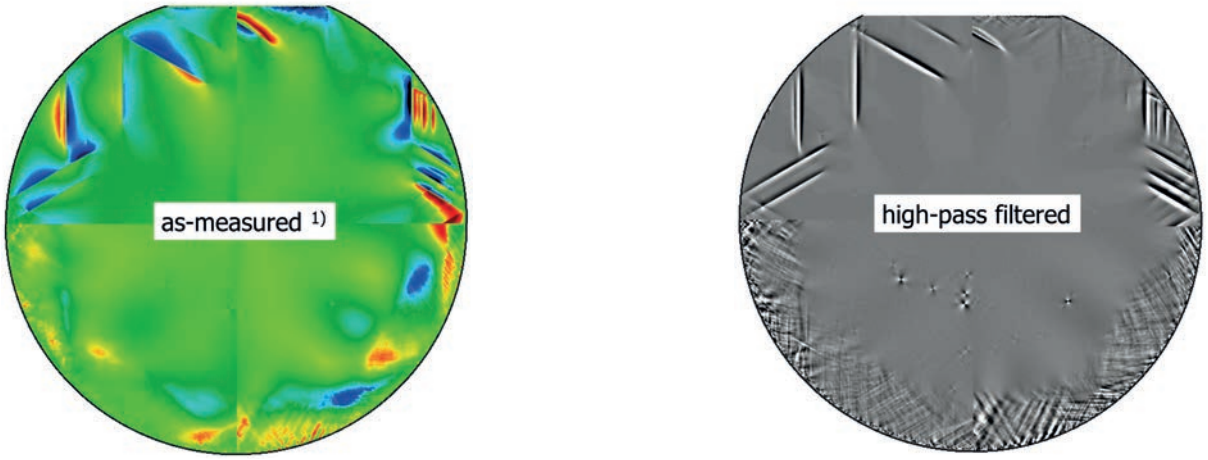
1) but composed and shadowed

Pinmarks are caused by pins which support the wafer at high-temperature processes. They are sources of further defect formation.

SIRD analysis software can be used both for **counting** and **classifying** (strength, symmetry etc.) the pinmarks

SIRD applied for epitaxy monitoring

(111)GaN-on-Si



Extended **slipline** areas generate global tensile or compressive stress fields.

SIRD analysis software determines measures for **quantifying** the defective part of wafer (cummulative slipline length).