



SUPERSiC[®] DUMMY WAFERS

POCO's line of SUPERSiC silicon carbide dummy wafers provides the user with maximum flexibility while meeting SEMI standard wafer dimensions. Wafers can be specified as full round or with user defined notches or flats. They are available in sizes up to 300mm.

POCO also offers user defined serialization on each wafer regardless of size or thickness. Custom laser engraving eliminates the risk of cross contamination in the fab.

SUPERSiC dummy wafers contain no silicon backfill and have high purity and durability. Due to their acid resistance and ability to withstand extended high temperature cycling, SUPERSiC wafers can be cleaned and reused indefinitely in LPCVD or diffusion processes.

Why Use POCO Graphite SUPERSiC Dummy Wafers?

It is still common for silicon dummy wafers to be made from reclaimed Si material. Si reclaimed wafers require recovery, cleaning, protection, and tracking in an extended term over SUPERSiC dummy wafers. Costs for reclaimed Si wafers can exceed \$100,000 per year.

The life time of a Si reclaimed dummy wafer is determined by its cleaning frequency. Each cleaning cycle reduces the life of the Si reclaimed wafer which results in the continuous purchase of more reclaimed Si wafers to replace those lost. SUPERSiC dummy wafers remain unchanged cycle after cycle when treated correctly. Lifetimes for SUPERSiC dummy wafers have been reported to be in excess of 3 years.

Due to the better match between the Coefficients of Thermal Expansion (CTE) of SiC and typical films, the film thickness that can be deposited is thicker for SiC than reclaimed Si. Also the surface roughness of SUPERSiC dummy wafers is higher than that of reclaimed Si which improves adhesion of the deposited film to support the growth of thicker deposits before a clean is needed. Depending upon material and process, deposition films of up to 10x the thickness of those produced with reclaimed Si wafers can be grown using SUPERSiC dummy wafers.

SUPERSiC dummy wafers can be custom engraved to avoid any crossover of dummy wafers between various processes which helps to avoid cross-contamination. Engraving is done by laser for easy reading and recognition. In contrast to reclaimed Si dummy wafers, this engraving is not affected by the cleaning cycles and never needs to be redone throughout the lifetime of the wafer.

SEMI Standard Dummy Wafers	
100mm SiC Wafers	200mm SiC Wafers
0.021" (533μm)	0.0285" (724μm)
0.025" (635μm)	
125mm SiC Wafers	300mm SiC Wafers
0.025" (635μm)	0.030" (775μm)
150mm SiC Wafers	
0.0265" (673μm)	

Poco Graphite SUPERSiC has longer life time than reclaimed silicon dummy wafers.

High potential for cross contamination with reclaimed silicon

Cost of Ownership for Poco Graphite SUPERSiC® Dummy Wafers:

A common belief in a wafer device company is that reclaimed silicon is cheap or free. However, this is not the case, as reclaimed Si wafers still originate from purchased Si wafers and the costs for cleaning, recovery and tracking can be very expensive.

Example for 200mm Customer with polySi process:

Consider a reclaimed Si dummy wafer cost of \$26 and a SUPERSiC dummy wafer cost of \$350. A set of side dummies contains 15 dummy wafers. Life time of the reclaimed Si dummy wafer is 30 days and the SUPERSiC dummy wafer is more than 36 months (3 years). Assume a conservative 5x the runs with SUPERSiC dummy wafers when compared with reclaimed Si wafers before cleaning with the reclaimed Si dummy wafers being cleaned every day. Cleaning costs of \$10 per wafer were reported equally for reclaimed Si and SUPERSiC.

Reclaimed Si dummy wafer:			
wafer costs + cleaning costs	$\$26 \cdot 15 \cdot 365 / 30 + \$10 \cdot 15 \cdot 365 / 1$		
	= \$4,745 + \$54,750		
		= \$59,495	each year
SUPERSiC dummy wafer:			
wafer costs + cleaning costs	$\$350 \cdot 15 \cdot 365 / 365 + \$10 \cdot 15 \cdot 365 / 5$		
	= \$5,250 + \$10,950	= \$16,200	1st year
	= \$0 + \$10,950	= \$10,950	2nd year
	= \$0 + \$10,950	= \$10,950	3rd year

In the first year of usage, the SUPERSiC dummy wafers saved more than \$43,200 for this customer. (This may vary for other customers depending on their specific costs.)

In the following two years, new reclaimed Si dummy wafers must be purchased but the SUPERSiC dummy wafers can continue to be reused. The respective costs in the formula above are then the same annually for reclaimed Si dummy wafers but only \$10,950 annually for SUPERSiC dummy

wafers, as only cleaning costs need to be paid. This increases the annual saved costs to more than \$48,500 per side dummy set in a tool, so the costs multiply again by the number of tools in use at the facility. With a total of 18 tools for this customer, the costs for Si dummy wafers sum up to more than \$1MM per year. For SUPERSiC dummy wafers the cost is only about \$291,000 in the first year and about \$197,000 in the two following years. Over a period of three years this customer saved \$2.3MM for these side dummies.

Example for 300mm Customer with SiN process:

Consider a reclaimed Si dummy wafer cost of \$65 and a SUPERSiC dummy wafer cost of \$800. The set of dummy wafers contains 12 wafers. Life time of the reclaimed Si dummy wafer is 20 days and the SUPERSiC dummy wafer is about 30 months (2.5 years). Consider a conservative 4x the runs with SUPERSiC wafers when compared to reclaimed Si wafers before cleaning with the reclaimed Si wafers being cleaned every day. Cleaning costs of \$17 per wafer were reported equally for reclaimed Si and SUPERSiC.

Reclaimed Si dummy wafer:			
wafer costs + cleaning costs	$\$65 \cdot 12 \cdot 365 / 20 + \$17 \cdot 12 \cdot 365 / 1$		
	= \$14,235 + \$74,460		
		= \$88,695	each year
SUPERSiC dummy wafer:			
wafer costs + cleaning costs	$\$800 \cdot 12 \cdot 365 / 365 + \$17 \cdot 12 \cdot 365 / 4$		
	= \$9,600 + \$18,615	= \$28,215	1st year
	= \$0 + \$18,615	= \$18,615	2nd year
	= \$0 + \$18,615	= \$18,615	3rd year

In the first year the usage of SUPERSiC dummy wafers saved costs of more than \$60,400 for this customer. (Again, this may vary for other customers depending on their specific costs.)

In the following two years new reclaimed Si dummy wafers must be purchased but the SUPERSiC dummy wafers can continue to be reused. The respective annual costs in the formula above are then the same for reclaimed Si dummy wafers but only \$18,615 annually for SUPERSiC dummy wafers,

as only cleaning costs need to be paid. This increases the annual saved costs to more than \$70,000 per dummy wafer set in a tool, so the costs multiply again by the number of tools in use at the facility. With a total of 24 tools for this customer, the costs for Si dummy wafers sum up to more than \$2.1MM per year. For SUPERSiC dummy wafers the cost is only about \$677,000 in the first year and about \$447,000 in the two following years. Over a period of three years this customer saved more than \$4.7MM on dummy wafers.



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