PVA TePla

Wafer Metrology System SIRD™ A300

- Imaging of Stress inducing defects
- Process performance monitoring
- Yield improvement
- In-line capability

Metrology Systems

PVA TePla

Advanced Wafer Metrology

The **SIRD™ A300** 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
- Prevention of wafer breakage
- Final quality testing

IC manufacturing

- Input control and sorting
- Slipline detection for high temperature processes
- Process optimization
- Monitoring of process induced stress mainly in RTP, ion implantation, diffusion and epitaxy trouble shooting

Technical Data

Measurement Module

Measurement unit	Infrared transmission plane polari meter (wavelength 1.3 µm)
Scanning unit	Two axis stage (rotation and radial translation) with wafer support
Wafer support	Support ring with 3-point wafer edge support (3 x 0.5 mm)
Control unit	Industrial PC with Windows OS
Software	SIRTec, SIRDInspec, SIRTecView
Operation Conditions and Parameters	
Wafer sizes	50, 75, 100, 125, 150, 200, 300 mm
Semiconductor material	Silicon, III-V Compounds and others
Resistivity	>6.5 m Ω cm
Surface	No metallic layers, no restriction by roughness
Max. lateral resolution	100 µm
Sensitivity	Shear stress equivalent $>10^{-5}$,
Stress detection limit	>6 kPa in Silicon (620 µm thickness)
Wafer area	Full wafer image (no signal in the edge facette of the wafer), Radial extension of the scanning area selectable by recipe
Throughput	10 wafer/h (full 300 mm wafer, normal resolution)
Laser safety	Class 1

Handling Module

Handling unit	Robot with prealigner and slot scanner
Robot end effectors	vacuum chuck, material: PEEK Edge gripper optional
Load port	Open carrier load port, SMIF-load port, FOUP available

Clean Room compatibility

Housing	Stainless steel, clean room class 1 compatible
Filter Fan Unit	H14 or U16

Dimensions

Foot print	SIRD M 1.350 x 650 mm SIRD A 1.350 x 1.240 mm SIRD P 1.550 x 1240 mm
Total weight	400 kg (SIRD M), 750 kg (SIRD A, P)

Media supply

Electricity	230 VAC, 50/60 Hz standard, power <1.5 kVA
Compressed air	7 bar, flow 200 l/min
Vacuum	pressure <20 kPa, flow 4 m^3/h

Environmental Conditions

Temperature	22°C ± 1°C
Relative humidity	<60%

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