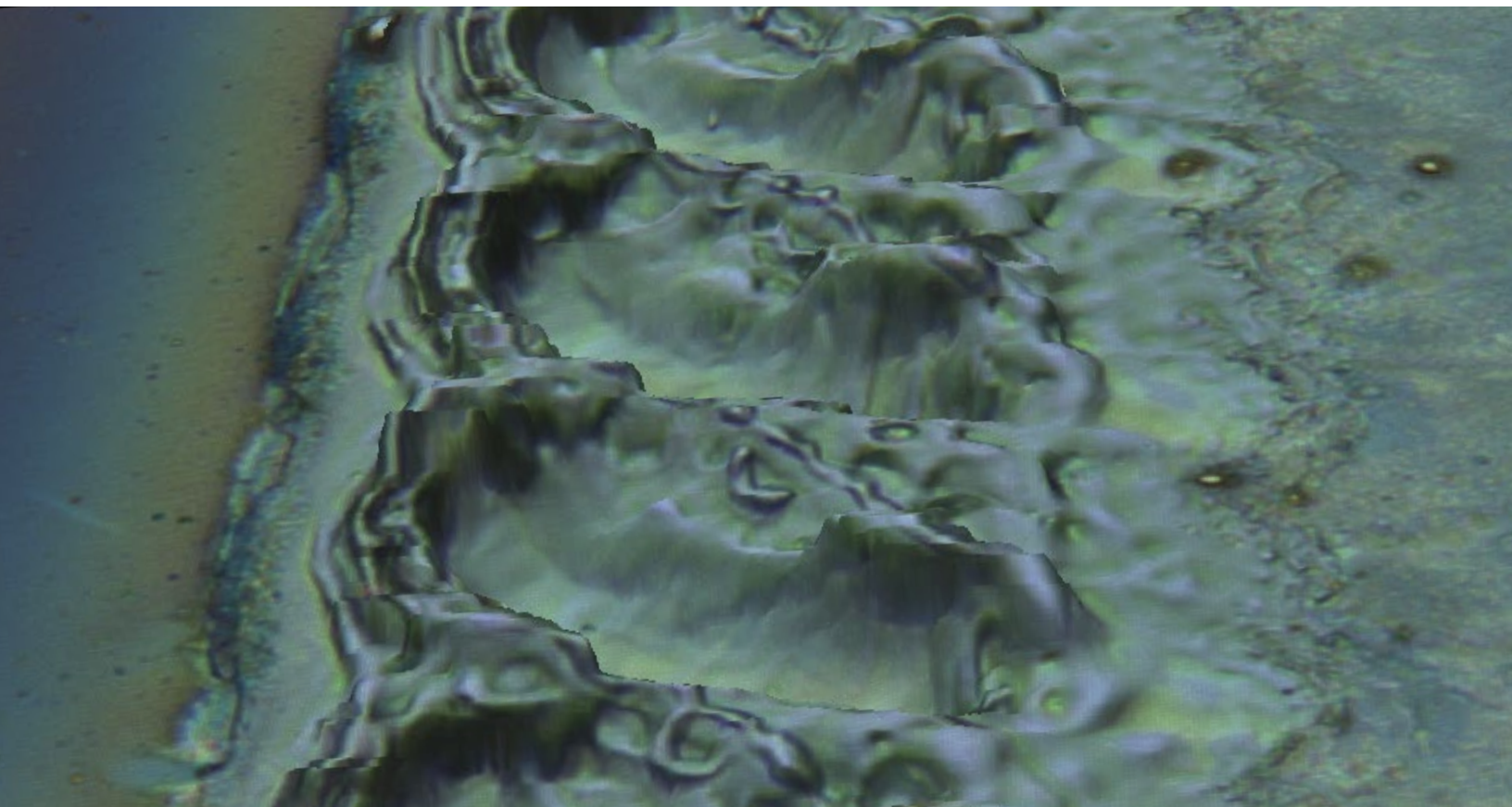


Zeta-388

Optical Profiler



Advantages

- Fast, non-contact, 3D optical profiler
- Multi-mode optics supporting 3D scanning, interference contrast, film thickness and automated defect inspection
- Fully automated measurements
- Simultaneous 3D scan and True Color infinite focus image capture
- Configurable for wafers from 100 to 200mm
- OCR and SECS/GEM support for use in production fabrication environments
- Intuitive user interface

Applications

- Step heights from nanometers to millimeters, including high aspect ratio
- Roughness of smooth (sub-nanometer) and rough (hundreds of microns) surfaces
- White light interferometry for wide area step height measurements with high z resolution
- Phase scanning interferometry for fast measurement of step heights up to 250nm
- Thin film stress and sample bow
- Transparent film thickness from 30nm to 100µm with film thickness mapping
- Automated defect inspection with sensitivity for defects > 1µm (lateral dimension)

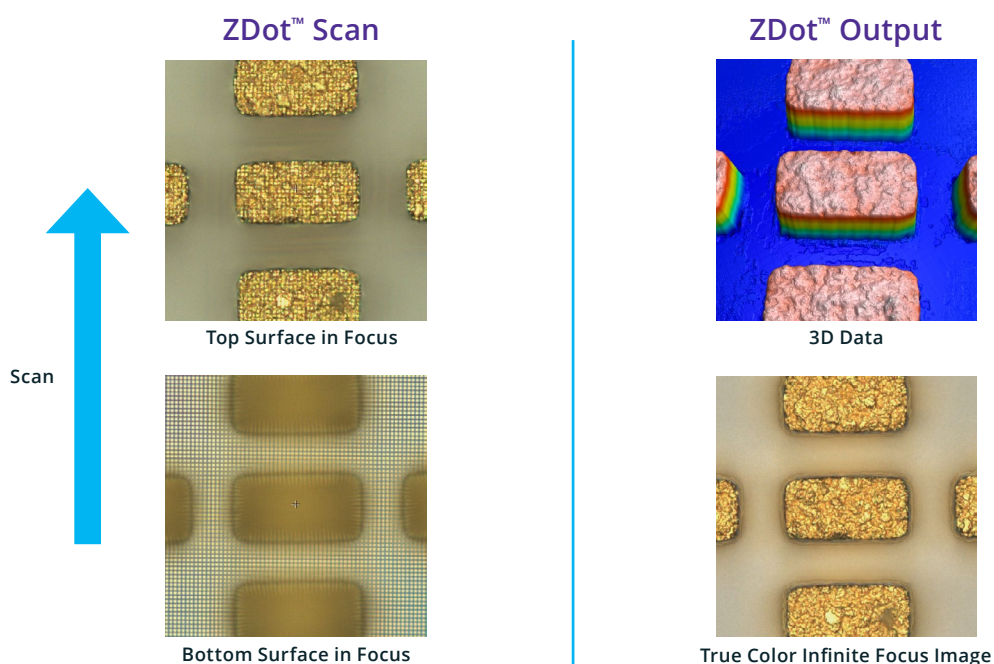
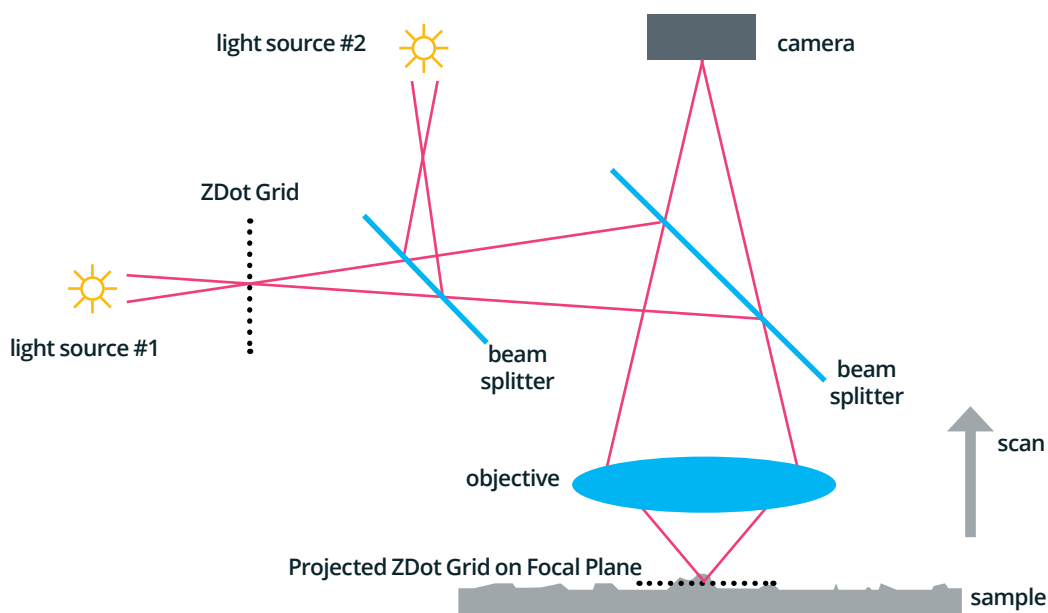
Zeta-388 Optical Profiler



The Zeta-388 optical profiler is a non-contact, 3D surface topography measurement system. The Zeta-388 builds on the capability of the Zeta-300 with the addition of a cassette-to-cassette handler for fully automated measurements. The system is powered by ZDot™ technology and multi-mode optics, enabling measurement of a variety of samples: transparent and opaque, low to high reflectance, smooth to rough texture, and step heights from sub-nanometer to millimeters. OCR and SECS/GEM support enable the Zeta-388 to be used in a fully automated production facility.

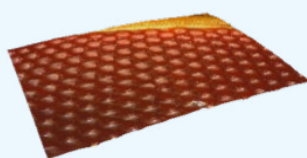
Core Enabling Technology

ZDot™ confocal grid structured illumination technology is the patented 3D non-contact measurement technique inside the Zeta-388. A grid pattern is projected at the focal plane, providing high contrast when the surface is in focus. The maximum contrast for each pixel as a function of z position is used to map the surface topography. Simultaneously, a second LED is used to provide the surface's True Color at the point of highest contrast. The final output is a high-resolution 3D scan and a True Color infinite focus image of the surface.

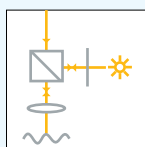


Multi-Mode Optics

Flexibility and upgradability are enabled with multi-mode metrology, packing six powerful techniques into one compact optical package.

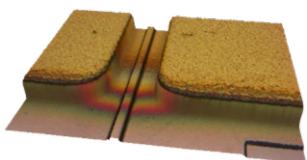


Eye of a Bee

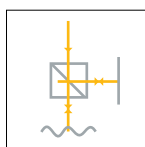


ZDot™

Proprietary 3D measurement technology combines innovative optics with powerful algorithms to produce high resolution 3D data on a variety of surfaces.



Pump Laser

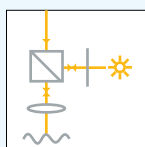


ZI

Phase and vertical scanning interferometry enable wide area measurements with high z resolution.

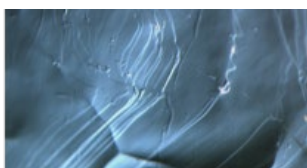


Residue on Glass

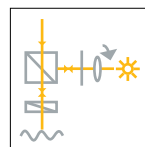


ZIC

Interference contrast provides enhanced 3D imaging of surfaces having sub-nanometer roughness.

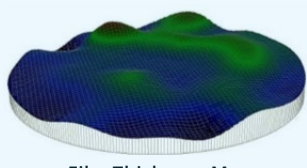


Atomic Steps

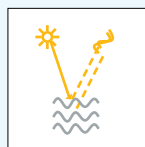


ZSI

Shearing interferometry uses a standard objective and interference to provide 3D data with high z resolution.

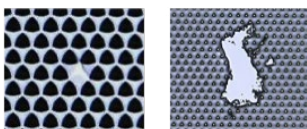


Film Thickness Map

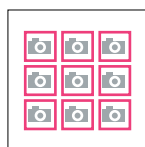


ZFT

An integrated broadband reflectometer measures film thickness and reflectance.



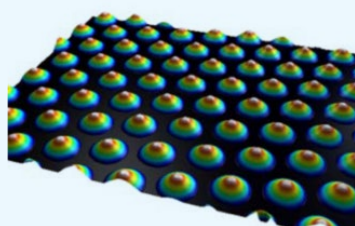
PSS Defects



AOI

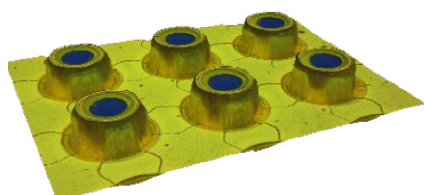
High quality camera and optics enable automated defect inspection by mapping defects across the sample.

Broad Range of Applications



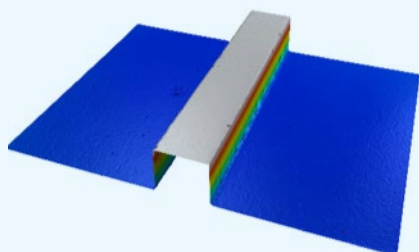
Patterned Sapphire Substrate

Measure the bump shape: height, pitch and width. Automated Optical Inspection locates defects such as contamination and missing bumps on the substrate.



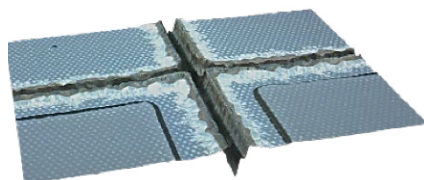
VCSEL Device

Measure the height of the vertical cavity surface emitting laser (VCSEL). True Color imaging shows the actual color of the surface, enabling visualization of material property changes that cannot be observed in a 3D topography map.



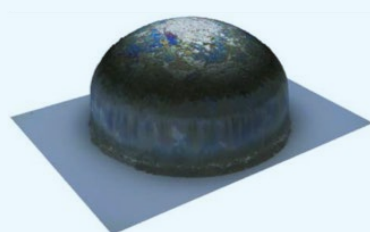
Nanometer Level Step Height

Measure the height of nanometer level steps with phase mode scanning (PSI). PSI delivers fast and precise measurements of step heights up to 250nm, enabling tight production control of etch, CMP and deposition processes.



Laser Dicing

Measure the depth of a laser cut on a LED device. Measure material build-up at the edge of the cavity to determine if it has flowed outside the scribe area and into the active area of the LED device.



Wafer Level Packaging

Measure the height of the plated copper with the dry photoresist film intact, enabled by measuring through the transparent photoresist. Measure redistribution lines (RDL), under bump metallization (UBM) height and texture, photoresist opening critical dimension (CD), photoresist thickness, polyimide thickness, and bump coplanarity.



Imaging

Image parameters such as field of view (FOV) and lateral resolution are determined by a combination of camera, coupler and objective.

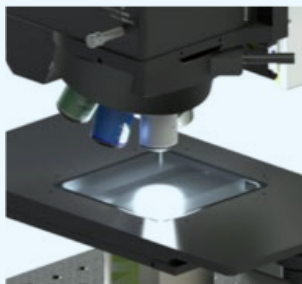
- 5MP color camera, programmable for different regions of interest
- Extensive suite of objectives and coupling lenses to measure an area as small as $45 \times 35 \mu\text{m}$, up to $9.5 \times 7.5 \text{mm}$ without stitching
- Image in brightfield, darkfield, or differential image contrast (DIC) modes



Objective Lenses

ZDot™ technology eliminates the need for expensive objectives by using standard objective lenses.

- ZDot™ uses standard, long and ultra-long working distance objectives
- Mirau objectives for interferometry
- Immersion, refractive index corrected
- Diamond-scribe objective with a precision diamond tip to mark features of interest for further analysis on AFM, SEM, FTIR, Raman or other review tools
- Manual or motorized turret with automatic objective identification



Illumination

Multiple illumination options to optimize performance for each application.

- Broadband white light or 405nm monochromatic high brightness LED light sources
- Transmissive imaging using high brightness LEDs to illuminate transparent samples from the bottom
- Illuminate in darkfield or brightfield
- Side illumination for enhanced defect inspection



System Configuration

Cassette-to-cassette wafer handling system for fully automated measurements.

- 200mm motorized XY stage
- High precision $200 \mu\text{m}$ z range piezo stage for enhanced z resolution
- Chuck options include vacuum chucks, glass chucks for transmitted illumination, and bowed wafer chucks for warped sample handling
- Built-in vibration isolation and acoustic enclosure with an active isolation table option to enhance capability for nanometer level step height and roughness measurements
- Automated sample loading for 100, 150, and 200mm wafers
- OCR, signal tower, and barcode reader for production environments

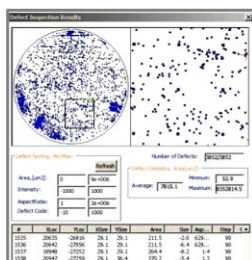


Simple scan setup

Fast and Easy to Use

Preparing samples and equipment for data acquisition is easy with simple, intuitive software and automated measurement analysis features.

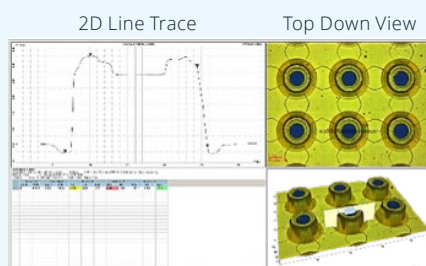
- ZDot™ focus assist for quick surface location
- Automatic illumination control
- Autofocus
- Auto-sequence for multiple sites
- Multiple transparent surface acquisition
- Wide area stitching
- Pattern recognition deskew for automatic sample alignment
- High dynamic range (HDR) for surfaces with high contrast range



Automatic Optical Inspection (AOI)

Comprehensive Analysis Suite

- ISO 2D and 3D roughness
- 2D and 3D step height
- Automatic feature detection
- CD measurement of detected features
- Bow, shape, and stress measurement
- Automated defect inspection (AOI), plus defect review
- Film thickness spectrometry



Simple, effective analysis report

Results

Advanced functionality plus easy reporting enable operators and engineers to communicate results:

- True Color and height color maps
- 2D and 3D data viewing
- Offline analysis license
- Apex advanced analysis packages
- Data upload via SECS/GEM for SPC process control

Optical and Stylus Profilers

Measure the topography of any surface with our range of benchtop and automated wafer handling optical and stylus profilers. Find out more at kla.com/profilers.



Profil3D, MicroXAM-800



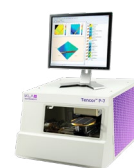
Zeta-20



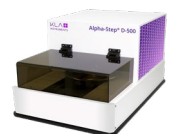
Zeta-300, Zeta-388



P-170, HRP-260



P-7, P-17, P-17 OF



Alpha-Step® D-500, D-600



KLA SUPPORT

Maintaining system productivity is an integral part of KLA's yield optimization solution. Efforts in this area include system maintenance, global supply chain management, cost reduction and obsolescence mitigation, system relocation, performance and productivity enhancements, and certified tool resale.

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KLA Corporation
One Technology Drive
Milpitas, CA 95035
www.kla.com/profilers
profilers@kla.com
Printed in the USA
Rev 1_2020-5-15