

SIRD

PRODUCT OVERVIEW

TRANSMISSION DARK-FIELD PLANE POLARISCOPE



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.

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 $\sim 100\ \mu\text{m}$ in 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



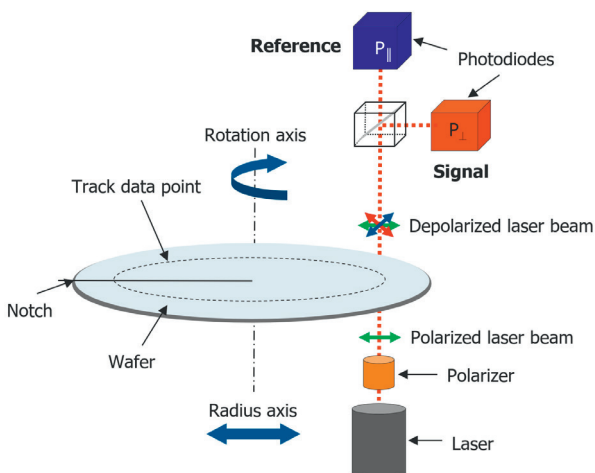
Automation

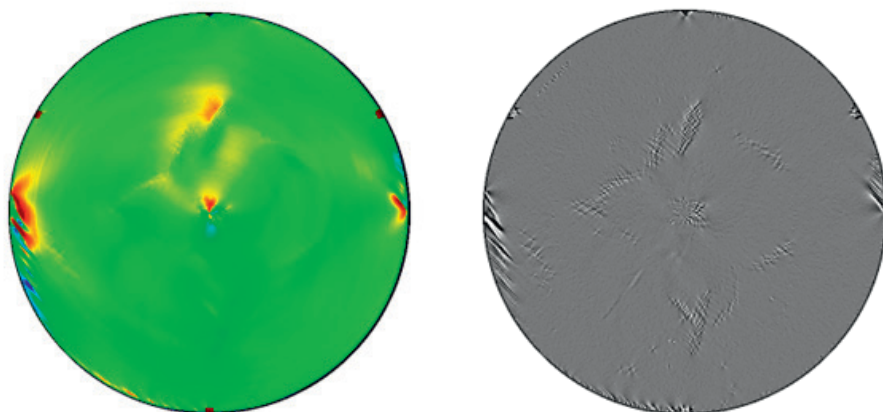
Fully automated with recipe-based measurement and analysis, and SECS / GEM and OHT available



Various semiconductor materials

Si, GaN, GaAs, InP, AlN, etc.





APPLICATION EXAMPLES

STRESS MADE VISIBLE DEFECTS REVEALED

SIRD enables users to detect and quantify the smallest stress fields at the wafer level. A typical application is the measurement of stresses in substrates and epitaxial layers. Besides general stress fields resulting from ingot growth, SIRD can also detect stress signatures caused by defects, making it a reliable tool for identifying defects. SIRD is a dependable solution for monitoring process steps and provides fast, informed feedback on process deviations.

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	$\sim 100 \mu\text{m}$
Throughput	Up to 12 WPH
Wafer Diameters	2" to 8"
Wafer Materials	Si, Al_2O_3 , GaAs, InP, AlN, etc.
Wafer Handling	Manual or singular or dual loadport robot automation
Inline Qualification	OHT available (compliant with SEMI E300, E84, and E87)
Measurement and Analysis Software	Carrier processing, customized recipes, and automated defect detection and quantification



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