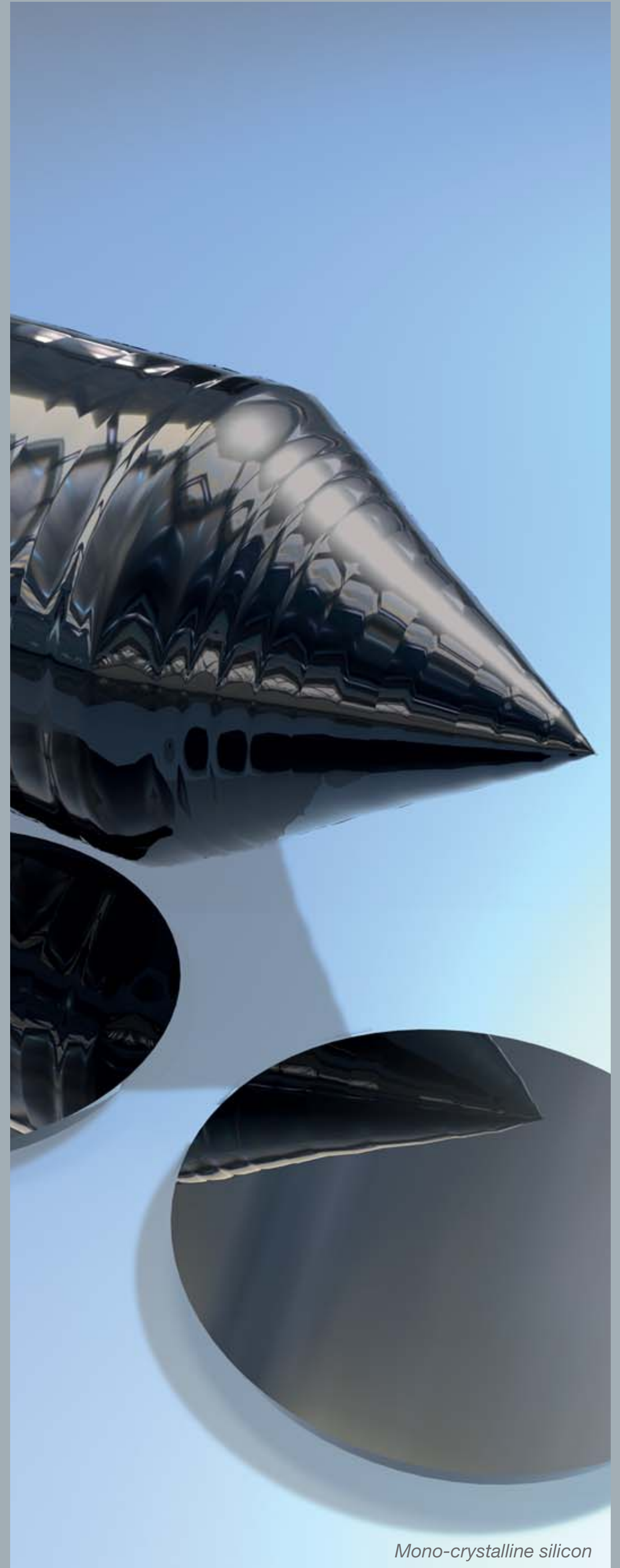
DELO



Mono-crystalline silicon

Adhesives for Wafer Cutting

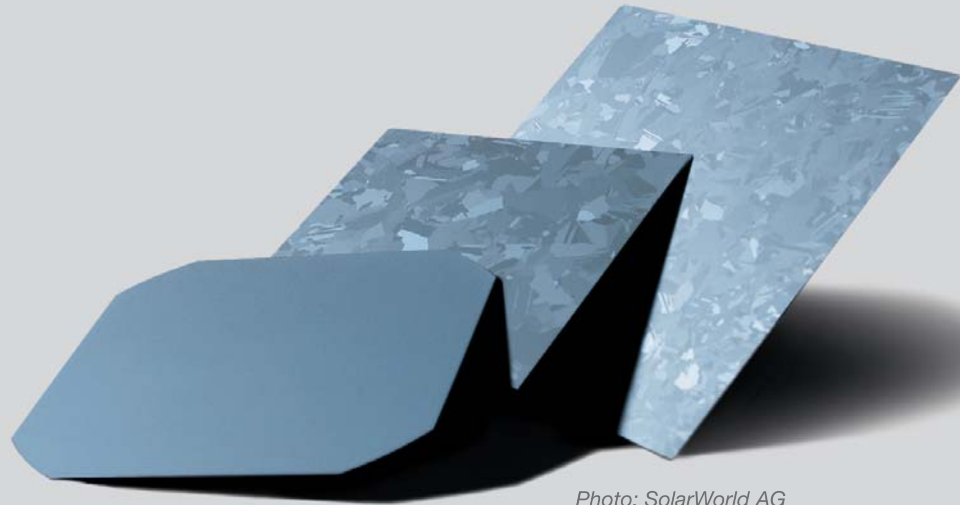


Photo: SolarWorld AG

Top process reliability

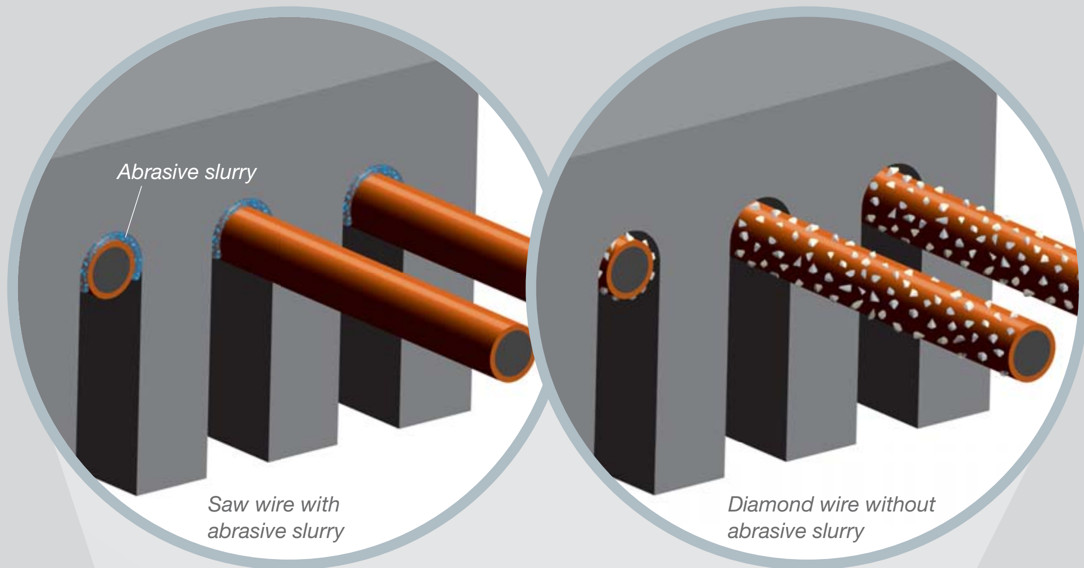
Adhesives for high yield rates

In the fully automated wafering process, wire saws cut monocrystalline or polycrystalline silicon blocks (ingots) into thin square or round disks (wafers). In the semiconductor industry, monocrystalline silicon is typically preferred, while in the photovoltaics industry, either polycrystalline or monocrystalline silicon is used. Among our customers' most important success factors are the utmost quality of the cut and top process reliability, as well as high efficiency of wafer production. The goal is to reach maximum yield rates from the costly silicon ingots. The increasing cost pressure in the market necessitates a continuous optimization of production processes.

High utilization of the saws at maximum speed and full loading requires specifically developed adhesives.
Working together with several well-known customers, DELO® has applied its decades of expertise in two-component adhesives to this process. The result of these joint efforts are adhesives that are exactly customized to the demanding requirements of the wafering process, and therefore allow high throughput. The outstanding properties of our products include high temperature stability and universal debonding behavior in water or diluted, tempered acid.

Technical properties	Your benefit
▪ Top product quality ▪ Free of nonylphenol ▪ High temperature stability and high bond strength on silicon, glass, polymer, steel or aluminum ▪ Very good resistance to glycol (slurry) ▪ Universal debonding behavior in tempered media like water or diluted acids ▪ Lowest possible shrinkage	▪ Excellent sawing properties for slurry and diamond wire saws ▪ Reliable fixing during the sawing process and very low silicon waste ▪ Simple processing ▪ Top process reliability ▪ High level of strength after a very short period of time ▪ No contamination of the silicon during debonding

Using our innovative adhesives in combination with diamond wire saws, you can cut slurry costs and reduce sawing times to a great extent.

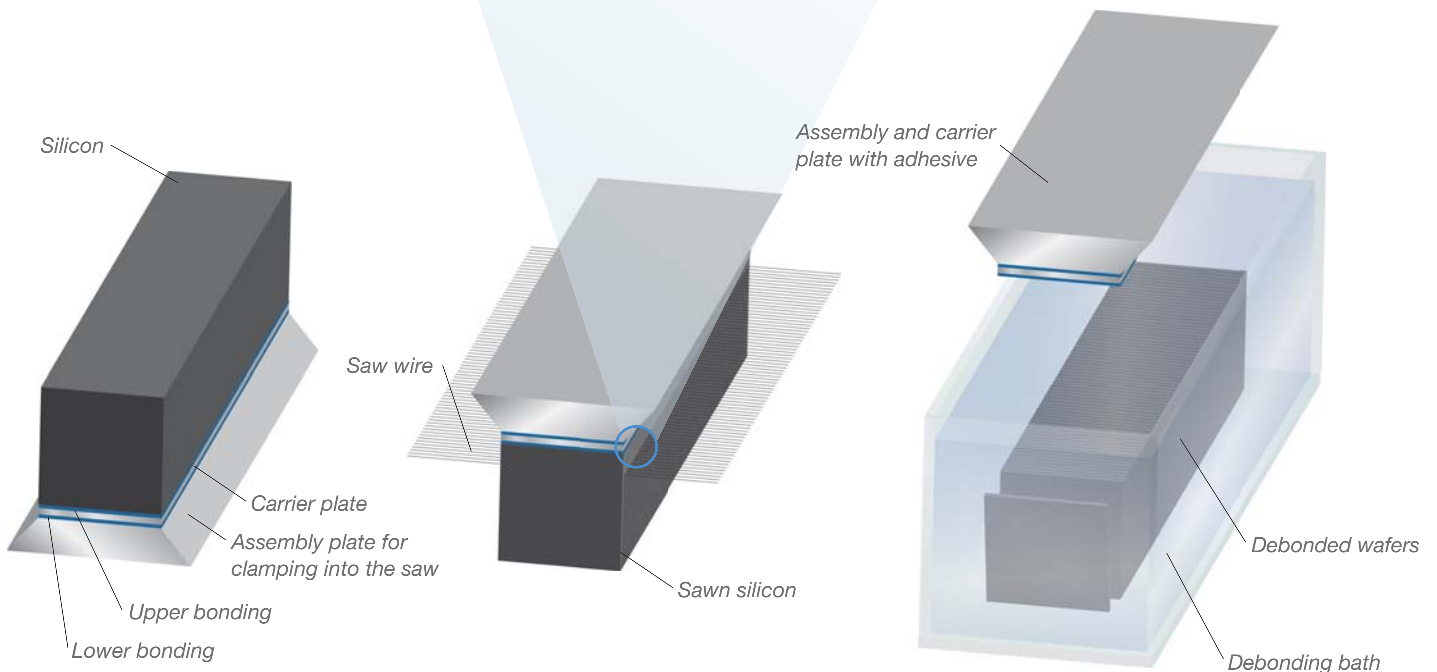


The wafering process

Bonding
In preparation for the sawing process, the assembly plate, the carrier plate or beam and the silicon ingot, as illustrated below, are bonded and fixed with DELO®-DUOPOX RM.

Sawing
During wafering, the bonded silicon ingots are positioned in the wire saw with the help of the assembly plate, and then cut into thin wafers. DELO® adhesives reliably fix the sawn wafers to the carrier plate.

Debonding
Afterwards, the wafers can be separated from the carrier plate without any residues. This is done in baths with hot water or diluted acid. It is important that the adhesive does not contaminate the debonding bath and the silicon, but adheres to the carrier.



		DELO®-DUOPOX RM885	DELO®-DUOPOX RM864	DELO®-DUOPOX RM845
Product properties		▪ Proven in practice ▪ For maximum sawing speeds and loads ▪ Well suited for diamond wire saws ▪ High temperature stability ▪ Universal debonding	▪ Reliable, in use for many years ▪ Fast curing ▪ High temperature stability ▪ Low flexibility ▪ Optimized for debonding in acid	▪ Very fast curing ▪ Very well suited for diamond wire saws ▪ Extremely high temperature stability ▪ Universal debonding
Mixing ratio A:B	by weight	1.26:1	2:1	1.23:1
	by volume	1:1	2:1	1:1
Viscosity [cP = mPas] at room temperature	component A	60,000	50,000	215,000
	component B	75,000	55,000	65,000
Storage life at room temperature		6 months	6 months	6 months
Processing time [min] at room temperature (100 g preparation)		25	10	6.5 (30 g preparation)
Firmness to touch (1 – 2 MPa)		4.5 h	2 h	45 min
Functional strength (> 10 MPa)		> 8 h	3.75 h	4.5 h
Strength after 24 h		2,031 psi (14 MPa)	2,901 psi (20 MPa)	1,595 psi (11 MPa)
Temperature stability Al/Al, after 24 h at room temperature measured at +158 °F (+70 °C)		725 psi (5 MPa)	580 psi (4 MPa)	1,015 psi (7 MPa)
Water	Debonding speed	• •	•	• •
	Debonding performance	• •	•	• •
Acid	Debonding speed	• •	• • ◖	• •
	Debonding performance	• •	• • •	• •
Curing speed		•	• •	• • •

Evaluation:	•	• •	• • •
Debonding speed:	moderate	fast	very fast
Debonding performance:	standard	good	very good
Curing speed:	moderate	fast	very fast

The data and information provided are based on tests performed under laboratory conditions. Reliable information about the behavior of the product under practical conditions and its suitability for a specific purpose cannot be concluded from this. It is the user's responsibility to test the suitability of the product for the intended purpose by considering all specific requirements. Type, physical and chemical properties of the materials to be processed with the product, as well as all actual influences occurring during transport, storage, processing and use, may cause deviations in the behavior of the product compared to its behavior under laboratory conditions. All data provided are typical average values or uniquely determined parameters measured under laboratory conditions. The data and information provided are therefore no guarantee for specific product properties or the suitability of the product for a specific purpose.

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