

Industrial Material Solutions

Premium graphite and silicon carbide materials designed specifically for use in a wide range of highly technical industrial applications.



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OVERVIEW

Entegris' POCO Materials, including a variety of specialty graphite and silicon carbide materials, are routinely used in a wide range of highly technical industrial applications. We are well known for producing uniform materials that range from 1 micron to 10 microns in particle size, with many post-processes, infiltrations, and coating options. Each grade has characteristics and properties that allow the user to match the ideal material to specific applications.

MATERIALS

GRAPHITE

Our graphite grades exhibit unique properties that make them the only choice for many industrial applications. Our proprietary manufacturing process yields synthetic graphite with a higher thermal expansion coefficient than competitive materials. Fine particle size and homogenous microstructure of the graphite yield materials of higher strength and isotropy when compared to competitive synthetic grades. We have the added capability to perform several post-processes on our materials to enhance specific properties as needed for particular applications.

SILICON CARBIDE

Based on a proprietary grade of graphite, our SUPERSiC® silicon carbide portfolio represents an ideal combination of the superior mechanical and thermal properties of SiC with the low cost manufacturing capability of graphite. This technology allows the machining of complex components into near-net shape in graphite using low cost machining processes. These net shaped articles are then converted directly, through high-temperature processing, into 100% beta-phase silicon carbide. This unique process allows for the manufacture of components that previously couldn't be considered for SiC, opening a trade space for mechanical engineers to use a high-strength, high-stiffness, high thermal conductivity material where no solution may have existed in the past.

The properties of SUPERSiC materials can be further enhanced through impregnations, coatings, and advanced cleaning methods to meet the requirements of specific industries, customers, or projects.

APPLICATIONS

AEROSPACE

We are a leading manufacturer of graphite and silicon carbide materials and products for use in aerospace applications. These materials are ideal for use in extreme environments and in systems that require both unparalleled precision and high performance.

Advanced aircraft engines rely on advanced materials to enable increased performance. Improvements in thermodynamic efficiency that lower specific fuel consumption require higher temperatures, and drive the need for materials that are able to withstand those temperatures. Our JET family of graphite is being used in tribological and structural applications in the core of these next-generation engines. JET graphite replaces polymers whose properties are less stable over large temperature ranges and whose capabilities are below the standards required in these new systems. Typical applications are stator vane bushings, vane tip bushing, thrust washers, bumpers, and seals operating up to 649°C (1200°F).

AIR BEARINGS

Our graphite materials have high uniform porosity in a wide range of densities. As a result, we are able to produce material with airflow in very narrow bands. Customers use this feature to manufacture air bearings with very tight airflow specifications. We also have the capability to test our graphite products for permeability prior to shipment, ensuring that customers receive bearings or bulk material that will provide high yield in their assemblies.

Our graphite enables OEMs to greatly reduce the cost of their bearings by eliminating machined metal components. As an added benefit, our bearings offer protection to high-precision spindles and housings if airflow is unexpectedly interrupted. This improves reliability, increases performance, and lowers cost over traditional metal bearings.

BEARING SLEEVES

Graphite has long been applied as a bearing component in mechanical systems due to its inherent self-lubricating properties, high wear resistance, and high temperature capability. Our bearing materials offer the highest performance in the industry. The graphite's uniform micro-structure provides high flex strength, high crack resistance, and uniform, predictable wear over the lifetime of the bushing. For applications exceeding 482°C (900°F), we offer a range of antioxidant impregnations that extend the life of the product and further enhance lubrication. Other impregnations may be added to further increase toughness and reduce friction.

BIOMEDICAL

The biocompatibility, safety, and efficacy of carbon and graphite within the human body allows our materials to be used in a variety of medical applications. Select graphite grades have FDA approval, via the medical device, for use in medical implants. Applications include mechanical heart valves, cancer treatment therapies, and joint replacements.

CRUCIBLES

For E-beam users, our graphite electron beam evaporation crucibles improve evaporation performance over that obtainable in bare hearth mode. The graphite crucible acts as an "energy efficient" thermal barrier between the molten evaporant and the water cooled copper hearth.

We manufacture and stock a wide range of standard sized crucibles. The crucibles typically utilize AXF-5QPYC graphite, a pyrolytically coated graphite, that seals surfaces and enhances the performance and lifetime of the product.

FUEL CELL & ENERGY STORAGE

Participants in the electrochemical processing industries, including fuel cells, batteries, and energy storage systems, agree that AXF-5QPYC material represents the benchmark for performance. Electrodes manufactured from our graphite exhibit longer life and higher efficiency than those made with alternative materials as a result of consistent resistivity, minimal permeability, and inherent chemical stability. We work with customers to enable the most efficient plate footprint and flow field designs that optimize cost and performance.

HEATERS

Our graphite grades are successfully used in a wide variety of electrical heating elements. The uniformity of our graphite ensures that no hot spots develop, extending the life of the manufactured heaters and thereby improving the cost of ownership. We can make tube heaters, serpentine heaters, coil heaters, bar heaters, or custom configurations.

HOT PRESS DIE

Our graphite is the ideal material for creating powdered metal dies due to its high temperature capability and high compressive strength. The uniform microstructure of our materials ensures the smoothest, most consistent finish for final products. Industry-leading high strength ensures that our graphite dies will outlast those from competitive materials, providing cost-of-ownership benefits to manufacturers.

INKJET

Manufacturers of inkjet print heads are constantly pushing for higher throughput, increased precision, and greater flexibility in print media in their equipment. Our graphite is the perfect solution to address these needs. Our highly uniform material allows manufacturers to maximize drop size control to allow for very high speed and high precision. The fine grain size and uniform porosity eliminate the potential for crosstalk between channels even at the tightest jet spacing. Inherent chemical stability from heads manufactured with our graphite will endure long-term, industrial use with no degradation of jetting performance.

OIL & GAS

HPD (hot press dies) material was the first industrial graphite we introduced to the market. This grade is specifically designed for the demanding requirements of manufacturers pressing dissimilar materials to enhance the properties of end products. In the oil and gas drilling market, HPD graphite is used to press hardening materials like diamond or carbides into hardened metal drill bits, allowing for longer lifetime and fewer tool replacements.

We also offer materials for use in pumping and compression equipment that is ubiquitous in the industry. The combination of wear-resistant graphite and our unique SUPERSiC silicon carbide is used in seals and bearings in liquid and gaseous pumping systems to ensure efficient operation over the life of the equipment.

OPTICS

Producers of telescopes for applications ranging from astronomy to optical sensors have long struggled to find a lightweight, stiff material that can be designed and produced in complex shapes. Beryllium is an ideal candidate, but the toxicity of that metal makes it cost-prohibitive both for manufacturing and for managing through a product's full lifecycle. SUPERSiC silicon carbide materials solve the problems of producible complexity, and enable development of low initial and lifecycle cost optical substrates, structures, and telescopes.

The enhanced thermal properties of SUPERSiC silicon carbide as compared to traditional optics materials enable customers to design systems that are exposed to wide-ranging (cryogenic to laser energy induced) temperatures without succumbing to thermally-induced fail mechanisms.

PHOTOVOLTAIC

As the photovoltaic industry strives to control the costs of producing solar cells, graphite and silicon carbide materials continue to offer cost effective solutions for a variety of applications. Graphite and pyrolytically coated graphite perform well as heat spreaders and custom components in deposition and diffusion processing. Custom graphite heaters can also be designed to meet the unique size and shape requirements of custom designed equipment.

Horizontal wafer carriers made from SUPERSiC silicon carbide and other SiC custom components offer excellent alternatives to quartz, remaining dimensionally stable through years of high-temperature deposition, annealing, and cleaning cycles.

These inert materials have proven to be excellent choices in photovoltaic industry applications including CVD, PECVD, diffusion, and other high-temperature and/or highly reactive processes.

THERMAL MANAGEMENT

As electronics and thermodynamic systems continually increase performance, the localized heat generated in those systems grows exponentially. To address this, we offer a family of thermal management materials including HTC (high thermal conductivity) graphite and POCOfoam® graphite. These highly engineered materials rapidly channel heat unidirectionally away from sensitive areas, extending the lifetime and enhancing performance of these systems. Heat sinks using both aerodynamic and enthalpic heat transfer are possible, with a range of density potential that allows designers to maximize the trade between speed of heat removal and system capacity.

ULTRASOUND

The fields of ultrasonic inspection and imaging are growing rapidly due to improved sensitivity, low relative cost, and safety of modern transducers. Through control of material properties, combined with a range of impregnations, we produce graphite with matching layers that exhibit a wide range of ultrasonic impedance, allowing designers to tailor the transmission of ultrasonic frequencies to the needs of their applications.

At the same time, these transducers are producing high heat loads. Our material is used by manufacturers to rapidly pull this heat from the transducer and away from sensitive materials (tissues). The combination of light weight and high thermal conductivity create the ideal solution for medical ultrasound transducers, providing high performance and comfortable use.

LIMITED WARRANTY

Entegris' products are subject to the Entegris, Inc. General Limited Warranty. To view and print this information, visit entegris.com and select the [Legal & Trademark Notices](#) link in the footer. Entegris does not warrant any failure in the case of customers using unapproved foreign components.

FOR MORE INFORMATION

Please call our Customer Service Center today to learn what our premium graphite and silicon carbide solutions can do for you. Visit poco.entegris.com/contact-us for the location nearest you.

TERMS AND CONDITIONS OF SALE

All purchases are subject to Poco Graphite's Terms and Conditions of Sale. To view and print this information, visit poco.entegris.com/terms-and-conditions.



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