

Digital Holographic Microscope (DHM)

Wafer contacting using micromanipulators

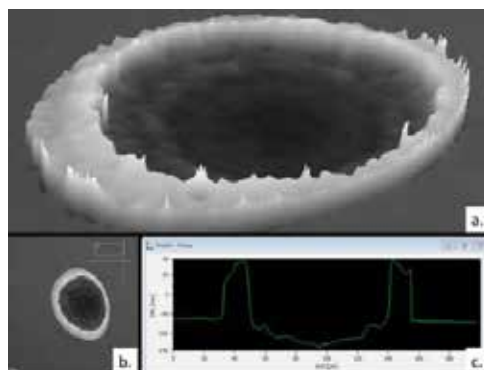
Our digital holographic microscope captures the complete topographic information of a microscopic sample in a single image acquisition, achieving a vertical resolution of up to 0.2 nm (approximately two atomic layers). This enables high-precision 3D imaging in real time. Furthermore, stroboscopic imaging allows for the capture and 3D visualization of rapid oscillations with nanometer precision.

Typical Samples

- Metals
- Silicon
- Glasses (e.g., optical lenses, mirrors)
- Silicon chips and whole wafers
- Deposited layers on substrates
- Patterned substrates

Features

- Suitable for 200 mm wafers
- Maximum sample size: 300 x 300 x 200 mm
- Requirement: Test structures must be highly reflective and clean (no splinters or particles prone to crumbling)
- Typical number of samples: <100 pieces



Crater on an HDD hard drive following ablation with a femtosecond laser (Ti:Sapphire laser, wavelength 720 nm, pulse duration 100 fs, repetition rate 1 kHz, 500 pulses, laser intensity 2.6 TW/cm²).

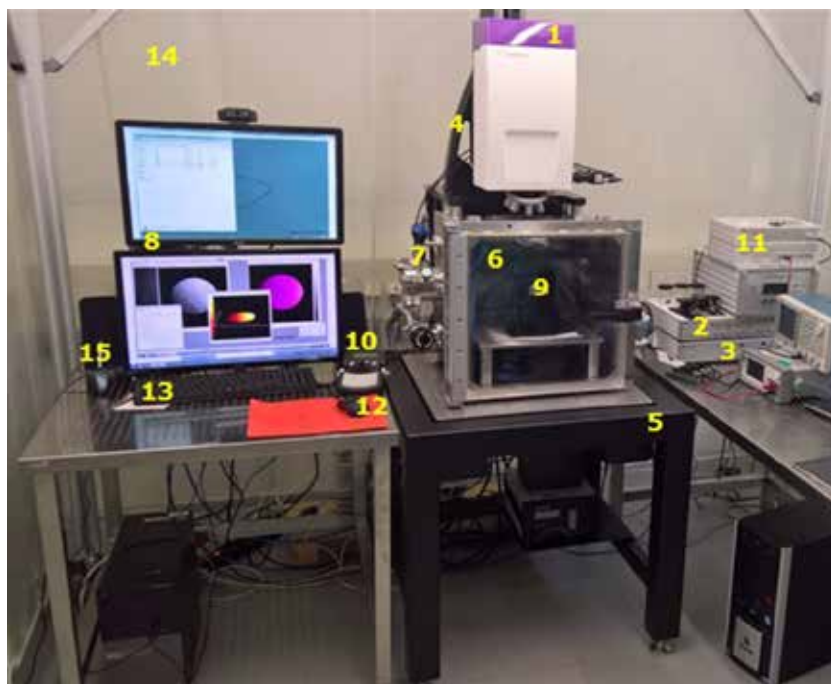
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Measured variables / Measurement ranges / Resolution	
Multi-wavelength configuration	
a. 3x lasers with wavelengths	666 nm, 793 nm, 685 nm
b. maximum measurable vertical step height	12 μm
c. maximum measurable height up to	500 μm
d. vertical resolution down to	0,2 nm
Measurements in a vacuum	up to 100 mTorr
Controlled temperature setting via Peltier stage	-10°C ... +180°C
Motorized XYZ sample stage	Travel range 100 x 100 x 38 mm with 1 μm resolution
Vibration-damped table	Actively controlled
6-position nosepiece	a. 2.5x, 5x, 10x, 20x, 40x, 100x b. lateral resolution of up to 0.1 μm c. Glass correction ring for vacuum chamber
Cleanroom tent	with adjustable airflow (according to ISO Class 6)
Stroboscopic unit	a. For capturing ultra-fast oscillations b. Oscillations up to 25 MHz measurable c. Four 10V output and input channels
Amplifier	20x up to 200 V
Semi-automated sample contacting with micromanipulators – MiBots	a. Vibration-free adjustability with nanometer precision b. Manipulators are equipped with various tools (tungsten DC and AC needle probes, deflection mirrors, microgrippers, micropipettes)
Koala Software and MEMSAnalysisTool	a. Various static and dynamic measurement tools (e.g., roughness measurement, profile measurement, stitching tool (for creating composite images), temporal phase monitor (height change over time), etc. b. Saving of holograms and offline post-processing analysis



- 1 – DHM
- 2 – Stroboscope and control unit
- 3 – Amplifier
- 4 – Tripod
- 5 – Vibration-damped table
- 6 – Vacuum chamber
- 7 – Vacuum gauge
- 8 – Two screens
- 9 – Sample table
- 10 – Joystick for sample table
- 11 – MiBots control
- 12 – Mouse
- 13 – Keyboard
- 14 – Low-dust room (Flowbox)
- 15 – MiBots joystick

