

Roiceram-HS PURITY TABLE

Roiceram-HS is preferred worldwide by furnace manufacturers and semiconductor fabricators whose processes require the use of high purity components. As Table 1 shows below, our CVD-Coated SiC only allows for insignificant levels of trace materials creating highly pure, solid and uniform components.

Analysis Method	(PPM by weight)		
	SiC + Si Substrate	SiC-CVD Coating	Quartz
Al	12.9	0.09	0.8
Ca	3.9	<0.03*	0.5
Cr	<0.6*	<0.04*	NA
Cu	<0.4*	<0.008*	0.01
Fe	3.8	0.013	0.4
K	<0.2*	<0.02*	0.1
Mg	<0.2*	NA	0.1
Mn	<0.2*	NA	NA
Na	<0.6*	0.01	0.1
Ni	0.7	<0.006*	NA
Ti	1	NA	0.5
V	1	NA	NA
Zn	<0.4*	NA	NA

Notes: Typical data. Based on in-house & outside laboratory analysis. * Indeterminate/below threshold level.

Table 1.

IN HIGH TEMPERATURE PROCESSES...

When process temperatures climb to over 1000°C, the wafer slots in a Roiceram-HS "boat" will easily maintain their initially machined tolerances, whereas a quartz boat will begin to soften and deform. Roiceram-HS boats will provide a much longer life in auto-wafer-transfer systems and increased up-time in your furnace. Table 2 shows a comparison of strength and softening point between SiC and Quartz.

	Unit	Quartz	Roiceram-HS
Strength	PSI	6200	33000
	MPa	42	230
	kgf/mm ²	4.3	23
Softening Point	°C	1070	>1400

Table 2.

IN LPCVD PROCESSES...

One of the major causes of particle generation from furnace components in LPCVD processes is from the thermal expansion differences between the wafer carrier itself and the deposited film. The coefficient of thermal expansion (CTE) of SiC is highly similar to that of Poly Silicon and Silicon Nitride (Figure 1), so that the matter of cracking and particle generation normally associated with quartzware is significantly reduced. Unlike quartzware, SiC also overcomes particle count fluctuations observed over a period of time.

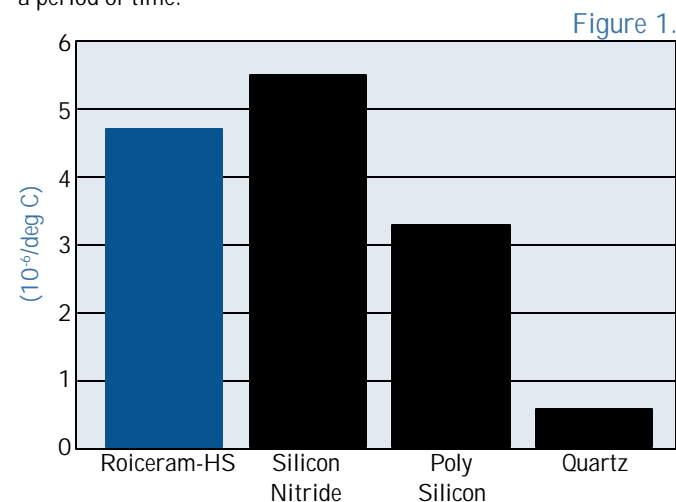


Figure 1.

IN ETCH CLEANING...

Silicon Carbide is chemically impervious to hydrochloric, hydrofluoric and nitric acids. Its chemical stability during cleaning provides an etch ratio over 1,000 times slower than quartz (Figure 2). The material surface conditions remain unchanged after acid cleaning processes whereas quartzware deteriorates rapidly. The impervious surface of Roiceram-HS prevents contamination and outgassing.

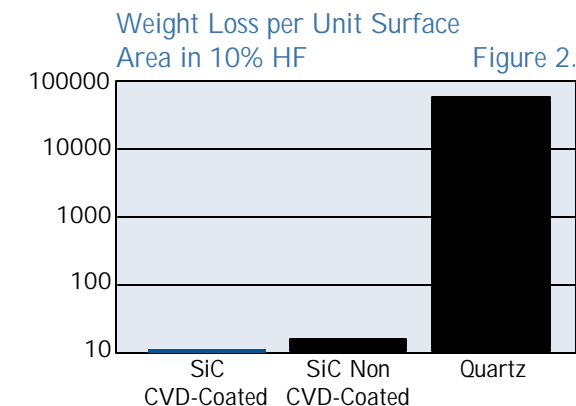


Figure 2.



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Horizontal Products

ULTRA HIGH PURITY SILICON CARBIDE

What's down the road in materials science? We're in the process of finding out, exploring future possibilities at the forefront of the industry.

Although relatively young as a US company, our roots run deep in the ceramics industry. Our parent, Asahi Glass Company, is one of Japan's longtime leaders, and the leading supplier of SiC products in Asia. Together, we're the only silicon carbide supplier in the world with two manufacturing centers - Japan and Oregon.

As partners with you, our customers, our success depends on our ability to provide new products and materials. With new technologies such as 300mm and beyond, demand for improved yield and uptime is critical to your operation. We're on top of it. Our sophisticated design and process control ensures a steady flow of high-performance products capable of meeting your most demanding applications. Together with our Asahi Research Center, we have a vast resource of scientists working on new product development and new applications for silicon carbide - constantly investigating purity, precision, and performance features.

Our full line of high-purity recrystallized and CVD-coated horizontal products is designed to optimize furnace utilization and yield. Our in-house custom design capabilities and state-of-the-art process control ensures consistent high-purity products combined with dimensional precision and overall lower cost of ownership.

Fit. Form. Function. Working with you hand-in-hand to deliver technical solutions for your most demanding applications. All in an effort to produce the highest yield and throughput for your fab. Isn't that what you want from a partner?

Contact **Agem** at our headquarters for a regional office near you:

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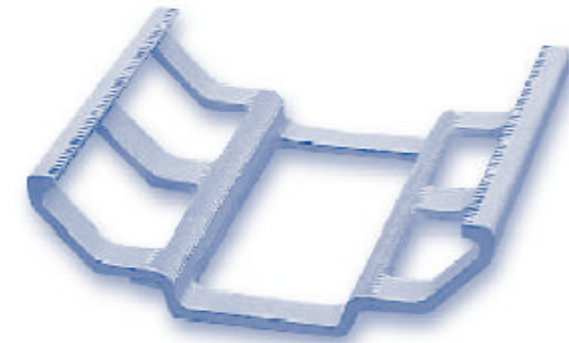
Your
Global Partner
in Wafer Processing

You ask. We deliver. At AGEM, we're committed to process improvement. Our focus on "technical solutions" means that not only can we provide the highest quality materials for your most demanding applications, but we also understand the impact of cost, lead-time, performance, maintainability, and durability of our products. Whatever you need, fully customized products, "fast-track" inventory programs, consignment programs, or process support, our global network is ready to help you succeed.

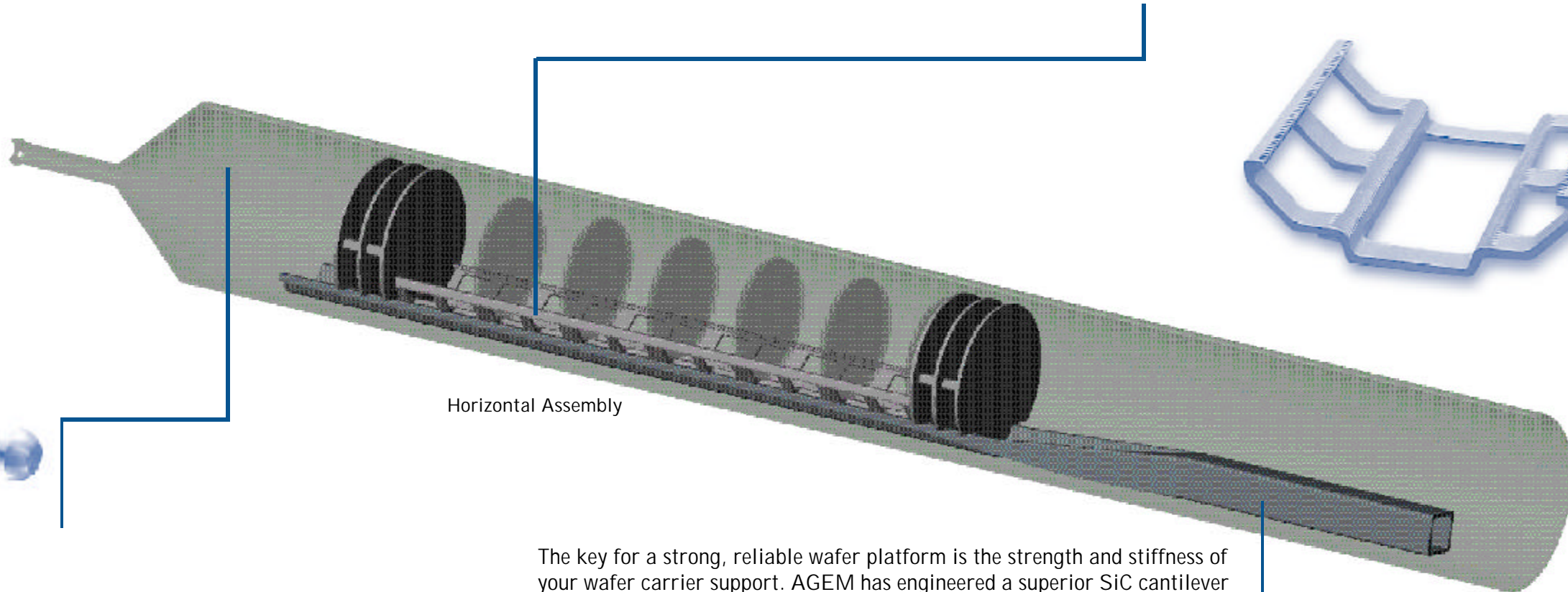
The keys to maximize die throughput are minimum particle defects and wafer uniformity. Because the wafer carriers come in direct contact with the product wafers, the purity and dimensional stability of your boats are critical. AGEM's cassette-style boats are made from the same, ultra-pure SiC material as our other products. Our CVD-coated SiC only allows for ppb-level contamination of trace materials (see table on page 4). With similar coefficient of thermal expansion to your deposition films, SiC reduces particle generation for LPCVD processes. Our boats are machined to exacting tolerances with slot-to-slot uniformity. SiC is virtually impervious to acid etch so repeated cleanings will not affect slot profiles, resulting in consistent and repeatable performance in your wafer transfer machines.



Cassette Boats



Cantilever & Horizontal Boat



Process Tube

Horizontal Assembly

The keys to maintaining a controlled process chamber are the integrity of the material and the manufacturing precision of the connections. No one knows this better than AGEM. Our high purity SiC materials are preferred by wafer fabs and furnace manufacturers worldwide. Our SiC material promotes an even flat zone temperature and dimensional and surface integrity up to 1400°C, which means no sagging or warping.

Notice the diamond-machined connections (image above). The fit and finish from our superior manufacturing technology are unmatched. Our full line of process tubes and liners are customized to your specifications. Whatever configuration you need, multiple inlets and outlets in specified locations, CVD coated, non-coated, and more. We'll deliver.

The key for a strong, reliable wafer platform is the strength and stiffness of your wafer carrier support. AGEM has engineered a superior SiC cantilever for maximum load weight with minimal deflection at elevated temperatures. The fit and finish of the load zone provide a reliable interface between the paddle and the boat. Our cantilevers are formed as a single, continuous component to eliminate concerns regarding tight process tube clearances. Round handles, square handles, slotted paddles, no slots, holes, no holes, CVD-coated or not, all your choice. Whatever you need, we'll deliver.

Cross Section	Handle	Load Zone
	31.8mm Square	95.5mm Wide 19.0mm Tall
	50.8mm Square	106.9 Wide 25.4Tall
	49.5mm Round	105.0 Wide 26.3 Tall