COVALENT

PRODUCTS

Covalent Materials Corporation
High Purity Quartz Glass Products
TPSS Si-Impregnated Silicon Carbide Products
High Purity Carbon and Graphite Products
CEPURE In-Line Gas Filters
Vacuum-Break Filters
GLASGRAIN High Purity Fused Silica Filler Material
ADS High Purity Alumina Ceramics
SAPPHAL High Purity Translucent Alumina Ceramics
High Purity Silicon Materials
CERASIC Atmospheric Pressure Sintered SiC

Large-Scale Photomask Substrates for Producing LCDs

Silicon Carbide Radiant Tubes
Crucibles for Solar-Battery Manufacturing

NEOBONE Ceramic Bone Substitutes

Kiln Furniture for Sintering Electronic Parts
TECORUNDUM Silicon Carbide Heating Elements
GLASSUN Fused Silica Refractories
Carbon Brushes
QCH-HEATER

Silicon Wafers
• Hyper Hi-wafer
• AT Wafer
• Polished Wafer
• Epitaxial Wafer
• Diffused Wafer
• SOI Wafer

Bio & Medical Related Products

FPD Related Products

General Industrial Products
In the wake of rapid development in the integration of the semiconductor industry, the demand for silicon wafers, a basic material for semiconductors, has increased spectacularly. Relying on our continuous production and quality control systems, which cover everything from pulling single crystal silicon, surface treatment and cleaning to packing, we offer a broad range of wafers that satisfy customers’ expectations for reliable quality.
Hyper Hi-wafer

The Hyper Hi-wafer was developed to support advanced devices beyond the 0.18 µm technology node. Compared with conventional wafers, and even the current Hi-wafer, improvements in crystal growing technology and the optimization of hydrogen annealing, as well as enhancements in processing technology, have provided the Hyper Hi-wafer with stronger intrinsic gettering ability, better flatness and lower Laser Scattering Topography Defect (LSTD) density. The Hyper Hi-wafer is also superior in terms of electrical properties such as junction leakage. Moreover, the flatness of the Hyper Hi-wafer is excellent for further miniaturization.

AT wafer (Argon annealed wafer)

AT wafers, which are created by annealing high quality Si substrate with argon, excel both in that it lacks surface defects and it has better intrinsic gettering ability. Like the Hyper Hi-wafer, the AT wafer was also developed to support miniaturized devices, and it has the added merit of an extremely flat boron profile beneath the wafer surface.

Polished Wafer

The polished wafer is a silicon wafer with one or both sides polished to produce a mirror surface. Our polished wafers, which are superior in such properties as flatness, cleanliness and gettering capacity, have earned an excellent reputation for high quality and accuracy.

Epitaxial Wafer

Our epitaxial wafer is produced by chemical vapor deposition of single crystal silicon onto the surface of a polished wafer. In accordance with specifications, it is used as a substrate on discrete devices such as diodes and transistors, and bipolar and MOS integrated circuits. We can meet a wide range of requirements for multilayer epitaxial wafers, including wafers with an embedded layer.

Diffused Wafer

Our diffused wafer is a polished wafer with a high density undiffused layer on the back side. They are mainly used as Pw MOS-FET and Bip transistors. The wafers, which accurately reflect specified diffusion density and diffusion depth through strict process control, are easy to apply in the user’s manufacturing control, and have earned a high reputation as superior products with various advantageous features regarding device design.

SOI Wafer (Silicon-on-insulator wafer)

Thick film SOI wafers are widely used in Bi-CMOS and power devices. They exhibit higher voltage endurance and performance speeds, as well as lower energy consumption, due to their silicon-on-insulator structure. We use a bonding method in the manufacture of thick film SOI wafers to exercise more precise control over the SOI film thickness and BOX film thickness. We are also developing an ultra-thin film SOI wafer to meet the increasing needs of microprocessors and other such leading-edge devices for higher performance speed and lower energy consumption.
We offer transparent quartz glass, fused from natural rock crystal; silica glass, fused from high quality natural silica; and synthetic quartz glass, made from silicon tetrachloride. Quartz glass with pure fused SiO₂ as its main component boasts not only high purity, but also a great number of other highly desirable properties such as superior heat resistance, light transparency, electrical insulation, and chemical stability.

In the semiconductor industry, the excellent properties of our quartz and silica glass can be fully utilized in such products as crucibles for pulling single crystal silicon; bell jars for epitaxial growth; process tubes, boats and other jigs for heat treatment such as oxidation and diffusion; and cleaning baths.

In addition, such properties of synthetic quartz glass as its high purity and low thermal expansion make it suitable for photomask materials essential to IC and LSI lithography processes, and for large photomask substrates for LCD production.
PRODUCTS

- Crucibles
- Photomask Substrates
- T-1930S Pedestals
- Process Tube and Wafer Boat for Vertical Furnace
- Cleaning Bath
- Precision Machined Products
- Bell Jar
TPSS Si-Impregnated Silicon Carbide Products

TPSS Si-impregnated silicon carbide products are semiconductor materials developed by our company using proprietary technology. Such properties as high purity, strength and corrosion resistance make them suitable for process tubes, liner tubes, boats and paddles for semiconductor heat treatment furnaces. In addition, we use the CVD method to offer a high grade product coated with super high purity, fine silicon carbide, making it suitable for a wide range of customer requirements. It has a good name in wafer boats manufactured with maximum use of processing technologies, which can raise the quality and yield rate for 300mm wafer processing.
High Purity Carbon and Graphite Products

Our carbon and graphite products with properties not found in metals and other ceramic materials are ideal for use in the semiconductor and a wide range of other industries. In particular, our high purity graphite materials contain less than 3ppm of ash, and are widely used in the semiconductor manufacturing process as heaters and crucibles for pulling single crystal silicon and boats for liquid phase epitaxial growth. In addition, CLEAR CARBON, composed of an SiC surface coating on a high purity graphite substrate, has earned a reputation worldwide for excellent quality as susceptors for epitaxial growth and other jigs.
Since the launch of “CEPURE” in-line gas filters in 1988, we have constantly endeavored to improve the purity and cleanliness of gas lines for semiconductor manufacturing equipment. The “M Series,” our first generation of products, adopted hexagonal multi-channel elements. In 1992, we introduced to the market the “TM Series,” our second-generation products that retained particle-free performance while improving the gas displacement properties. Today, the “CEPURE” series has evolved into the third-generation “STM Series,” with even better gas displacement properties and further reductions in size. For these reasons, the STM Series has earned an excellent reputation among users. At the same time, we have added the “STM-V Series” to our line of products in order to meet the requirements of integration-type gas panels, which are becoming the mainstream in the semiconductor manufacturing equipment industry. Furthermore, we continue to press forward with the development of various types of filter application products to match increasingly diverse user needs while working on reducing the size of integrated filters and improving their performance.

CEPURE In-Line Gas Filters

Vacuum-Break Filter, developed in cooperation with Tokyo Electron AT, is a gas flow control diffuser in breaking a vacuum by utilizing the pressure buffer effect, which makes use of the extremely fine pores of porous ceramic material. Conventionally, to break a vacuum in a load lock chamber, nitrogen gas was slowly introduced into the chamber in a slow vent process, in order to prevent particle dispersion. Simply installing a break filter to the nitrogen gas vent port of the load lock chamber improves throughput by eliminating the need for slow venting. It also reduces atmospheric particle counts by preventing particle dispersion.
The requirements for silica filler widely used for packaging of semiconductor devices are increasingly sophisticated due to their integration. These requirements include small grain size, high purity and superior dispersibility. GLASGRAIN has the high grade features to meet these requirements and a wide range of product lineups from the CUS series for advanced LSI applications to the G series for lost wax casting molds.

GLASGRAIN High Purity Fused Silica Filler Material

With translucency properties similar to those of sapphire, a single crystal alumina, translucent alumina ceramics allow diffusion transmission of practically the whole spectrum of visible light, and they are used as lighting components in products such as sodium vapor lamps. We have focused on the high purity of translucent aluminum ceramics in addition to their excellent resistance to corrosion from fluorine gas, and have developed new applications for them as semiconductor manufacturing components. SAPPHAL has a high purity and a high density structure which is extremely precise with well-controlled crystal size, giving excellent plasma resistance. Now, it has become possible to manufacture large size products and parts in complicated shapes, which had been considered very difficult previously.

SAPPHAL High Purity Translucent Alumina Ceramics

ADS high density alumina ceramic is a sintered material with a low moisture absorption rate of 0.01% or less. It has many applications in various industries as various structure parts due to its excellent electric insulation, high strength, and abrasion-resistance, etc. Additionally, thanks to its high resistance to acids, alkali, and halogen plasma, it has applications as parts and jigs in the semiconductor and FPD industries.

ADS High Purity Alumina Ceramics
High Purity Silicon Materials

High purity silicon materials, which have the same purity level as silicon wafers, generate almost no contamination and considerably fewer particles. Although the standard material is manufactured in a plate shape, it can also be produced as a rod or a ring. Furthermore, high precision machining that was once considered difficult when producing parts is now possible. Therefore, there are great expectations regarding its application in various processes.

CERASIC, a silicon carbide material, is an ideal material for machine parts that require not only high thermal strength, but also abrasion and corrosion resistance. A range of applications in the semiconductor and FPD manufacturing process has been developed for this material. In addition, ultra high purity products with a CVD coating are available.
The T-4000 series of synthetic quartz glass boasts not only high purity, but also a great number of other highly desirable properties such as high heat resistance, light transmittance, electrical insulation, and chemical stability. In addition, the advanced technology of polishing make it suitable for photomask substrates for the exposure process of minute patterns in the manufacture of large size LCDs.
CERASIC, a silicon carbide material, is a ceramic material that has superior properties in terms of machining, and abrasion and corrosion-resistance to corrosive gases and chemicals. It is widely used in heat-treatment, and its long life property makes it a recognized contributor to low running costs and the reduction of industrial waste. In addition, we can make large-scale products of 1000mm or more, which is the largest size in the world for ceramic materials. (Plates: 1000 X1000mm or more, Tubes: 2000mm or more in length)

The main ingredient of our polycrystalline silicon melting crucibles is high purity fused silica. They exert minimum impact on polycrystalline silicon because they are resistant to thermal shocks and are highly pure. They are susceptible to minimal size changes during molding, thanks to a special molding method that is used in their manufacture. They are therefore capable of accommodating large sizes and complex shapes.
Hydroxyapatite, the principal constituent material of human bone and teeth, is well known as a safe material. Some companies sell types of porous hydroxyapatite artificial bone filling material, but because new bone can only be grown on the surface of the artificial material after osteoplasty, all these types tend to lack strength and involve long patient recovery times. The Hydroxyapatite synthetic bone substitute, NEOBONE, a new functional synthetic bone filler, is a solution to the common problems of all existing bone filler materials. Based on the notion that a necessary requirement of a bone filler is its ability to allow biological tissue to grow rapidly inside the grafted area (newly generated bones), it has a porous structure that facilitates the deep penetration of tissue growth and aids new tissue formation. The frame portion of the pore of NEOBONE is made of very dense sintered hydroxyapatite, and so it has enough strength in handling during grafting operations, or against mechanical stress. In the principal tests (animal tests), the biological tissues’s rapid penetration into the NEOBONE structure and the bone conduction ability have been confirmed, and its porous structure is proved effective. Also, in clinical tests, where the product was used in various cases, no inflammation was observed after the grafting operations. In more than half the cases, X-ray evaluations revealed that bone development occurred in the grafted areas within a short span of two months, which demonstrated the safe and excellent bone conduction properties of NEOBONE.
products

General Industrial

Kiln Furniture for Sintering Electronic Parts

Heat-treating technology for such electronic component materials as ferrites, ceramic dielectrics, and IC substrates is advancing year by year. We supply an extensive range of kiln furniture for use in electronic component heat treatment such as pure alumina, alumina-mullite, and electro-fused zirconia, to satisfy the wide-ranging demands of its customers. By providing products that facilitate automated and energy-efficient heat treatment, we contribute to the advancement of heat treatment technology. In particular, our lightweight material CELITE, and a number of coated products used as setterless materials, are highly regarded for their contributions to more economical energy usage and labor allocation.

Kiln Furniture

Plasma Coated Plates for Sintering Ferrites

GLASSUN Fused Silica Refractories

GLASSUN refractories consist mainly of high purity fused silica materials. The major products are divided roughly into the GLASSUN Series, shaped by slip casting, the GLASSUN CASTABLE Series of monolithic refractories, and GLASSUN CEMENT. GLASSUN has many superior properties, including high resistance to thermal shock due to a very low thermal expansion rate, low thermal conductivity, and high corrosion resistance to chemical substances and molten metals. Moreover, it can be fabricated into various sizes, including very large sizes, as well as into complex shapes.

Hearth bed
The TECORUNDUM series of non-metallic heating elements are made of recrystallized silicon carbide. Some of these elements are usable at 1,600˚C and their calorific value per unit area, which is higher than nichrome elements, allows them to be heated quickly. Simple to use and with a long service life, these heating elements are employed in a wide variety of heat treatment applications, including electronic component heat treatment, sintering of metal powders, annealing of wire rods, and melting of glass and other substances. Furthermore, we offer elements whose heated areas are specially coated to allow efficient performance in conditions that would otherwise be harmful. Among these, TECORUNDUM SC is coated with a fine layer of SiC that protects against severe furnace conditions and provides a greater lifespan than that of competitive products. We also produce a grade of TECORUNDUM known as ST, which has improved anti-oxidation properties.

Carbon brushes have a very important role as parts providing electric current in order to rotate motors. Our carbon brushes are widely employed in various types of motors in such primary industries as electric power plants, iron and steel works, public transportation, and also in everyday products such as automobiles, electric appliances, and computer peripherals. In addition, non-lead brushes are enjoying an excellent reputation among many customers given their environmentally-friendly properties.

QCH-HEATER developed by our company is a new heater that consists of high purity carbon wire heating element and quartz glass. Conventional heaters available in industries have been either metal wires or ceramic heaters; however, as they can be affected by their purity and the operating environment, it is very difficult to achieve the intended purposes. QCH-HEATER has a number of features such as high purity, low thermal capacity, and high output. As it is more immune to the operating environment, it is expected to have a wide range of applications, including the heating of liquids, the sterilization of foods and medical appliances, and use in chemical equipment.
OVERSEAS

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Covalent is used in the chemistry terms “covalent bond” and “covalent crystal,” and it refers to chemical bonds formed by the sharing of electrons between atoms.

We bring together our ceramics and silicon technologies to create new values, and are determined to grow with the people who have a connection with us. These are the ideas behind our new company name “Covalent Materials.”

The vertical bars on either side of COVALENT represent the mathematical symbol for the absolute value, and signify our advanced technologies and strong will.

Through collective strength, we are committed to creating new values and better serving the users of our products and all other stakeholders.