



NANOprof[®]

Flexible Multi-Sensor
Metrology for Advanced
Packaging

VERSATILE NEW-GENERATION METROLOGY TOOL

NANOPROF® is a flexible multi-sensor metrology system for advanced packaging, combining contactless optical measurement, active and passive vibration damping, and configurable wafer handling in one platform. It supports wafers up to 300 mm, delivers fast, precise and repeatable measurements, and integrates smoothly into fab environments with automated handling and Camtek CAL3 EFEM compatibility.

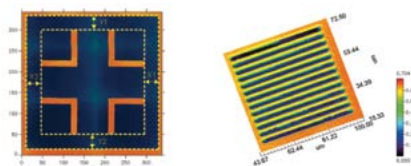
Wafer Metrology with automated handling

- > Fully automated handling of 300 mm wafers in FOUPs/FOSBs, open cassettes or film frames
- > Robotic handler with end effector, dual load ports, wafer mapper, and pre-aligner
- > Support for a broad range of wafer types: warped (eLWB), bonded, tape-mounted, TAIKO, bare, thinned, and fan-out
- > EFEM with ISO Class 3 cleanroom conditions, optional thin-wafer handling, and ionizer bar

Powerful Recipes for every process step

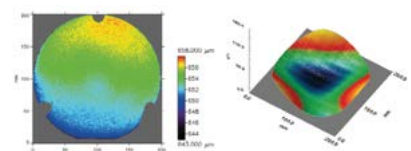
- > SEMI compliant FRT Acquire Automation XT software with recipe-based measurement and analysis
- > Flexible measurement and evaluation packages for structured and unstructured wafers
- > Layout wizard with GUI and pattern recognition for efficient teaching and precise alignment
- > Engineered for high TPT, fully automated workflows in a SECS/GEM integrated production environment

MEASURING TASKS



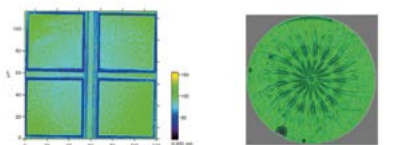
DIMENSIONAL METROLOGY

- > Critical Dimension (CD)
- > Overlay
- > Trenches
- > Redistribution Layers (RDL)
- > Step Height / Width
- > Bump Dimensions and Coplanarity



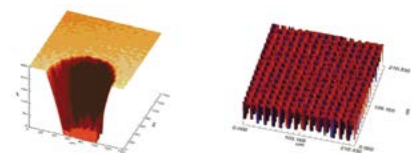
WAFER GEOMETRY & STRESS

- > Wafer Thickness / TTV
- > Stacked Wafer & Bond Layer Thickness
- > Bow, Warp and Die Warp
- > Wafer Stress
- > Roll Off Amount
- > Taper



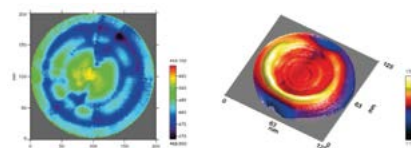
NANO & CMP TOPOGRAPHY

- > Post CMP Flatness
- > Copper Dishing and Erosion
- > Nanotopography
- > Surface Roughness and Waviness



TSV METROLOGY

- > Via and TSV Geometry
- > Top & Bottom CD
- > Depth Measurement
- > Copper Pillar Protrusion
- > Remaining Silicon Thickness (RST)



FILM THICKNESS & LAYER STACK METROLOGY

- > Very Thin Film Thickness
- > Multi Layer Stack Analysis
- > Transparent and IR Transparent Materials

METROLOGY CAPABILITIES

DIMENSIONAL



CRITICAL DIMENSION



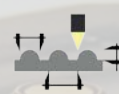
OVERLAY



TRENCHES



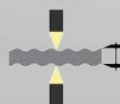
STEP HEIGHT / WIDTH



BUMPS / COPLANARITY

For structured wafers and advanced packaging interconnects, NanoProf® delivers high precision dimensional metrology. Critical dimensions, overlay parameters and height profiles are measured with high repeatability - including complex RDL, trench and bump structures

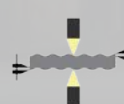
WAFER GEOMETRY



WAFER THICKNESS / TTV



BOW / WARP



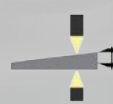
TOPOGRAPHY (TOP & BOTTOM)



STRESS



ROLL-OFF AMOUNT



TAPER

NanoProf® provides accurate wafer geometry and deformation measurements throughout the entire manufacturing workflow. From wafer thickness and TTV to bow, warp, roll off and stress, the system ensures reliable process monitoring - even for ultra-thin, bonded or highly warped wafers.

NANO & CMP TOPOGRAPHY



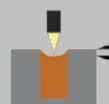
NANOTOPOGRAPHY



ROUGHNESS / WAVINESS



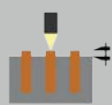
FLATNESS



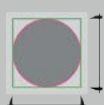
COPPER DISHING

For post CMP and polished surfaces, NanoProf® delivers detailed nano scale topography analysis. Flatness deviations, copper dishing and erosion, as well as surface roughness in the nanometer range are reliably detected and quantified.

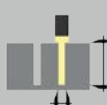
TSV METROLOGY



COPPER NAIL PROFILE



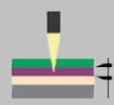
CRITICAL DIMENSION



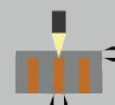
VIAS / TRENCHES

NanoProf® enables comprehensive characterization of TSVs and other high aspect ratio features. Via geometry, top and bottom CDs, depth, remaining silicon thickness and copper protrusion are measured accurately supporting robust TSV processes.

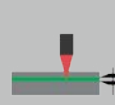
FILM THICKNESS



FILM THICKNESS / LAYER STACK



RESIDUAL SILICON THICKNESS (RST)



BOND LAYER

NanoProf® measures ultra-thin films or complex multi-layer stacks with high precision. Transparent and IR transparent materials are characterized contactlessly, making the system ideal for hybrid bonding and chiplet processes.