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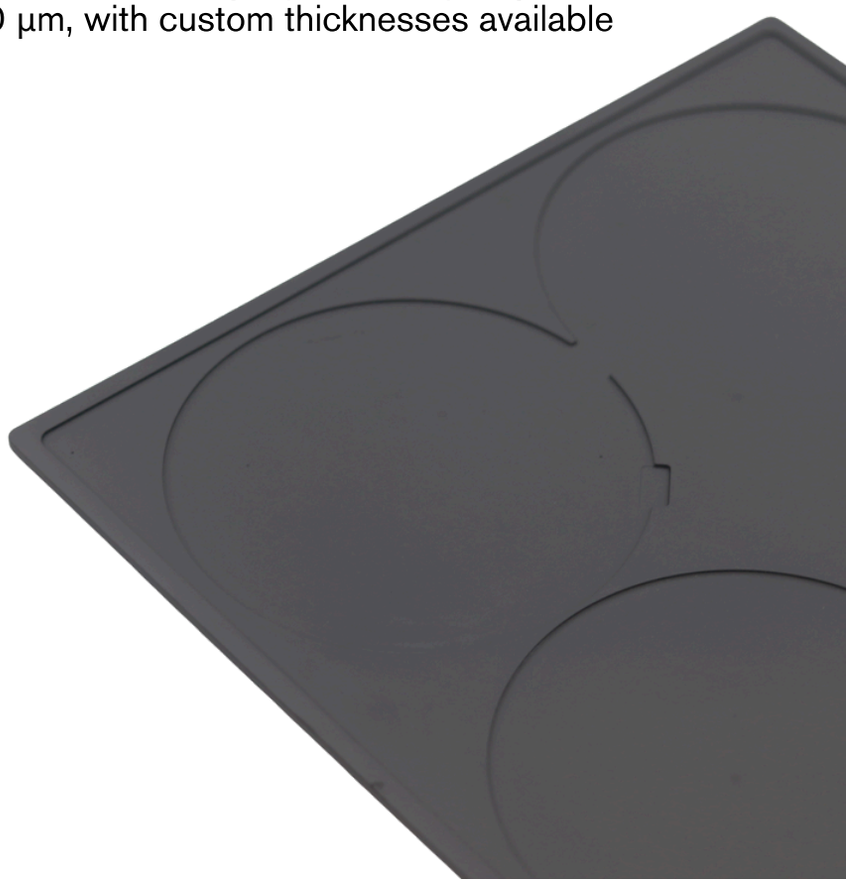
Thermic Edge
Vacuum Heating Technology

SiC³ - Engineered for high-temperature, corrosive, and vacuum environments

- **Cubic structure giving high density coating**
  This vastly improves corrosion resistance and increases the component's life.
- **Excellent coverage down blind holes**
  With 30% coating thickness down a Ø1x5mm deep hole.
- **High thickness uniformity**
  SiC coating offers high coating thickness uniformity of +/-10microns on 100micron thick coating.
- **High purity coating**
  Our SiC coating is deposited using ultra-high-purity precursor gases, delivering consistently low impurity levels and minimal nitrogen incorporation. This results in purity exceeding typical industry benchmarks, with excellent chemical stability and process reproducibility

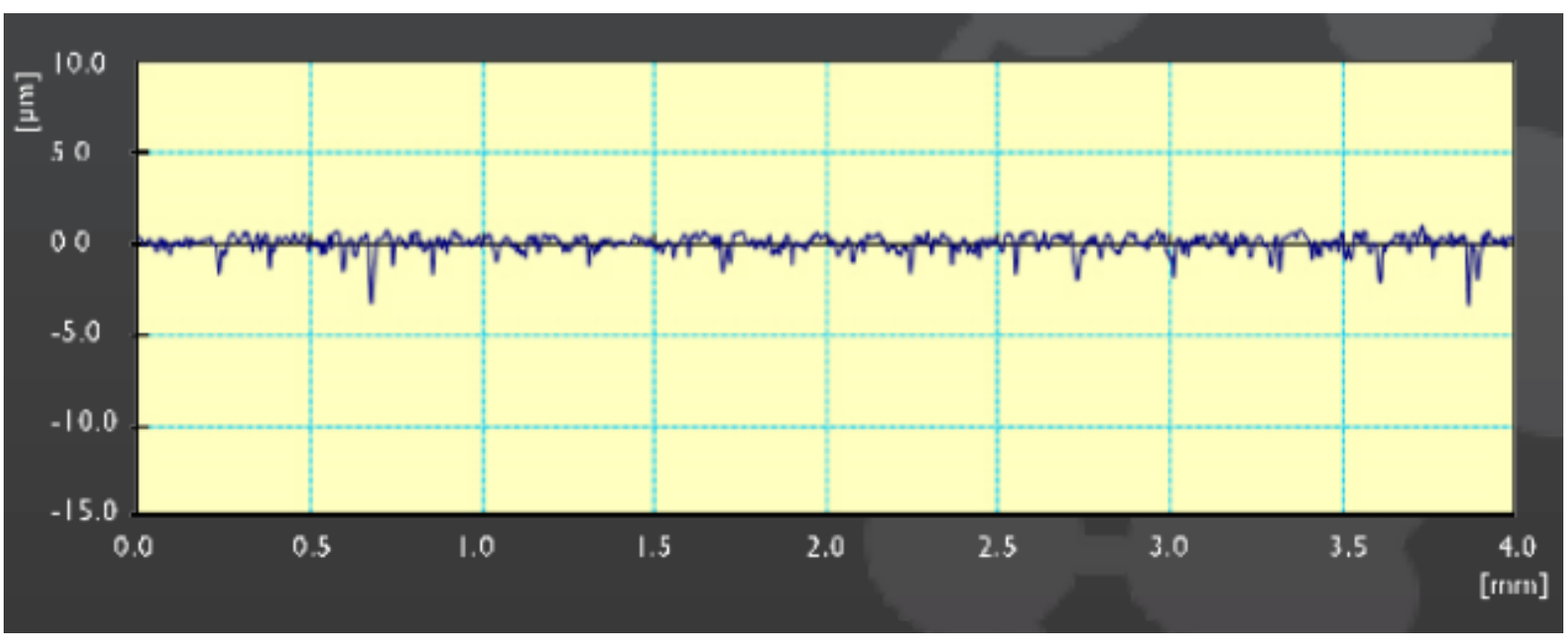
Thermic Edge Ltd is the sole manufacturer of SiC³, our proprietary cubic silicon carbide coating engineered for demanding semiconductor process environments. The SiC³ process delivers a tightly controlled crystal size, isotropic microstructure, and low surface roughness, supporting uniform thermal behaviour, excellent dimensional stability, and consistent surface performance across critical components. High deposition growth rates enable commercially viable coating thicknesses while maintaining repeatable quality and throughput. Typical coating thickness is 80 to 100 µm, with custom thicknesses available to suit specific process requirements.

SiC³ provides a high-purity, dense, and impervious protective layer on graphite, porous ceramics, and composite substrates, offering excellent resistance to process gases, plasma exposure, and high-temperature cycling. Combined with Thermic Edge's in-house expertise in graphite selection, precision machining, and component design, SiC³ supports improved uptime, reduced particle risk, and long-term reliability in semiconductor manufacturing equipment.



General Properties

SiC³ Specification	
Property	**Value**
Density	3200 kg.m-3
Crystal Structure	3C (cubic; β)
Porosity	0% (helium leak tight)
Crystal Size	1–5 µm
Visual Appearance	Grey, satin to dull
Thermal Expansion (RT–400 °C)	4.2×10^{-6} m·K^{-1}
Thermal Conductivity (@ 20 °C)	200 W·m^{-1}·K^{-1}
Elastic Modulus	450 GPa
Electrical Resistivity (@ 20 °C)	1 MΩ·m



Surface Roughness
A typical surface roughness profile is shown here.

The surface roughness parameters are Ra = 0.8 µm, Rz = 5 µm and Rt = 8 µm.

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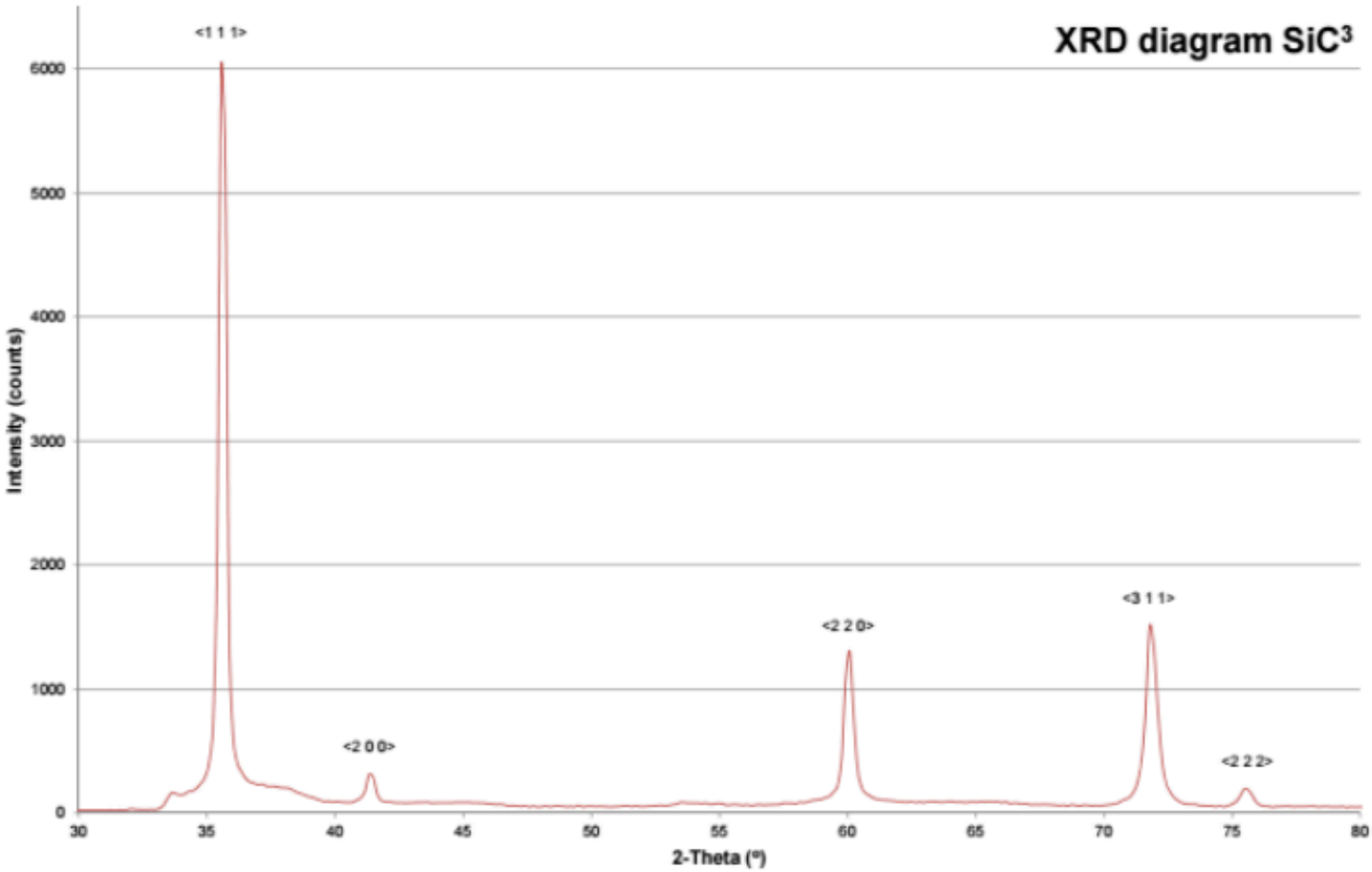
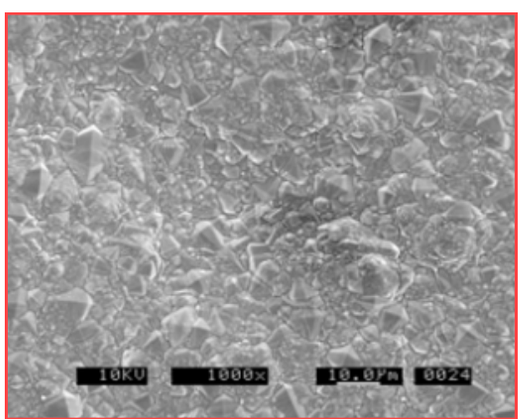
XRD

X-ray diffraction patterns show strong correlation with the reference 3C-SiC phase, confirming the cubic crystal structure of the coating. Data acquired from an approximately 80 µm thick deposited layer.

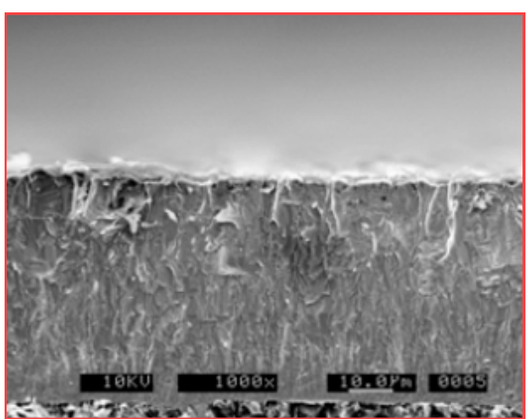


SEM

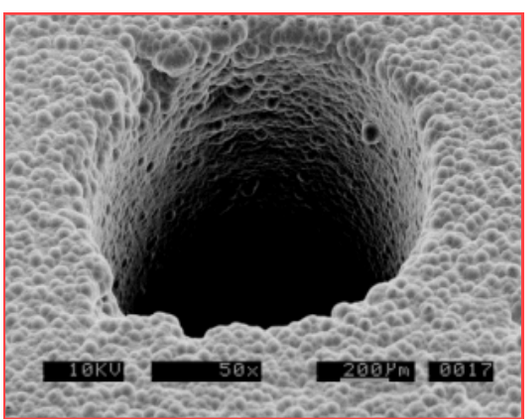
SEM surface and fracture analysis is shown below (Images 1 & 2).



Surface Analysis



Fracture Analysis



Covering Small Holes

Penetration (Image 3)

SiC³ deposited by CVD offers significantly higher throwing power than line-of-sight coating technologies. Internal features with diameters down to 1 mm can be coated to depths of up to 5 mm while maintaining approximately 30 percent of the nominal layer thickness at the deepest point. Improved thickness uniformity is achieved in larger diameter features, supporting consistent coverage of complex geometries and high aspect ratio components.

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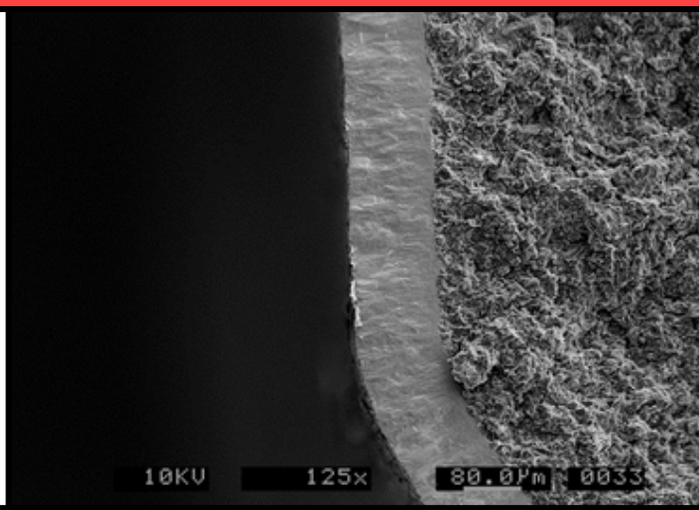
Applications

Protective coating for graphite and ceramic components used in:

- Semiconductor manufacturing equipment
- MOCVD and EPI systems
- LED production
- Power electronics and wide bandgap materials (SiC, GaN)
- Vacuum furnaces and thermal processing systems
- Chemical vapour deposition and plasma processing equipment
- Crystal growth and materials research
- Solar and photovoltaic manufacturing
- Aerospace and high-temperature test systems
- Research laboratories and pilot production facilities

SiC^3 Ceramic Coating

SiC^3 is Thermic Edge's proprietary cubic silicon carbide coating developed for high-temperature and chemically demanding process environments. The coating forms a dense, impervious barrier that protects underlying materials from corrosion, oxidation, and diffusion of contaminants, supporting stable and repeatable process performance.

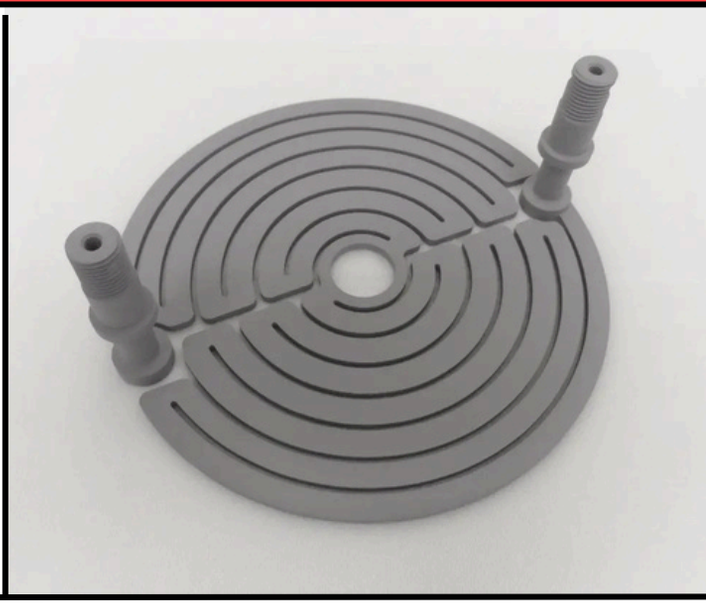


Key Characteristics

- Dense, high-purity CVD silicon carbide coating
- Isotropic cubic (3C) microstructure
- Low surface roughness and controlled surface finish
- Strong adhesion on dense and porous substrates
- Effective diffusion barrier and corrosion protection
- Suitable for complex geometries and internal features
- Substrate material include High-purity graphite, SiSiC, SiC, Ceramic and Tungsten.

Thermic Edge Coatings

Thermic Edge operates as an independent coating supplier, working closely with material and machining partners to deliver consistent quality, reliable lead times, and application-specific solutions. Combined expertise in substrate selection, precision machining, and CVD coating supports both standard production and bespoke development programmes.



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Material Purity

This table shows the impurities in SiC^3 coating.

* Lowest Limit of Detection With This Method.

Element	Impurities (PPM)
Sodium	< 0.01
Magnesium	< 0.01
Aluminium	< 0.02
Potassium	< 0.5*
Calcium	< 0.05
Titanium	< 0.005
Vanadium	< 0.005
Chromium	< 0.3
Iron	< 0.04
Cobalt	< 0.05
Nickel	< 0.05
Molybdenum	< 0.05
Tin	< 0.05
Tungsten	< 0.01

Testing carried out by EAG Laboratories using Glow Discharge Mass Spectroscopy.

Elements

The following diverse selection of heaters have been used by customers worldwide for heating in O2 environments. A range of standard element sizes are available from stock.




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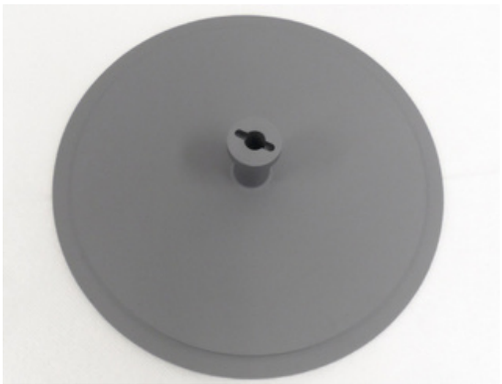
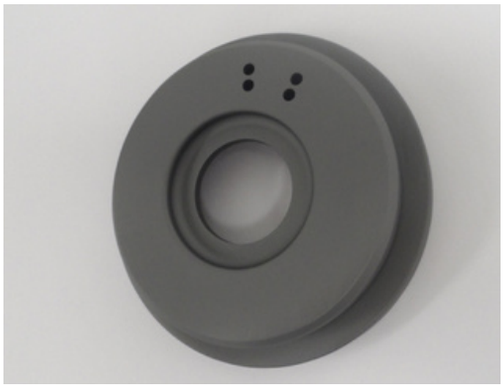
Applications

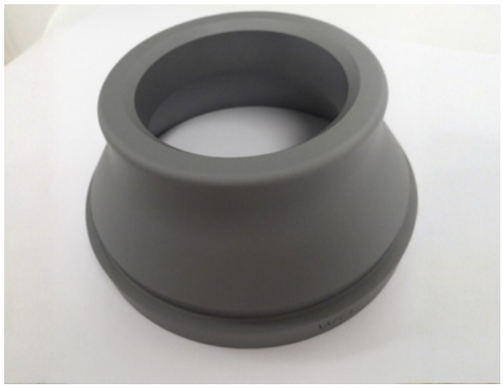
The gallery below shows SiC3 coated products used in semiconductor, LED and mechanical applications.



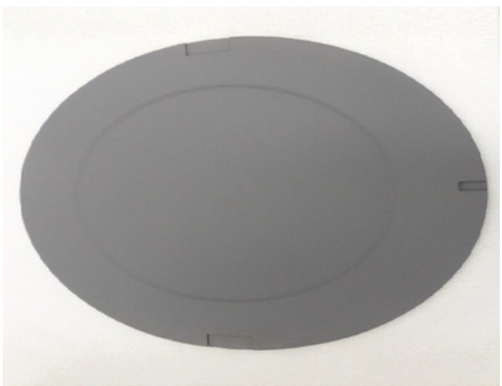
6 “ Wafer Holder



Support

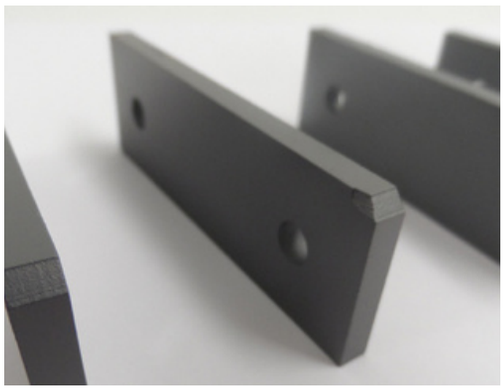


Ejector Nozzle

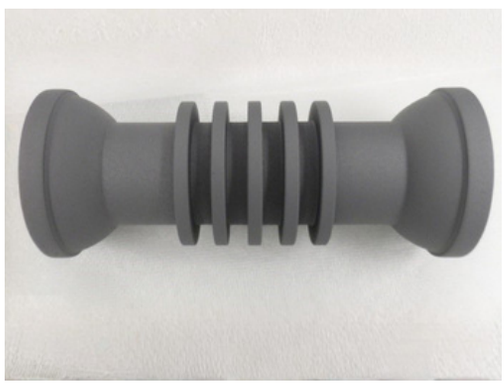


Ultra Thin, 6 Inch Susceptor For GaN Epitaxy

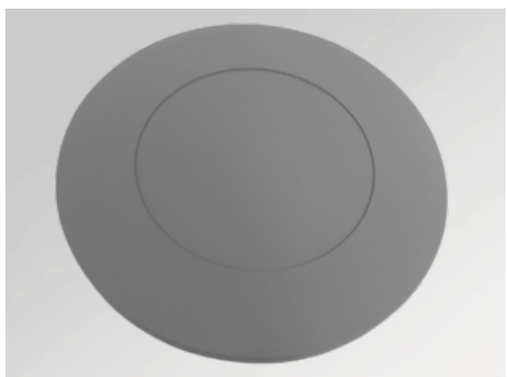
7 x 2 Susceptor



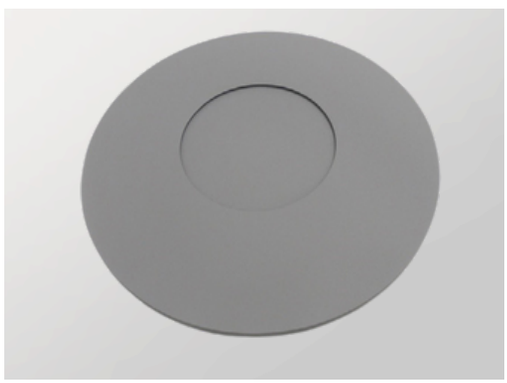
Guides



SiSiC Gas Inlet Tube



4 Inch Susceptor



5 Inch Receptor, 3 Inch Recess

THANK YOU FOR YOUR INTEREST

Please visit our website for more information.

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