



**FULL 2D CURVATURE, TILT, AND STRESS MAPPING**

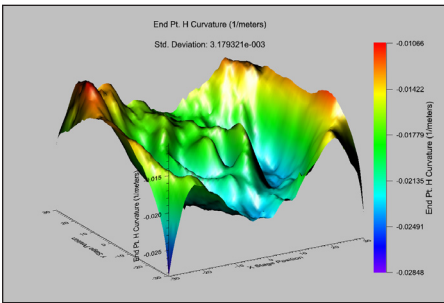
## THE HIGHEST RESOLUTION CURVATURE AND STRESS MAPPING SYSTEM AVAILABLE

### FAST AND FLEXIBLE SCANNING

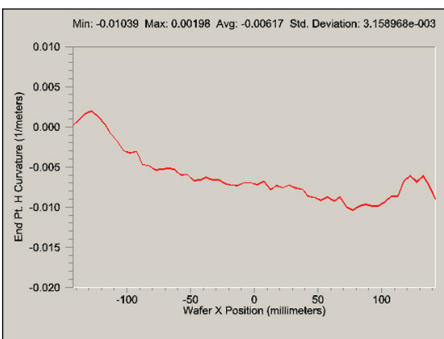
The **kSA MOS Ultra Scan** is a flexible, high-resolution scanning curvature and tilt-measurement system. Based on the proven technology of our standard in-situ kSA MOS system, the Ultra Scan uses a laser array to map the two-dimensional curvature and stress of semiconductor wafers, optical mirrors, lenses—practically any polished surface. The standard system provides a 200 mm x,y scanning range with 2  $\mu$ m scanning resolution. Optionally, larger scanning stages (up to 300 mm x,y scanning range with 4  $\mu$ m resolution) are available. Scans are fully programmable for selected area, line scan, or full area map. The system also provides quantitative film stress analysis with full area map by first scanning the bare substrate and then re-scanning the sample post-process.

#### Applications include:

- Semiconductor wafers (Si, SOI, compound semi)
- High performance optical coatings (mirrors, lenses, glass)



2D curvature mapping of 100 mm bare silicon wafer. Curvature can be compared post process to determine localized 2D stress induced by the thin film.



30 consecutive wafer line scans with 300 mm SOI wafer showing excellent reproducibility from MOS technology.

### > FEATURES

- Real time plotting of curvature, radius of curvature, stress-thickness product, stress, and tilt
- Vibration controlled environment
- Fully programmable scanning for selected area, line scan, or full area map

### > BENEFITS

- 10x higher resolution and repeatability than other curvature mapping techniques
- Map the 2D curvature of semiconductor wafers, optical mirrors, lenses, or practically any polished surface
- Patented Multi-beam Optical Sensor (MOS) technology
- 200 mm x,y scanning range with 2  $\mu$ m spatial resolution
- Quantitative film stress analysis map

## > PATENTED 2D OPTICAL ARRAY TECHNOLOGY

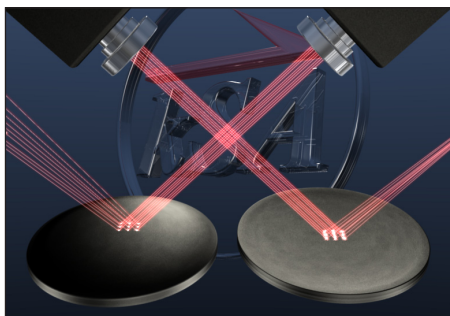
# 2D LASER ARRAY DIRECTLY MEASURES CURVATURE WITHOUT USING ROTATING MIRRORS OR COMPLEX OPTICS

A single laser is used to generate a two-dimensional laser array. Changes in the beam spacing are used to determine curvature and subsequent stress via pre- and post-mapping. In this way, the MOS Ultra Scan measures a true physical property in two dimensions that other systems—that use a point/line scan with mechanical restoring technique—cannot capture.

The ability to directly image and view the entire reflected laser array greatly simplifies use and alignment compared with position-sensitive detector techniques. Simultaneous detection of the array makes the measurement inherently less sensitive to sample vibration compared with scanning-laser systems, leading to increased curvature resolution capability (10x). And because

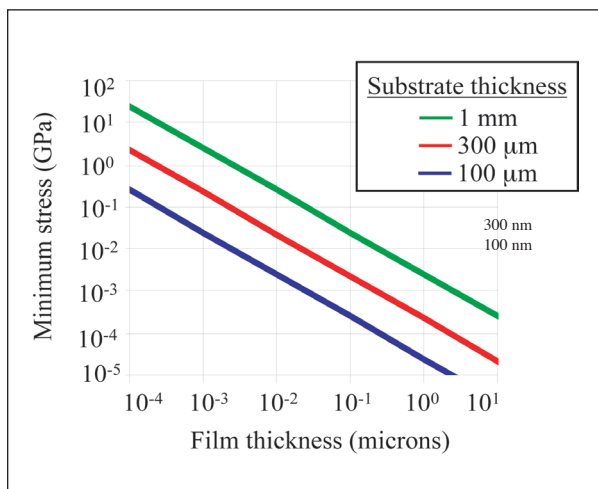
all the laser spots move together at the same frequency, movement or tilt is not detected as a change of curvature. Through the use of simple image processing and data analysis algorithms, the Ultra Scan can easily detect micron-sized changes in spot position.

## > HOW IT WORKS



Stress in thin films induces curvature in the substrate. The kSA MOS Ultra Scan system measures localized curvature by monitoring the deflection of parallel beams of light. Curvature mapping of the entire sample surface is performed by 2D iteration via a high precision, servo motor controlled x-y stage.

## > STRESS RESOLUTION



Depending on substrate and film thickness, kSA MOS Ultra Scan can detect stress in the MPa range.

## > ULTRA SCAN STANDARD SPECIFICATIONS

### Substrate Capability

Any polished surface with > 2% reflectivity (658 nm light)

### Max Scan Speed

20 mm/sec (x,y)

### Spatial Scan Resolution

User selectable, up to 2 μm\*

\*Higher resolution stages available

### Radius of Curvature Resolution

Up to 100 km (1 sigma)

### Average Tilt Repeatability

<1 microradian (1 sigma)

### Average Curvature Repeatability

<2×10<sup>-5</sup> 1/m (1 sigma)

## > OPTIONAL HARDWARE UPGRADES

Option/ Part Number	Description	Features
<b>High Resolution Detector</b> M-HRD/U	High-resolution digital detector and frame grabber	2x increase in curvature resolution
<b>Table Top</b> MOS-US/TT	Compact enclosure design with remote computer and without integrated stand	Smaller footprint and flexible installation in lab environments
<b>Thermal Scan</b> MOS-TSC	Complete system with integrated vacuum chamber	Full analysis and temperature control for ramping and annealing of wafers up to 4"