



Fine ceramics for highest performance

The quality of materials used in high-temperature applications is important. For decades, products made out of Kyocera's technical ceramics and StarCeram® have proved efficient in a wide variety of demanding process equipment in the semiconductor industry as well as in process analysis equipment.

High-purity ceramic materials and excellent manufacturing quality provide exceptional corrosion resistance, outstanding specific stiffness and exceptional wear resistance and hardness to reduce particle generation even at maximum temperatures. Our success is based on a combination of these properties allowing better component performance, longer equipment uptime and thus higher process yields.

Kyocera's technical ceramics and StarCeram® materials have been specially developed for use in high-demanding environments like the semiconductor processes. They are particularly convincing, when exposed to combined stresses from for example high temperatures and corrosive atmospheres.



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About Kyocera

Headquartered in Kyoto, Japan, Kyocera is one of the world leaders in the manufacturing of ceramic components and products, with an extensive range of applications. Our long-standing experience in the field of ceramics is applied in the production of very precise, high quality products used in multiple fields.

KYOCERA Fineceramics Europe GmbH has grown steadily in recent years – and is now a leading European supplier of customised solutions made of technical ceramics. With this Kyocera is able to respond quickly to clients in Europe, satisfying the growing market demand for fine ceramic components.

CERAMIC PRODUCTS
FOR SEMICONDUCTOR
PROCESSING EQUIPMENT

Silicon carbide (StarCeram® Si and StarCeram® S)

StarCeram® Si: Impressive performance for large-scaled intricate components

StarCeram® Si, a specially processed isostatic pressed silicon infiltrated silicon carbide, allows designs with intricate features and large-scaled components up to about 1 x 1 x 1 m. Particularly large structural components in moving stages, beamlines and other high precision mechanical assemblies are good examples for applications in semiconductor equipment.

The excellent mechanical properties of StarCeram® Si, typical for silicon carbide materials, in combination with a low density, result in a very high specific stiffness. This is complemented with a high thermal conductivity, a good electrical conductivity and low thermal expansion, making StarCeram® Si the material of choice for many applications in front- and back-end semiconductor processing equipment from fixtures, via susceptors and handling components to chucks and chuck supports.



Structural fixture



Inner structure of water cooled mirror (without upper shell)



Beamline fixture



Chuck support

StarCeram® S: Superior performance in harsh environments

As a fully dense sintered silicon carbide StarCeram® S exhibits excellent chemical resistance and high temperature stability. It is perfectly suited for a wide range of semiconductor process equipment like etching, deposition, and temperature processes.

Applications in the harsh environment like plasma processing, as an example, with components like shower heads, focus rings and more are possible with StarCeram® S.



Gas baffle



Susceptor

CVD SiC coating on StarCeram® Si and StarCeram® S: Very low contamination levels and application in UHV

Both materials, StarCeram® Si and StarCeram® S can be additionally coated with a CVD SiC coating. Due to the unique process these coatings reach contamination levels below 3 ppm allowing applications in particular contamination sensitive process environments like ALE and other ultra-thin deposition processes.

The adherence and aspect ratio of the CVD coatings enables multiple coating and deep hole coverage allowing applications in extreme UHV and intricate designs for special processes.

Silicon nitride (StarCeram® N)

StarCeram® N: The choice for wear and thermal shock resistance

Materials of the StarCeram® N family are isostatically pressed silicon nitride materials, processed with procedures to obtain optimized mechanical and thermal properties. StarCeram® N materials are performing especially well in semiconductor equipment applications where high wear resistance and strength are required.

StarCeram® N silicon nitride materials additionally show an exceptional thermal shock behaviour allowing the application of this material family in thermal cycling and high temperature processes in semiconductor equipment.

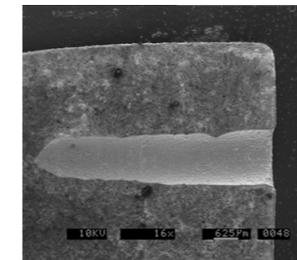
Applicable parts range from high-end end effectors, wafer handlers, hot plates, and many more parts wherever the handling and moving of still hot wafers are essential for higher equipment throughput and performance.



Wafer chuck



End effector



Good coverage in holes with high aspect ratio; hole diameter 1.2 mm; hole depth 5.5 mm

Joining of StarCeram® components

Utilizing the unique manufacturing process of StarCeram® Si allows the production of water and helium-tight hollow structures. This enables the production of water or gas-cooled components, like temperature-controlled chucks or susceptors, heater blocks or other processes requiring a precise temperature control or exact heat ramp. This fusion process of two or more individually machined green silicon carbide components results in a monolithic component exhibiting the extraordinary properties of a typical single StarCeram® Si component.

With the excellent capabilities in machining equipment and machinability of StarCeram® silicon carbide and nitride materials the design of intricate and complex features is possible. This allows the construction of special mounting features or the applicability of fasteners and other standard mounting options.



Threaded metal inserts