

SIC COATINGS

Our silicon carbide coated
products for semiconductor
industry

Silicon Carbide Coated
Semiconductor Components
Silicon Carbide Ceramic



ABOUT US

Semicorex Advanced Material Technology Co., Ltd is a leading high-quality supplier of top-notch chemical vapor deposition (CVD) SiC coating products in China. We are committed to the research and development of innovative semiconductor materials, particularly of SiC coating technology and its application in the semiconductor industry. We offer a wide range of high-quality products such as SiC coated graphite susceptors, deep UV epitaxy susceptors, CVD substrate heaters, CVD SiC wafer carriers, wafer boats, as well as semiconductor equipment components and silicon carbide ceramic products.



R&D Capabilities

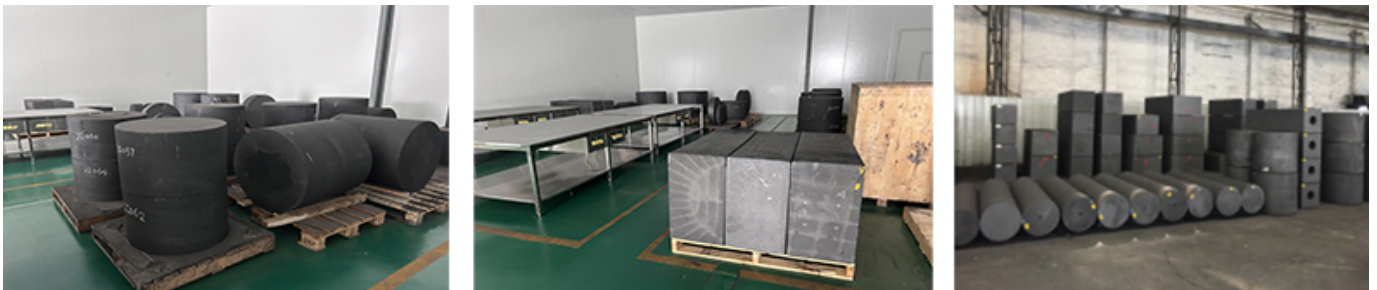
Material Analysis



Precision machining



Raw Material Warehouse



Advantages

Fast delivery

Sufficient stock

Over 4000 square meter of class
1000 cleanroom

Multiple advanced production lines

Service

Customized solutions for SiC-
coated products

One-stop turnkey services

Modern management

Multiple advanced production lines

Top-notch professional research
team

High Quality

High-purity silicon carbide thin film

Various size and specifications for
epitaxial graphite susceptors

Fully automated inspection

Competitive prices



Customize

We supply the silicon carbide coating products as per your drawings.

MOCVD susceptors (graphite + SiC coating)

Semiconductor Industry

Monocrystalline silicon epitaxial susceptors (graphite + SiC coating)

Semiconductor Industry

Plasma etching disk

Semiconductor Industry

Solar photovoltaic products

Solar photovoltaic

Silicon carbide products such as heaters, crucibles, molds, fixtures



> LED

INDUSTRY OUTLOOK

The SiC thin film used in LED chip epitaxy and silicon single crystal substrates has a cubic phase with the same crystal lattice structure as diamond, and it is second only to diamond in hardness. SiC is a widely recognized wide-bandgap semiconductor material with immense potential for application in the semiconductor electronics industry, and has excellent physical and chemical properties, such as high thermal conductivity, low thermal expansion coefficient, and high temperature resistance and corrosion resistance.



Application Field

SiC coatings are widely used in the semiconductor industry and solar photovoltaics. In particular, the susceptors used in the epitaxial growth of LEDs and Si single crystal epitaxy require the use of SiC coating. Due to the strong upward trend of LEDs in the lighting and display industry, and the vigorous development of the semiconductor industry, SiC coating product prospects are very good.

Smart Solutions

Semiconductor Industry

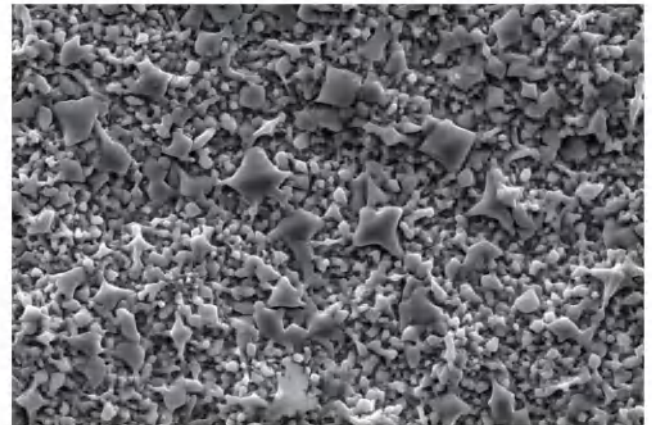
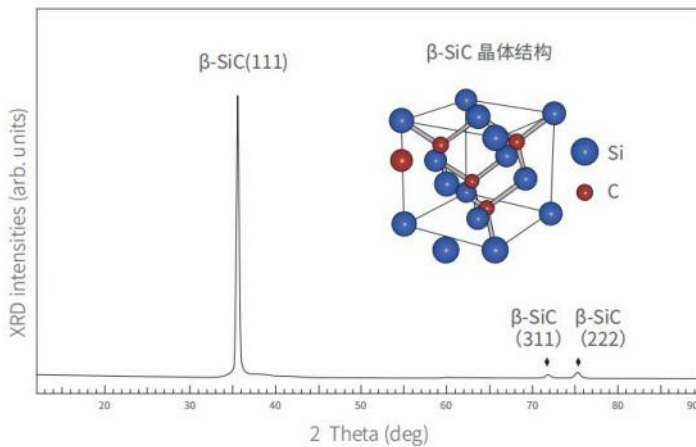
MOCVD susceptors
Monocrystalline silicon epitaxial susceptors
Plasma etching disk
Silicon carbide products such as heaters, crucibles, molds, fixtures

Solar photovoltaic

Solar photovoltaic products

Highly(close to 100%) 111- Oriented 3C-SiC

SEM data of CVD SiC films, size 2-10 μm



10 μm EHT=20.00kV SignalA=SE1
wd=10.5mm Mag=1.00KX

Material data of Semicorex SiC Coating

| Typical properties | Units | Values |
|--|------------------------------------|-------------------|
| Structure | | FCC β phase |
| Orientation | Fraction (%) | 111 preferred |
| Bulk density | g/cm | 3.21 |
| Hardness | Vickers hardness | 2500 |
| Heat Capacity | J kg ⁻¹ K ⁻¹ | 640 |
| Thermal expansion 100 600 °C (212 1112 °F) | 10 ⁻⁶ K ⁻¹ | 4.5 |
| Young s Modulus | Gpa (4pt bend, 1300°C) | 430 |
| Grain Size | μm | 2 -10 |
| Sublimation Temperature | °C | 2700 |
| Felexural Strength | MPa (RT 4-point) | 415 |
| Thermal conductivity | (W/mK) | 300 |

Purity

> 99.99995%

| Element | ppm |
|----------------|------------|
| Li | < 0.001 |
| Be | < 0.001 |
| B | 0.03 |
| C | Matrix |
| F | < 0.1 |
| Na | < 0.05 |
| Mg | < 0.05 |
| Al | < 0.05 |
| Si | Matrix |
| P | < 0.05 |
| S | < 0.1 |
| Cl | 0.43 |
| K | < 0.1 |
| Ca | < 0.05 |
| Sc | < 0.01 |
| Ti | < 0.05 |
| V | < 0.01 |
| Cr | < 0.05 |
| Mn | < 0.05 |
| Fe | < 0.05 |
| Co | < 0.01 |
| Ni | < 0.01 |
| Cu | < 0.05 |
| Zn | < 0.05 |
| Ga | < 0.05 |
| Ge | < 0.05 |

| Element | ppm |
|----------------|------------|
| As | < 0.05 |
| Se | < 0.05 |
| Br | < 0.05 |
| Rb | < 0.05 |
| Sr | < 0.05 |
| Y | < 0.05 |
| Zr | < 0.05 |
| Nb | < 0.05 |
| Mo | < 0.05 |
| Ru | < 0.05 |
| Rh | < 0.05 |
| Pd | < 0.05 |
| Ag | < 0.05 |
| Cd | < 0.05 |
| In | < 0.05 |
| Sn | < 0.05 |
| Sb | < 0.05 |
| Te | < 0.05 |
| I | < 0.05 |
| Cs | < 0.05 |
| Ba | < 0.05 |
| La | < 0.05 |
| Ce | < 0.05 |
| Pr | < 0.05 |
| Nd | < 0.05 |
| Sm | < 0.05 |

| Element | ppm |
|----------------|------------|
| Eu | < 0.05 |
| Gd | < 0.05 |
| Tb | < 0.05 |
| Dy | < 0.05 |
| Ho | < 0.05 |
| Er | < 0.05 |
| Tm | < 0.05 |
| Yb | < 0.05 |
| Lu | < 0.05 |
| Hf | < 0.05 |
| Ta | < 5 |
| W | < 0.05 |
| Re | < 0.05 |
| Os | < 0.05 |
| Ir | < 0.05 |
| Pt | < 0.05 |
| Au | < 0.05 |
| Hg | < 0.05 |
| Tl | < 0.05 |
| Pb | < 0.05 |
| Bi | < 0.05 |
| Th | < 0.01 |
| U | < 0.01 |

Silicon Carbide Coated

SiC coating is a thin layer onto the susceptor through the chemical vapor deposition(CVD) process. Silicon carbide material provides a number of advantages over silicon, including 10x the breakdown electric field strength, 3x the band gap, which provides the material with high temperature and chemical resistance, excellent wear resistance as well as thermal conductivity.

Customized service, help you innovate with components that last longer, reduce cycle times, and improve yields.

LED Manufacturing

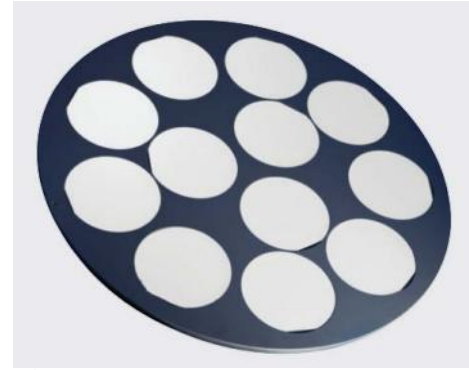
CVD SiC coated susceptor is used in manufacturing processed of various LED types, including blue and green LED, UV LED and deep-UV LED

Mobile communication

CVD SiC coated susceptor is a crucial part of the HEMT to complete the GaN-on-SiC epitaxial process

Semiconductor Processing

CVD SiC coated susceptor is used in the semiconductor industry for various applications, including wafer processing and epitaxial growth



↑ PSS Etching Carrier



↑ Deep-UV LED Epitaxial Susceptor



↑ Barrel Susceptor



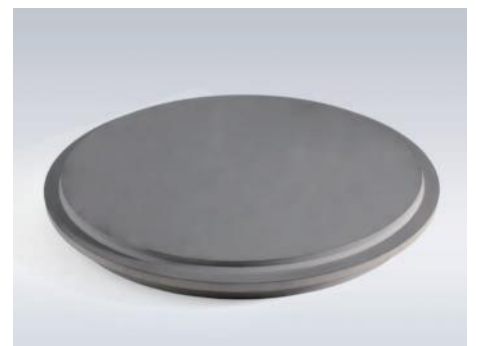
↑ MOCVD Epitaxial Disc



SiC Coated Graphite Components

Made by Silicon Carbide Coating (SiC) graphite, the coating is applied by a CVD method to specific grades of high density graphite, so it can operate in the high temperature furnace with over 3000 °C in an inert atmosphere, 2200°C in vacuum.

The special properties and low mass of the material allow fast heating rates, uniform temperature distribution and outstanding precision in control.



Semiconductor Components by Silicon Carbide Coated

Semicorex is your partner for improving in semiconductor processing. Our silicon carbide coatings are dense, high temperature and chemical resistant, which are often used in the whole cycle of semiconductor manufacturing, including semiconductor wafer & wafer processing and semiconductor fabrication.

High-purity SiC coated components are crucial to processes in the semiconductor. Our offering ranges from graphite consumables for crystal growing hot zones (heaters, crucible susceptors, insulation), to high-precision graphite components for wafer processing equipment, such as silicon carbide coated graphite susceptors for Epitaxy or MOCVD.





Chamber Lids

Chamber Lids used in crystal growth and wafer handling processing must endure high temperatures and harsh chemical cleaning.

End Effector

End effector is the robot's hand which moves semiconductor wafers between positions in wafer processing equipment and carriers.



Inlet Rings

SiC coated gas inlet ring by MOCVD equipment Compound growth has high heat and corrosion resistance, which has great stability in extreme environment.

Focus Ring

Semicorex supplies Silicon Carbide Coated focus ring is really stable for RTA, RTP or harsh chemical cleaning.



Wafer Chuck

Semicorex ultra-flat ceramic vacuum wafer chucks is high purity SiC coated using in the wafer handling process.

Silicon Carbide Ceramic

Silicon carbide ceramic (SiC) is an advanced ceramic material containing silicon and carbon. Grains of silicon carbide can be bonded together by sintering to form very hard ceramics. Semicorex supplies custom silicon carbide ceramics as your requiring.

| Typical properties | Units | Pressureless Sintered Silicon Carbide (SSiC) | Reaction Sintered Silicon Carbide (RBSiC) |
|----------------------------------|----------------------|--|---|
| | | | |
| Bulk Density | g/cm ³ | 3.15 ± 0.03 | 3 |
| Flexural Strength | MPa (kpsi) | 380(55) | 338(49) |
| Compressive Strength | MPa (kpsi) | 3970(560) | 1120(158) |
| Hardness | Knoop | 2800 | 2700 |
| Breaking Tenacity | MPa m ^{1/2} | 4 | 4.5 |
| Thermal Conductivity | W/m.k | 120 | 95 |
| Coefficient of Thermal Expansion | 10 ⁻⁶ /°C | 4 | 5 |
| Specific Heat | Joule/g 0k | 0.67 | 0.8 |
| Max temperature in air | °C | 1500 | 1200 |
| Elastic Modulus | Gpa | 410 | 360 |

| Typical properties | Units | Recrystallized Silicon Carbide (R-SiC) |
|---------------------------------------|----------------------|---|
| | | |
| Working temperature | °C | 1600°C (Oxidizing environment) 1700°C (Reducing environment) |
| SiC content | % | > 99 |
| Free Si content | % | < 0.1 |
| Bulk density | g/cm ³ | 2.60-2.70 |
| Apparent porosity | % | < 16 |
| Crushing strength | MPa | > 600 |
| Cold bending strength | MPa | 80-90 (20°C) |
| Hot bending strength | MPa | 90-100 (1400°C) |
| Thermal expansion coefficient @1500°C | 10 ⁻⁶ /°C | 4.7 |
| Thermal conductivity @1200°C | W/m•K | 23 |
| Elastic modulus | GPa | 240 |
| Thermal shock resistance | | Extremely good |

With silicon carbide ceramics the material properties remain constant up to temperatures above 1,400°C. The high Young's modulus > 400 GPa ensures excellent dimensional stability.



A typical application for silicon carbide components is dynamic sealing technology using friction bearings and mechanical seals, for instance in pumps and drive systems.

- Axle Sleeve
- Bushing
- Mechanical Seal



With the advanced properties, silicon carbide ceramics are also ideal for use in the semiconductor industry.

- Wafer Carrier
- Wafer Boat



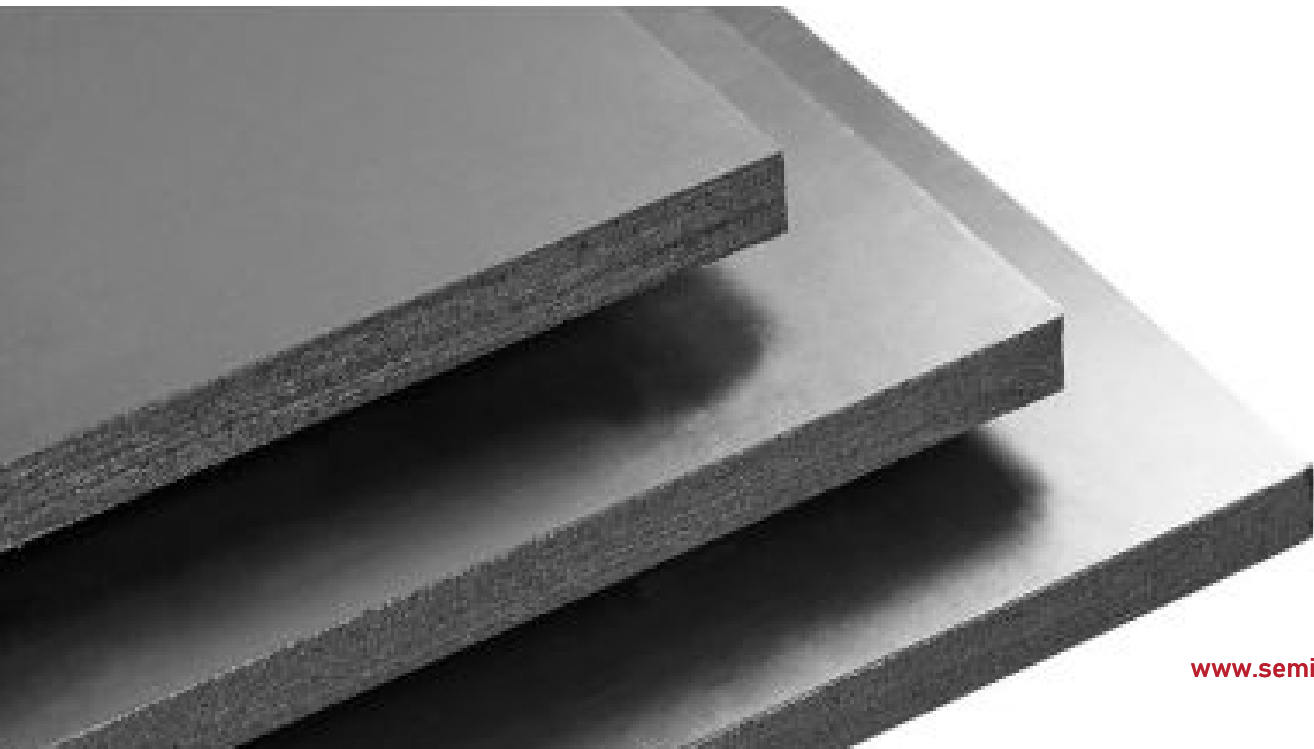
Wafer Boats →

Semicorex Wafer Boat is made of recrystal silicon carbide ceramic, which has good resistance to corrosion and excellent resistance to high temperatures and thermal shock. Advanced ceramics deliver excellent thermal resistance and plasma durability while mitigating particles and contaminants for high-capacity wafer carriers.



Graphite Material

carbon graphite
porous graphite
rigid felt
soft felt
graphite foil

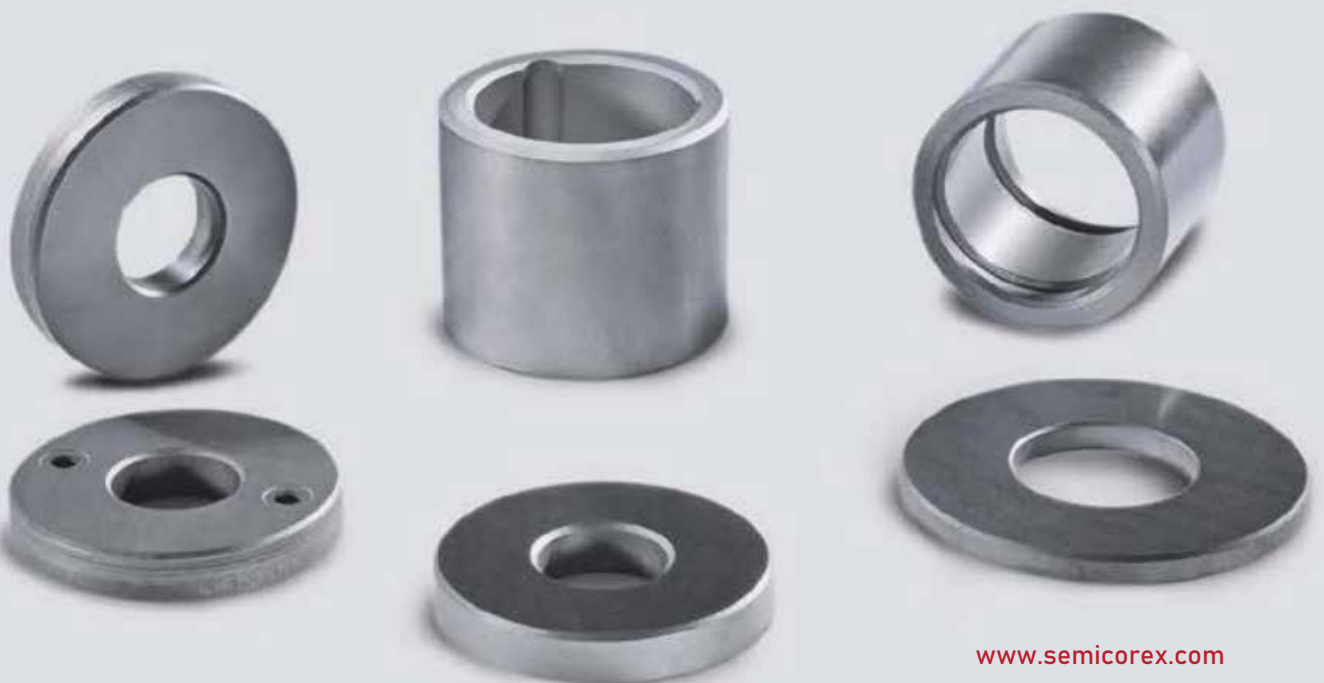


carbon graphite

Materials for mechanical applications

Our carbon graphite with self-lubricating properties and extreme consistency makes it ideal for a wide range of applications.

It is good to produce components for seal rings, bearing, bushing, etc.



porous graphite

This is a graphite material with micro particles and an isotropic structure and properties which created through the cold isostatic pressing(CIP) of micro particles.

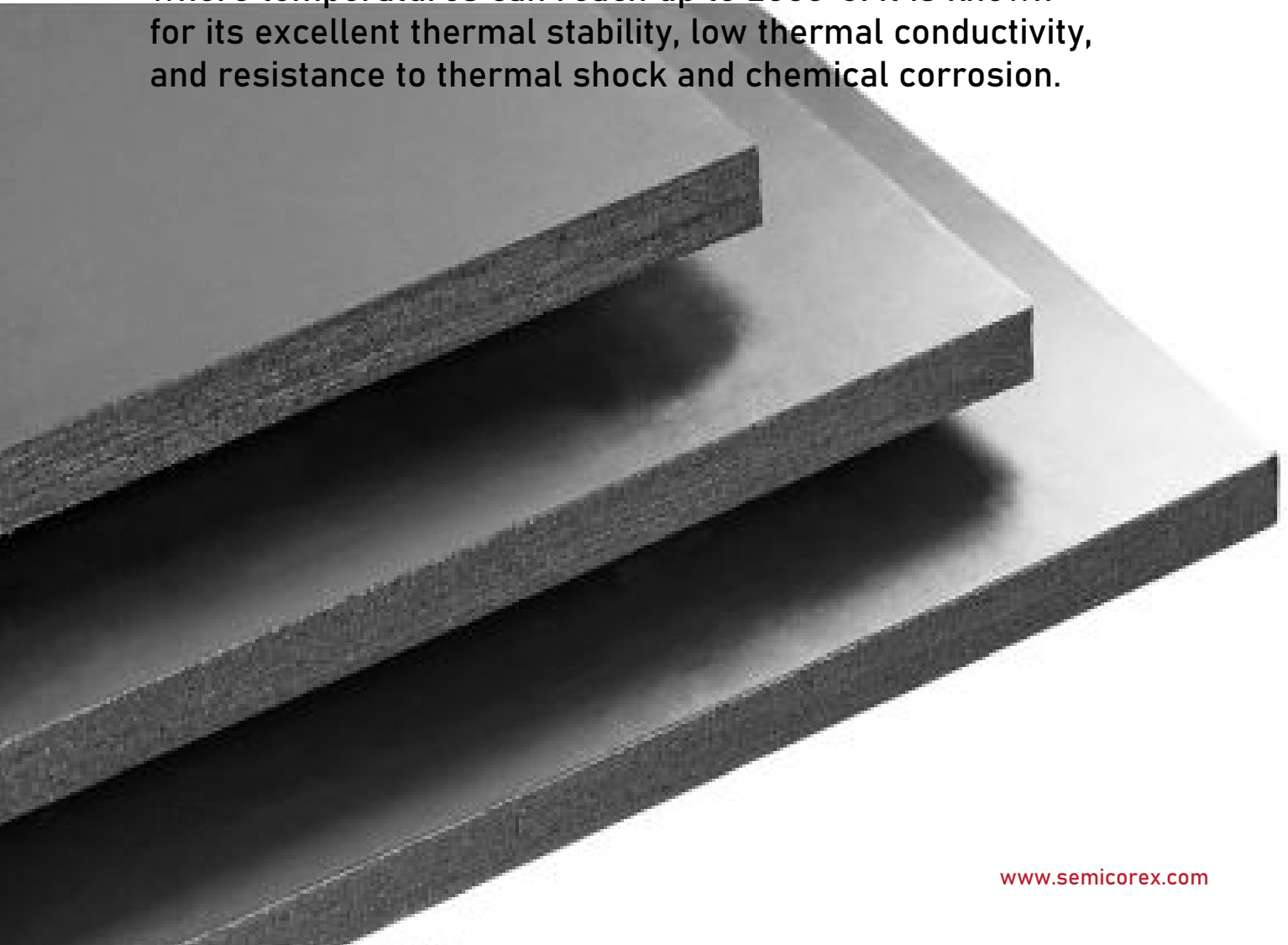
- High Reliability
- Ultra Heat and Chemical Resistance
- Excellent Electrical Conductivity
- Lightweight and Easy to Machine



rigid felt

Semicorex High Purity Graphite Rigid Felt is a type of high-temperature insulation material made from graphite fibers that have been compacted and processed into a rigid, lightweight felt.

High Purity Graphite Rigid Felt is designed to provide excellent thermal insulation and resistance to high temperatures, which is typically used in high-temperature furnaces, kilns, and other thermal processing equipment where temperatures can reach up to 2800°C. It is known for its excellent thermal stability, low thermal conductivity, and resistance to thermal shock and chemical corrosion.



soft felt

Semicorex soft felt is a specialty graphite which is perfect for insulating induction in the heater furnace chambers or process temperatures above 2000° C.

We provide customized services to satisfy different requirements.



graphite foil

Semicorex high-purity flexible graphite foil is a high-performance material designed to withstand extreme temperatures and challenging processes. With 10 ppm ash content, this flexible graphite foil is ideal for high-temperature applications in the semiconductor, solar, and ceramic industries.

Semicorex high-purity expanded graphite foil and sheets are a smart solution for a wide range of heat treatment processes. These materials are predestined for high-temperature technology, as they offer unique properties that can improve the performance of high-temperature systems.



COOPERATIVE R&D INSTITUTIONS



STRATEGIC SUPPORTING PARTNERS





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