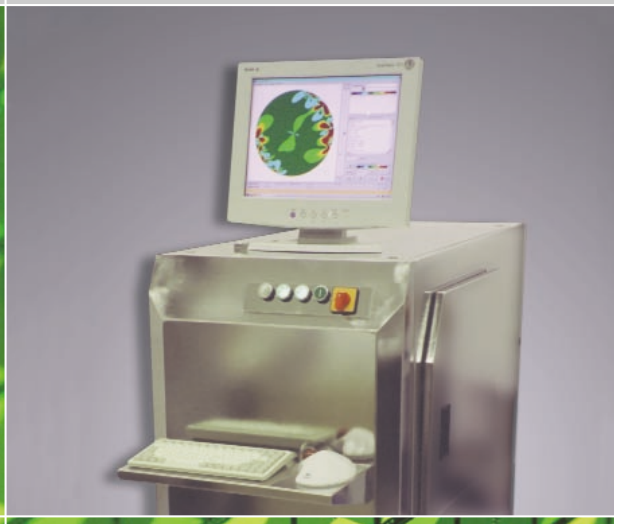
SEMICONDUCTOR | PCB/CHIP PACKAGING | INDUSTRIAL/MEDICAL

SIRD™ Metrology System

Scanning infrared depolarization tool for monitoring of process related stress in wafers



- Defect mapping/imaging and screening
- Process quality monitoring
- Process tool verifcation
- Yield improvement
- <7 min measuring time per wafer possible
- In-line capability

PVA TePla

SEMICONDUCTOR PCB/CHIP PACKAGING INDUSTRIAL/MEDICAL

The SIRD™ depolarization imager is a noncontact, nondestructive evaluation tool for the characterization of mechanical stress fields in semiconductor material. Stress fields cause birefrigence due to the photoelastic effect in semiconducting material. The SIRD™ tool, acting as a polarimeter, visualizes the stress by measuring and recording the depolarization of incident polarized laser light after its transition through the wafer. Monitoring of process induced stress and process induced defects by their stress fields plays an important role for rapid process development in semiconductor technology. The way through the learning curve can be considerably accelerated by applying nondestructive evaluation methods like scanning infrared depolarization. In addition, a continuous monitoring of the defect generation with standard recipes in high temperature tools prevents parameter deviations and yield reduction. The SIRD™ is capable of generating a full wafer image of the stress fields for silicon wafers up to 300 mm diameter in less than 7 minutes providing a lateral resolution of 0.1 mm.

Wafer manufacturing

- Defect screening and wafer sorting in early stages of wafer manufacturing
- Slipline detection in case of rapid thermal annealing procedures
- Monitoring of temperature gradients by induced stress evaluation
- Monitoring of technological procedures during wafer design
- Fracture prevention
- Final quality testing

IC manufacturing

Input control and sorting

- Slipline detection for high temperature processes
- Fracture prevention
- Monitoring of process induced stress mainly in RTP, ion implantation, diffusion and epitaxy trouble shooting

Technical Data

Measurement Module	
Measurement unit:	Infrared transmission plane polarimeter (wavelength 1.3 µm)
Scanning unit:	Two axis stage (rotation and radial translation) with edge grabber for Wafer support
Control unit:	Industrial PC (IBM AT compatible, Windows operating system)
Housing:	Stainless steel, clean room class 1 compatible
Handling Module	
Handling unit:	Robot with prealigner and slot scanner Robot end effectors: vacuum chuck, material: VESPEL Edge gripper optional Support ring with 3-point wafer edge support (3 x 0.5 mm)
Load port:	Open carrier load port, SMIF-load port, FOUP available
Filter Fan Unit	
Dimension:	524 x 755 x 550 mm
Filter type:	H14 or U16
Software	SIRDtec, SIRDinspec, SIRDview
Operation Conditions and Parameters	
Wafer sizes:	50, 75, 100, 125, 150, 200, 300 mm
Resistivity	>6 m Ω cm Semiconductor material: Silicon, III-V Compounds and others
Surface:	No metallic layers, no restriction by roughness
Wafer support:	Support ring with 3-point wafer edge support (3 x 0.5 mm)
Maximum lateral resolution:	100 µm
Sensitivity:	Shear stress equivalent >10^{-5}, stress detection limit in Si-wafer of 620 µm thickness >6 kPa
Wafer area:	Full wafer image (no signal in the edge facette of the wafer), Radial extension of the scanning area selectable by recipe
Througput:	Full wafer image (normal resolution, 300 mm-wafer), 5 min 10 wafer/h (typical)
Laser safety:	Class 1
Installation Requirements and Physical Dimensions	
Foot print:	Module 1,350 x 700 mm
Total weight of connected modules:	700 kg
Media supply:	Electricity: voltage 230 VAC, frequency 50 Hz standard, power <1.5 kVA Compressed air: pressure 6 bar, flow 200 l/min Vacuum: pressure <20 kPa, flow 4 m^3/h
Environmental Conditions	
Temperature:	22°C ± 1°C
Environmental factors:	3K2 according DIN IEC 721/3–3
Relative humidity:	<60%
Floor:	Flat, air exhaust to bottom

PVA TePla AG
Hans-Riedl-Strasse 5
85622 Feldkirchen, Germany
Tel. +49(0)89-905 03-0
Fax +49(0)89-905 03-185
E-mail: plasma@pvatepla.com
www.pvatepla.com

11/04