

DELO

**Wafer Level
Opto Assembly**
Adhesives with
crystal-clear advantages



Printed microlenses on a glass wafer for wafer-level cameras

Fast-curing adhesives for wafer-level opto assembly

The growing demand for more functions and features, combined with pressure to reduce costs, is a driving force in the design and manufacture of mobile devices such as PDAs, laptops and mobile phones. The industry puts great effort into improving the performance and manufacturing methods of mobile phone cameras. Wafer-level manufacturing of camera modules is one of the technologies of choice for addressing these requirements.

Therefore, in very close collaboration with its customers, DELO has developed fast-curing and highly reliable adhesives specially designed for wafer-level packaging.

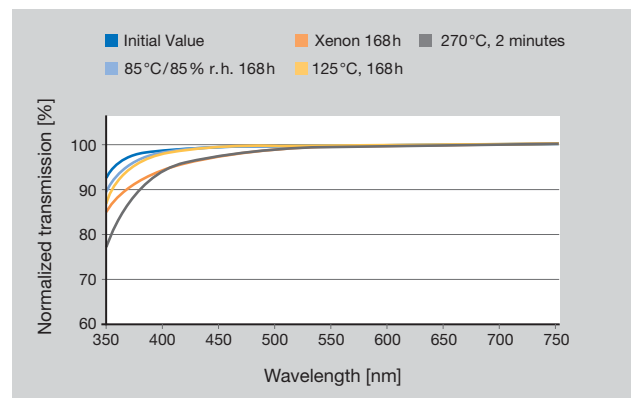
These adhesives do double duty – they not only bond the camera components, they also form the actual lens. This method of producing optically sophisticated lenses represents a significant breakthrough.

Your advantages:

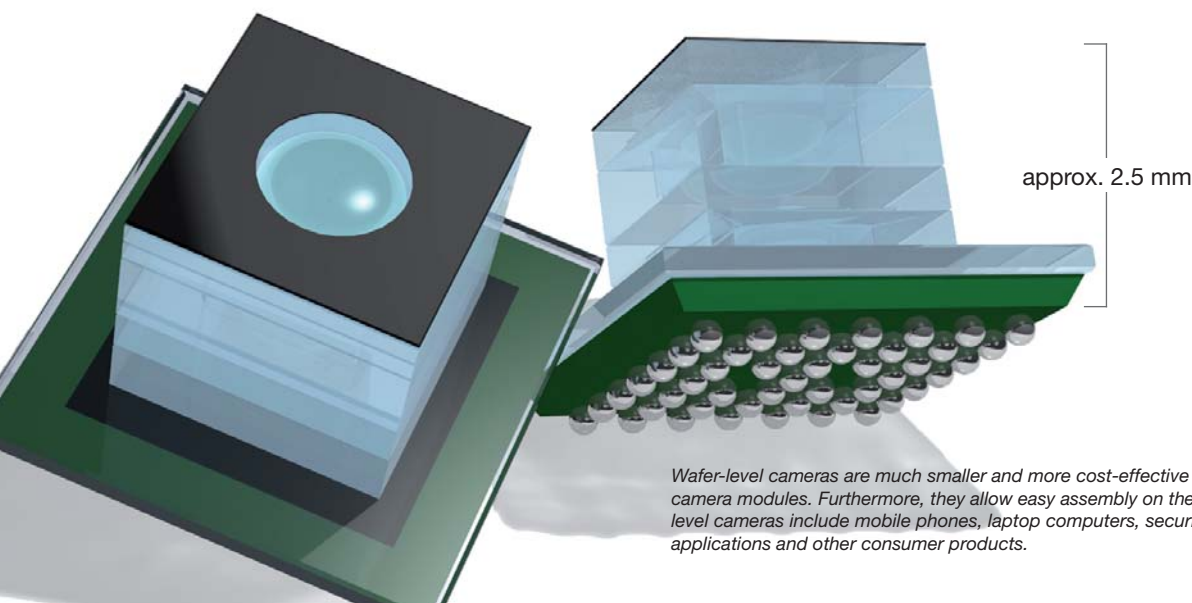
- Size reduction of camera modules
- High reliability, due to low shrinkage and excellent reflow compatibility
- High throughput and cost reduction, due to reduced cycle times (fast curing)
- High-quality camera modules, thanks to high optical transmission even after aging storage

Product properties at a glance

- Reflow-compatible (+260 °C)
- Fast curing (see page 4)
- Excellent adhesion to glass combined with low adhesion to the stamp material
- Low outgassing
- High thermal stability
- Matched index of refraction
- High optical transmission, no yellowing



*Transmission of 100 µm thick films
An optical transmission greater than 90% over the visible spectrum (400 nm – 750 nm) was achieved for all conditions tested. This enables high-quality camera modules.*



Wafer-level cameras are much smaller and more cost-effective than conventional compact camera modules. Furthermore, they allow easy assembly on the PCB. Applications for wafer-level cameras include mobile phones, laptop computers, security electronics, automotive applications and other consumer products.

The wafer-level bonding process

MicroLens Imprinting (1)

A liquid UV-curing adhesive is dispensed onto the wafer and lenses are imprinted using a transparent stamp or mold.

Products: DELO-PHOTOBOND, DELO-KATIOBOND

- High transparency
- Fast UV-curing mechanism
- Excellent adhesion to glass combined with low adhesion to the stamp material
- Low shrinkage
- Refractive index matching
- Crown and flint materials available

Lens wafer stacking through adhesive bonding (2)

Lens and spacer wafers are stacked together by a UV bonding step.

Products: DELO-KATIOBOND, DELO-DUALBOND

- Low outgassing
- Jet or needle dispensable
- BLT (Bond Line Thickness) control with spacer-filled adhesives

Optics to CMOS sensor bonding (3)

Optics modules are bonded onto the CMOS image sensor (singulated or wafer level).

Products: DELO-KATIOBOND, DELO-DUALBOND

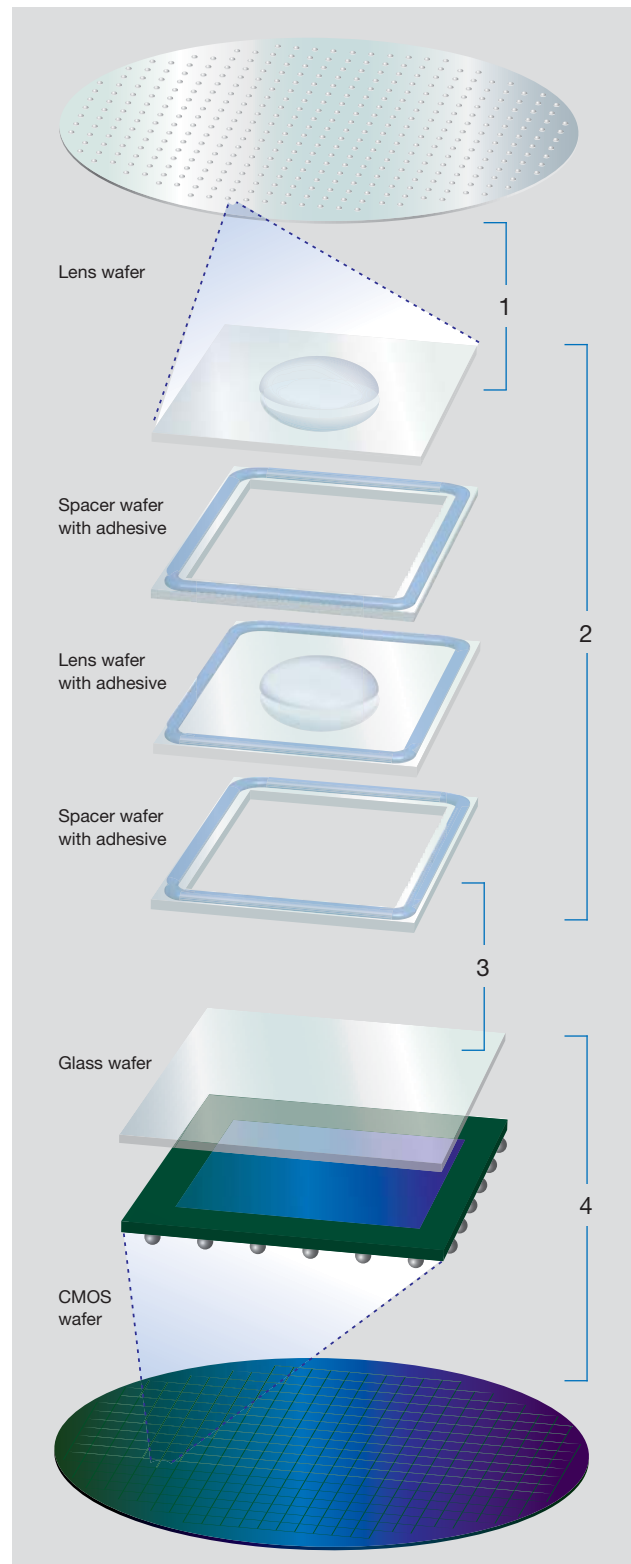
- Optimized viscosity
- BLT (Bond Line Thickness) control with spacer-filled adhesives
- Light and thermal curing

CMOS image sensor wafer level packaging (4)

To protect the image sensor and to allow backside through-silicon-via processes, a glass wafer has to be bonded to the CMOS wafer.

Products: DELO-PHOTOBOND, DELO-DUALBOND, DELO-MONOPOX

- Spin coating uniformity
- Dual bond capability
- High thermal stability



Technical data overview

Worldwide support

	DELO-PHOTOBOND	DELO-KATIOBOND	DELO-DUALBOND
	Photoinitiated-curing acrylates	Photoinitiated-curing epoxy resins	Dual-curing adhesives
Viscosity [mPas]	Different viscosities available depending on the application		
Curing wavelength* [nm] (* Depending on the adhesive)	320 – 450	320 – 400, 400 – 550	320 – 400, 400 – 550 or with heat
Curing time [s] at 55 mW/cm² UVA intensity	< 20	< 20	< 20
Index of refraction	1.51 – 1.56	1.51 – 1.58	approx. 1.5
Recommended Applications:			
Microlens imprinting	✓	✓	
Lens wafer stacking		✓	✓
Optics to image sensor bonding		✓	✓
CMOS image sensor packaging	✓	✓	✓

Worldwide support



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Adhesives

Dispensing

Curing

Consulting

DELO

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