Semiconductor Materials

Semiconductor Materials and Production Process Materials

As a super supplier of semiconductor-related materials, we supply silicon wafers and a wide variety of materials indispensable to the manufacture of semiconductors. We also supply gases, chemicals, fixtures, etc. for use in production processes.

[Semiconductor materials]

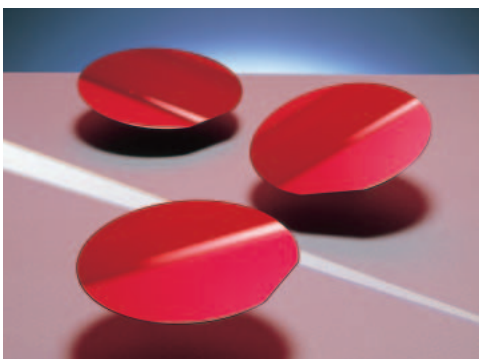
300mm silicon wafers

For inquiry 8

With the arrival of the era of full-scale mass production of 300mm wafers, customers' expectations on silicon wafers are increasingly high. As a pioneer in the world silicon market, Shin-Etsu Handotai (SEH) took the head start of the mass production of 300mm and has established a system ensuring a stable supply to the market. In responding to even higher requirements from the customers for the future, we continue the incessant efforts and challenges for the quality improvements.

Features
- We have respond to the growing market demand in timely manner with our capacity expansions since the starting of the mass production in February 2001.
- Our products can meet the 0.13um design rule process and beyond.
- Our product portfolio covers wide range of the customers' various requirements.

Applications
- Substrates for memory devices, microprocessor devices, etc.



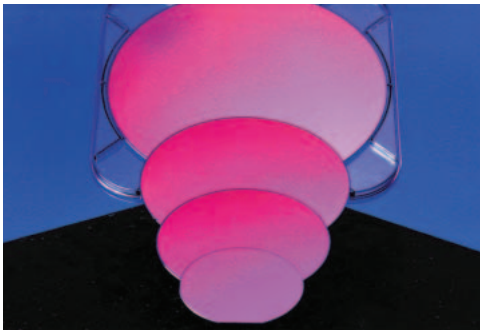
IG-NANA wafers

For inquiry 8

IG-NANA wafers (annealed wafers) can be used in wide range of device processes, from high-temperature processes to low-temperature processes. This product can provide high device performances at a reasonable cost.

Features
- Enhancement of the "getter effect" is achieved with the presence of highly-densed and highly uniformed BMD in the bulk.
- The surface layer is defect-free.
- Suitable for advanced technology processes with narrow design rule
- Available also in 300mm

Applications
- Substrates for memory devices, logic devices, etc.



SOI (Silicon On Insulator) wafers

For inquiry 8

SOI wafers, with the structure having insulated oxide film under active silicon layer, are promising semiconductor material for leading edge devices such as high speed and low power consumption LSI, smart sensors, smart power devices and MEMS.

Features
- Excellent thickness uniformity of SOI layer
- SOI crystal quality equivalent to bulk Silicon wafers
- Buried oxide film quality being equivalent to thermal oxide
- Available for volume supply

Options : the customers can specify the following items
- SOI layer thickness and resistivity
- Specification of base and bond wafer
- Buried oxide layer thickness

Applications
- High speed/low power/low voltage Ics
- System-On-Chip LSI
- High-temperature electronics
- Radiation-hardened circuits
- Smart power devices
- Smart sensors

Compound semiconductor materials

For inquiry 15

Shin-Etsu Handotai (SEH) produces light emitting element materials such as gallium phosphide (GaP), gallium arsenide phosphide (GaAsP) ,aluminum gallium arsenide(AlGaAs) and aluminum gallium indium phosphide (AlGaInP) products, which are used in light emitting diodes and lasers in the optoelectronics field. These materials possess unique functions that cannot be found in silicon semiconductors. In addition to these materials, SEH has a lineup of chips, which are one step nearer to devices.

Features
- The materials cover the fields of GaP, GaAsP, AlGaAs and AlGaInP.
- Integrated production of crystal, bassubstrate, epitaxial wafer and chip is realized.
- The brightness, color tone and electric characteristics are ensured by excellent crystal technology, growing technology of liquid phase and gaseous vapour phase epitaxial wafers, and machining technology in each manufacturing process. These characteristics are well received both in Japan and abroad.

Applications
- For visible light, infrared ray, functional use etc.

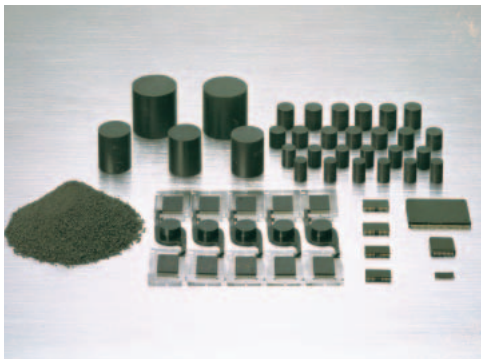
Junction coating resins

For inquiry 6

Junction coating resins help to improve the reliability of semiconductor devices. They provide electrical protection of semiconductor chips, improve moisture-resistance, reduce mechanical stress, and prevent software error of VLSI.

Features
- High purity, together with excellent adhesive capability and working property

Applications
- Surface coating materials for semiconductor elements
- Circuit protection, sealing and other uses for optical devices and flat panel display (LCD, PDP, EL, etc.) panels



Epoxy molding compounds

For inquiry 6

These encapsulating materials provide low stress, low alpha-ray property and high thermal conductivity.They are also environment-friendly.

Features
- Superior moisture resistance, electrical characteristics, and moldability. This material meets the high requirements for resin encapsulation of devices.
- By introducing a new, original flame-retardant system, this product is free from halogen and antimony trioxide.

Applications
- D-RAM and other LSI molding, full pack molding for power devices etc.

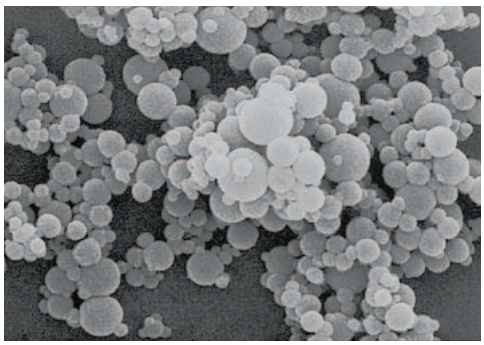
Liquid epoxy encapsulating materials

For inquiry 6

This is a liquid epoxy resin encapsulating material for the protection and adhesion of semiconductor devices.

Features
- Excellent low stress, adhesive, and penetration property

Applications
- Under filling, COB potting, hermetic seal, and other uses for electrical or mechanical protection and highly reliable adhesion of semiconductor devices



True spherical shape ultra-fine particulates "ADMAFINE"

For inquiry 19

ADMAFINE is true spherical shape ultra-fine particulates produced using a special process of oxidize metallic powder. Admatecs, a joint venture of Toyota Motor, Shin-Etsu Chemical, Shin-Etsu Quartz Products and Tatsumori, succeeded in commercial production of this product as a pioneer in the world.

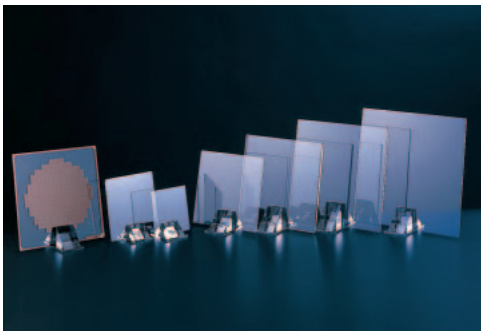
Features
- The true spherical shape ultra-fine particulates have a sharp granular distribution, capable of improving the toughness, flowability, thermal conductivity and other physical properties of composite materials.
- Not only simple oxide but also of composite oxide fine spherical particulates can be produced.
- It is possible to coat the particles with various types of composites or classify the particles.

Applications
- Filler material for semiconductor enclosure applications
- Filler material for precision resin molding applications
- Anti-blocking materials
- Sintering materials

[Manufacture process materials]

Synthetic quartz glass substrates

Shin-Etsu Chemical is a top-ranking manufacturer of synthetic quartz photomask substrates for IC and synthetic quartz large photomask substrates for LCD. For over 20 years, we have offered a stable supply of top quality substrates. Synthetic quartz wafers mainly used in high-temperature poly-Si TFT-LCD are now available up to 300mm ϕ in diameter, meeting the wide range of requirements from customers.



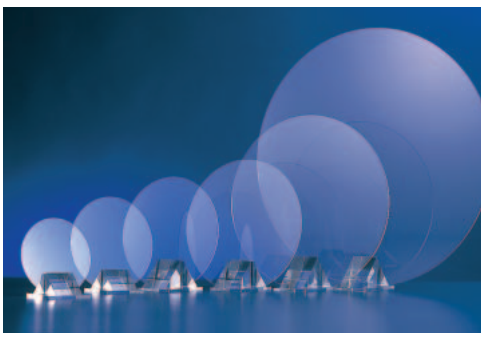
Synthetic quartz photomask substrates

For inquiry 7

This substrate excels in the permeability and low thermal expansibility in the far-ultraviolet range. It is suitable as photomask substrates for optical lithography and other applications that require ultra-high purity and high precision polishing (flatness processing at a submicron level).

Features
- It has ultra-high purity, and contains no bubble, foreign matter and stria.
  Surface defects: For IC ≦ 1μm (SZS grade) and ≦ 2μm (SMS grade). For LCD ≦ 2μm (SMS grade).
  Flatness: Various lineups are available.

Lineup
- Synthetic quartz photomask substrates for IC
  - Synthetic quartz photomask substrates for g line, i line, KrF (248 nm) lithography
  - Synthetic quartz photomask substrates for ArF (193 nm) lithography
  - Synthetic quartz photomask substrates for F2 (157 nm) lithography
- Synthetic quartz photomask substrates for LCD
  - Synthetic quartz photomask substrates for TFT
  - Synthetic quartz photomask substrates for Color Filter



Synthetic quartz wafers

For inquiry 7

This wafer has excellent thermal resistance and light transmission properties. It is most suitable as wafers for high temperature poly-Si TFT-LCD and other applications that require high purity and high precision polishing.

Features
- It is an ultra-high grade product free from bubble and foreign matter.
- Compared with ordinary glass, it possesses a low thermal expansion and extremely high permeability over the whole wavelength range from ultraviolet to infrared region.
- We have two grades for wafers, which are VIOSIL-SQ and VIOSIL-SX. VIOSIL-SQ is same material as synthetic quartz photomask substrate.VIOSIL-SX is improved material for heat resistance to support the use in the high temperature range (1,000˚C or higher).

Lineup
- External diameters from 3"ϕ (76.2 mm) to a maximum of 12"ϕ (300 mm) are included in the lineup. Other sizes are also available.

Semi-transparent quartz crucibles for silicon single crystal pulling applications

For inquiry 19

The same silica raw material as transparent quartz glass is used. The manufacturing method is unique.

Features
- The purity is the same as the transparent quartz glass product.
- The internal surface has a smooth transparent layer containing no bubbles.

Lineup
- Various sizes can be produced, with external diameters up to 40 inches to accommodate silicon ingot for the next generation large diameter wafers.
- Various grades depending on the uses, ranging from standard products to ultra-high purity products

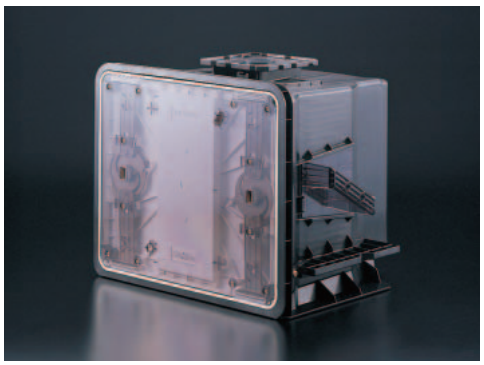
Quartz glass for semiconductor production processes

For inquiry 19

Technological innovation continues in the field of semiconductor; with horizontal furnaces being replaced by vertical furnaces, wafer size evolving toward larger diameters, and so forth. We are meeting the changing demands by a broad range of product configuration and excellent processing technology.

Features
- Various grades of natural quartz and synthetic quartz are available, ranging from general products to ultra-high purity products.
- Specially processed products with improved heat resistance and anti-plasma property are also available.

Applications
- Furnace tubes and boats used in the oxidation/diffusion process or CVD process
- Wet cleaning tanks used in cleaning processes such as chemical treatment and ultra-pure water cleaning
- Various parts used in dry etching



Silicon wafer carrier and semiconductor-material container

For inquiry 16

300mm Front Opening Unified Pod-FOUP
300mm Front Opening Shipping Box-FOSB

These are carrier and containers for storing and transporting high-purity materials such as silicon wafers, synthetic quartz mask substrates and other high quality chemical material used in semiconductor industry.

Features
- Unique high-purity plastic materials
- Manufactured in clean room environment
- SEMI standard and automation optimized design

Applications
- 125/150/200/300 mm wafer shipping box
- 300 mm FOUP
- Mask substrate container
- Reticle container, and others

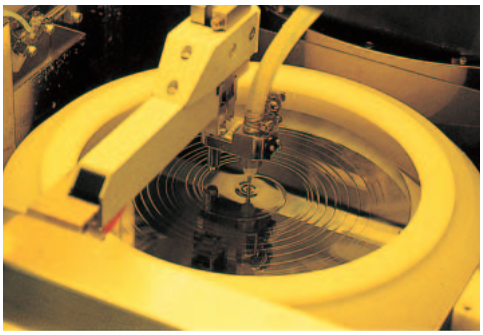
Silicon wafer case pouches

For inquiry 20

These are packaging bags for semiconductor silicon wafer cases, for which high levels of cleanliness and air-tightness are required.

Features
- The products are manufactured in a clean environment within the clean room (class 1,000) using clean film as raw material, and the manufacturing process and quality are evaluated.

Applications
- For packaging of silicon wafer case



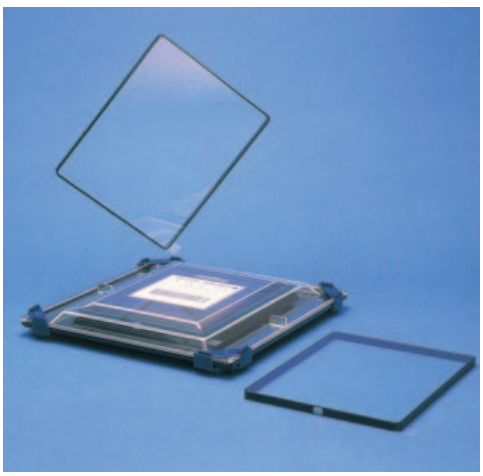
Photoresists

For inquiry 12

Drawing upon the extensive electronic material expertise acquired in the chemical manufacturing field, we offer the latest high-quality and high-performance KrF, ArF and F2 photoresists and other materials related to semiconductor production processes.

Features
- It is applicable to the excimer laser process for processing designs at 0.18μm or below.
- We also manufacture polymers and photoresist ingredients using technology developed at our company.
- We conduct the whole production process from polymerization of raw material to finished products.

Applications
- Semiconductor lithography process for the manufacture of memory and logic devices

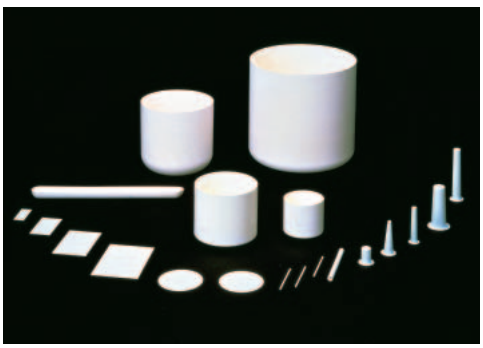


Pellicles

For inquiry 14

Pellicle is a high-quality cover for the protection of photomasks against dust, which was developed based on the know-how accumulated from the development and manufacture of various electronic materials. In addition to the grade for g/i-line and the KrF excimer laser grade, the ArF excimer laser grade is also available. Through consolidated quality design, we are equipped to meet all the high level needs of our customers.

Features
- Pellicle membrane has high transmission and excellent laser durability.
- Adhesives for fixation of the membrane and for mounting on photomask have excellent light resistance quality, and were developed independently by our own technology.
- Special processing of the frame surface prevents generation of particles.
- Pellicle container was uniquely designed and is made of antistatic and dust-free materials (adaptable to auto-mounter).



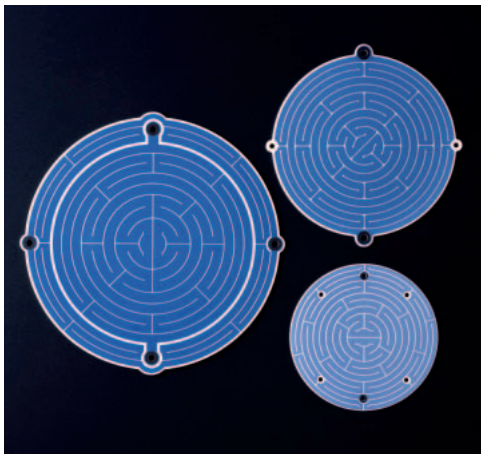
Pyrolytic boron nitride (PBN)

For inquiry 7

The product is a kind of ceramics manufactured with a thermal decomposition under reduced pressure. It is mainly used for breeding Ⅲ-Ⅴ compound semiconductor crystals such as GaAs, which are attracting more and more attention as an element for the mobile communication MMIC or for optical devices.

Features
- The product is pure and stable chemically.
- Excellent in high temperature strength
- Excellent in insulation property and thermal conductivity

Applications
- For pulling of single crystals of the Ⅲ-Ⅴ group semiconductor
- As dopants for doping of boron into silicon wafers
- As crucibles for impurity analysis
- As crucibles for organic EL



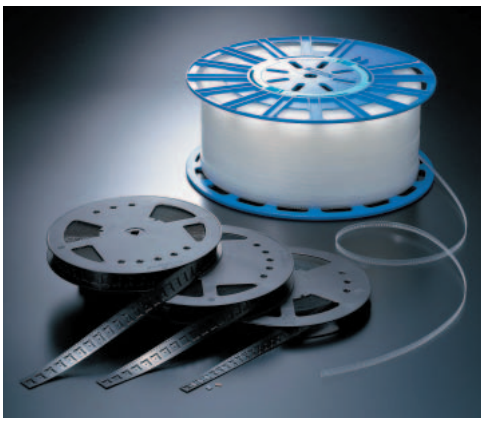
PG/PBN heater

For inquiry 7

The product is a ceramic heater made by laminating two kinds of ceramics (PBN, PG), manufactured by the pressure reduced heat decomposition CVD method.

Features
- A large type heater up to a maximum diameter of 380 mmϕ
- It is highly strong against thermal impact.
- It is highly pure chemically and no outgassing occurs (being able to cope with high vacuum).
- Heater pattern may be designed freely, and its allowable highest temperature is 1,600°C.
- A substrate heater and a pipe heater are available.

Applications
- Substrate heater for spatter, CVD equipment and others in semiconductor production processes
- Small heaters, substrate and tube, for special uses in high vacuum process



Carrier tapes

For inquiry 16

It is the package materials for transporting semiconductor devices and various surface-mounting electronic devices(SMD).

Features
- This carrier tape can be used in BGA, CSP, WL-CSP and other high-tech packages. Design based on our unique simulation is offered.
- Considering PKG visual inspection of the taping process, we offer carrier tapes suitable for image recognition. They help to improve the yield of inspection in the taping process.

Lineup
- General grade for passive components and conductive grade for semiconductor devices are available.
- Broad carrier tape(over 56mm width) for various mechanical components

Silicon carbide abrasive powder

For inquiry 21

"SHINANO-RUNDUM" is an abrasive powder produced by the following procedures. Only the selected crystal portion is extracted from the ingot of black or green silicon carbide. They are crushed, ground to fine powder, treated chemically, graded, filtered and dried.

Lineup
- CP and GP are made from black and green silicon carbides, respectively. CP and GP are different in crystalline property. CP is tough, while GP is harder and more brittle.

Applications
- Wire-saw slicing of semiconductor silicon ingot etc.

High-purity silane

For inquiry 6

This is used in a wide range of industries such as electronics, chemical, ceramics, and metal industries. A lineup of tetrachlorosilane, richlorosilane, dichlorosilane etc. is available.

Features
- It has a wide range of application, depending on the kind of silane.

Applications
- Semiconductor insulation layer, epitaxial layer etc.
- Tetrachlorosilane is used for optical fibers.
- Tetrachlorosilane and trichlorosilane are used for chemical products such as fine ceramics etc.

Shin-Etsu high-purity organometallics

For inquiry 7

Organometallics precursors are used to produce thin film compound semiconductors with MOCVD technique. We have seven products, which are TMGa, TEGa, TMIn, TMAl, DMZn, DEZn and TBP.

Features
- For all the sorts of the compound, high purity of less than 0.1-ppm metallic impurities is assured.
- Solid raw material TMIn has also accomplished the feed stability of ±0.002 vol%(20°C) by improving of containers and devising filling method.
- Low oxygen TMAl has been developed by our unique method.
- TBP is a safe liquid raw material substituted PH_3.
- We are now coping with user's needs with our unique technology and high-level analyzers.

Applications
- HEMT, FET, Laser, High-brightness LED, Solar cells, etc.

High-purity chloromethane

For inquiry 10

Using natural gas found near the Naoetsu Plant of Shin-Etsu Chemical, chlorine, methanol, and hydrochloric acid as raw materials, our unique reaction technology, advanced refining techniques, and development of excellent stabilizers enable us to supply products at stable, high quality. The products include methylchloride, methylenechloride, and chloroform.

Features
- As a solvent, it has very strong dissolving capability.
- It has wide application as reaction raw materials.
- It is used as a reaction solvent in order to improve the yield.
- Because of the low boiling point, it is used as a low-temperature extraction solvent.

Lineup and applications
- Methylchloride is used as reaction raw materials for silicone, methylcellulose, agricultural chemicals, surfactant, and perfume, as well as a low-temperature extracting solvent for caffeine, etc.
- Methylene chloride is used as a reaction solvent for plastics, medicine, agricultural chemicals, and perfume, as well as a precision washing solvent for electronic equipment and optical instruments.
- Chloroform is used as a reaction solvent and extraction solvent for drugs, agricultural chemicals, dyes, and perfume, as well as a reaction raw material for fluorocarbon resin.

Shin-Etsu Group is a super supplier of semiconductor-related materials ranging from semiconductor materials to production process materials.

For detail Click Here

For More Information

Shin-Etsu
http://www.shinetsu.co.jp/

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2	Silicone Division Sales and Marketing Dept. IV	+81-3-3246-5152	http://www.silicone.jp/
3	Silicone Division Sales and Marketing Dept. IV	+81-3-3246-5153	
4	Electronics Materials Division Rare Earths & New Materials Dept.	+81-3-3246-5252	
5	Electronics Materials Division Magnet Dept.	+81-3-3246-5246	http://www.shinetsu-rare-earth-magnet.jp/
6	Electronics Materials Division Organic Electronics Materials Dept.	+81-3-3246-5231	
7	Advanced Materials Division Opto-Electronics Materials Dept.	+81-3-3246-5222	
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9	Organic Chemicals Division Cellulose & Pharmaceutical Excipients Dept.	+81-3-3246-5261	http://www.metolose.jp/
10	PVC Division Chlor, Alkali & Derivatives Dept.	+81-3-3246-5081	
11	International Division	+81-3-3246-5311	http://www.shinetsu-fcl.jp/
12	New Functional Materials Department I	+81-3-3246-5346	
13	New Functional Materials Department II	+81-3-3246-5346	
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15	Shin-Etsu Handotai Co., Ltd.	+81-3-3214-1836	
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17	Shin-Etsu Polymer Co., Ltd. Connector Division	+81-48-652-5913	http://www.shinpoly.co.jp/business/connector/
18	Shin-Etsu Polymer Co., Ltd. RC Division	+81-48-652-5912	http://www.shinpoly.co.jp/
19	Shin-Etsu Quartz Products Co., Ltd.	+81-3-3348-1913	http://www.sqp.co.jp/
20	Shin-Etsu Film Co., Ltd.	+81-3-3259-1061	http://www.shinetsu-film.co.jp/
21	Shinano Electric Refining Co., Ltd.	+81-3-5298-1601	

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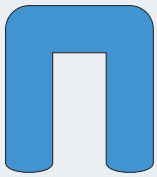
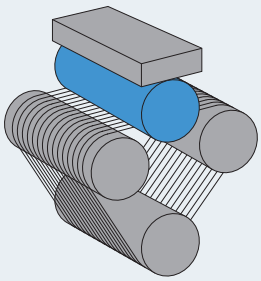
Raw materials



Poly crystals

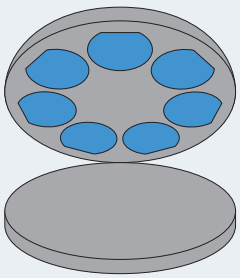
Single crystal growing

- 300 mm silicon wafers
- IG-NANA wafers
- SOI wafers
- Semi-transparent quartz crucibles for silicon single crystal pulling applications
- Compound semiconductor materials
- Pyrolytic boron nitride (PBN)
- Oxide single crystals (LT)

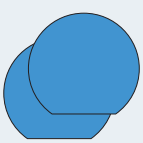


Cutting

- Silicon carbide abrasive powder



Polishing

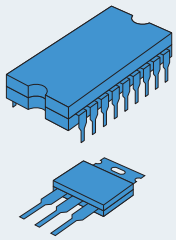


Epitaxial wafers

- High-purity silane
- Shin-Etsu high-purity organometallics

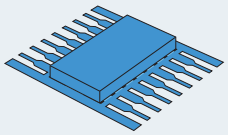
Silicon wafers

- Silicon wafer carrier and semiconductor-material container
- Silicon wafer case pouches



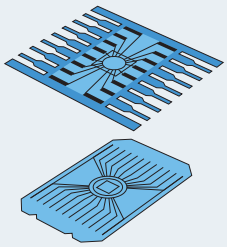
Device

- Silicone RTV rubber
- Thermally conductive silicone rubber products
- Carrier tapes



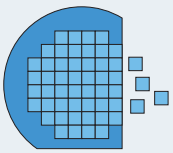
Resin encapsulation

- Epoxy molding compounds
- Liquid epoxy encapsulating materials
- True spherical shape ultra-fine particulates "ADMAFINE"

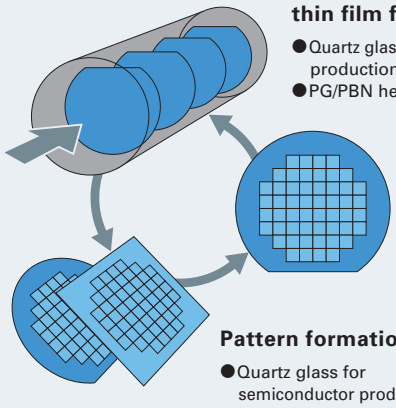


Assembly

- Junction coating resins



Dicing



Oxidation, diffusion, thin film formation

- Quartz glass for semiconductor production processes
- PG/PBN heater

Pattern formation

- Quartz glass for semiconductor production processes
- PG/PBN heater
- Synthetic quartz photomask substrates
- Photoresists
- Pellicles