



Technical Note

Continued device feature size reduction, increased number of metal layers, SOC devices and low-k materials contribute to enhance the difficulty of timely failure analysis.

Complementing our line of high performance failure analysis tool and detector hardware, Hamamatsu introduces a new software tool for enhance FA productivity.

NanoLens (Solid Immersion Lens)

Resolution and light collection efficiency greatly improved by increasing numerical aperture (N.A.)

The silicon that forms the substrates of LSIs has a high index of refraction, and since most of the light emitted at the back side of devices is reflected at the surface of the Si. With the NanoLens (solid immersion lens), light emissions that were previously reflected at the silicon substrate boundary are now propagated out into the viewing air by bringing a substantially hemispherical lens contact with the LSI substrate, thereby raising the numerical aperture (N.A.). This leads to major improvements in resolution and light collection efficiency. We have made high-resolution, rapid detection possible and dramatically improved the precision for identifying locations of failures by using the NanoLens.

PHEMOS-1000 and -2000, TriPHEMOS and μ AMOS can be equipped with the NanoLens. Each Model's application software has an easy-to-use interface for NanoLens operation.

■ Configuration

- High N.A. 50 \times objective lens for light emissions
- SILCap (three types: for thickness of 370 μ m, Si; for thickness of 70 μ m, Si; for thickness of 70 μ m, GaP)

■ Basic use

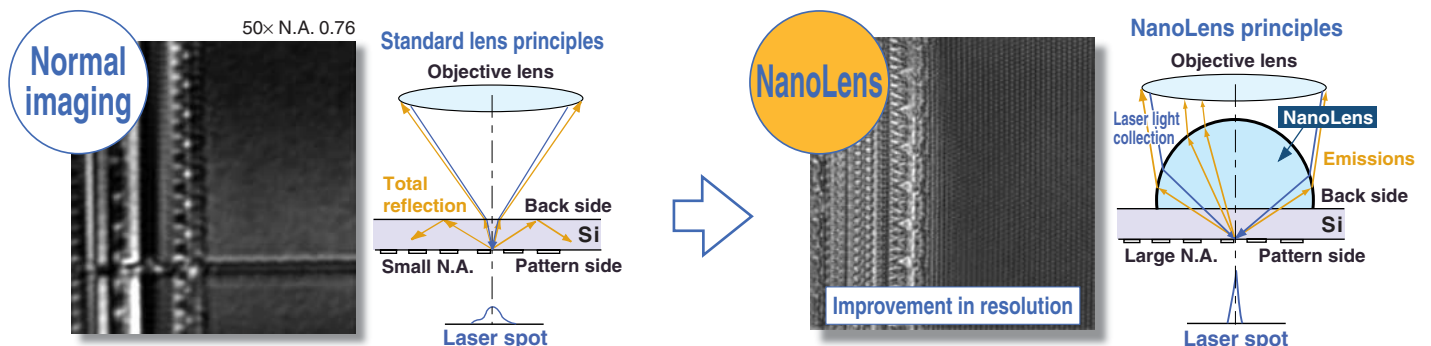
- Magnification: 175 \times ¹
- Maximum N.A.: 2.5¹
- Maximum resolution: 0.15 μ m/s, half pitch or less²
- Si substrate thickness correction: the objective lens is equipped with a Si substrate thickness correction function (automatically controlled through the application software)
- Attachment and removal of solid immersion lens: the lens is manually attached or removed (switching between the three types of solid immersion lenses can be done easily)
- Sample thickness and observation mode

Solid immersion lens	Sample thickness	Application
for thickness of 370 μ m, Si	370 μ m \pm 25 μ m	Light emission (NIR camera), IR-OBIRCH
for thickness of 70 μ m, Si	70 μ m \pm 25 μ m	Light emission (NIR camera), IR-OBIRCH
for thickness of 70 μ m, GaP	70 μ m \pm 25 μ m	Light emission (NIR camera & C-CCD camera), IR-OBIRCH ³

¹ Value when Si lens is used depend on substrate thickness.

² Value at a measurement wavelength of 1.3 μ m.

³ Please use the GaP lens for emissions observations at wavelengths of 1.1 μ m or less.



■ Target samples

- Packaged products: rear mirror surface

■ Systems that can be equipped

- PHEMOS-1000 (optional)
- PHEMOS-2000 (standard equipment)
- TriPHEMOS-1000 (optional)
- μ AMOS-200 (optional)

■ Advanced IC Backside Polishing Unit (optional)

Hamamatsu Photonics provides the optimal packaged IC polishing machine for preparing samples for use with the NanoLens. Use the Advanced IC Backside Polishing Unit to improve the NanoLens contact properties.



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