

# Business at a Glance



## PVC/Chlor-Alkali Business



### Business Overview

Polyvinyl chloride (PVC) resins are general-purpose resins used in a wide range of applications from everyday products to all kinds of industrial materials. With three production bases, in the United States, Europe and Japan, the Shin-Etsu Group has the capacity to produce 4.15 million tons of PVC resins each year. Shintech, a PVC manufacturing subsidiary based in the United States, started operation in 1974 at a production capacity of 0.1 million tons per year. Since then, Shintech has completed several expansion projects and become the largest PVC manufacturer in the world, with an annual production capacity of 2.95 million tons. The Group is stably supplying products to customers throughout the world. Shintech is supporting it by further increasing its capacity by establishing a new ethylene plant with the goal of achieving stable procurement of raw materials and constructing an integrated PVC complex for processing from the raw materials stage.



### Contributing to the Achievement of SDGs Through Product Supply

Approximately 60% of the raw materials used in PVC are salts, which are abundant throughout the world. Compared to other general-purpose resins, the benefits of PVC include a low dependence on petroleum resources, placing a relatively small burden on the environment. The process of manufacturing PVC from raw materials uses around 60% of the energy required to make other general-purpose resins. Highly durable and easy to recycle, PVC is used for a wide range of social infrastructure materials, including vinyl windows, water and sewerage pipes, public works and other construction.





# PVC/Chlor-Alkali Business

## TOPICS

### Launch of Operations at Shintech's Ethylene Plant

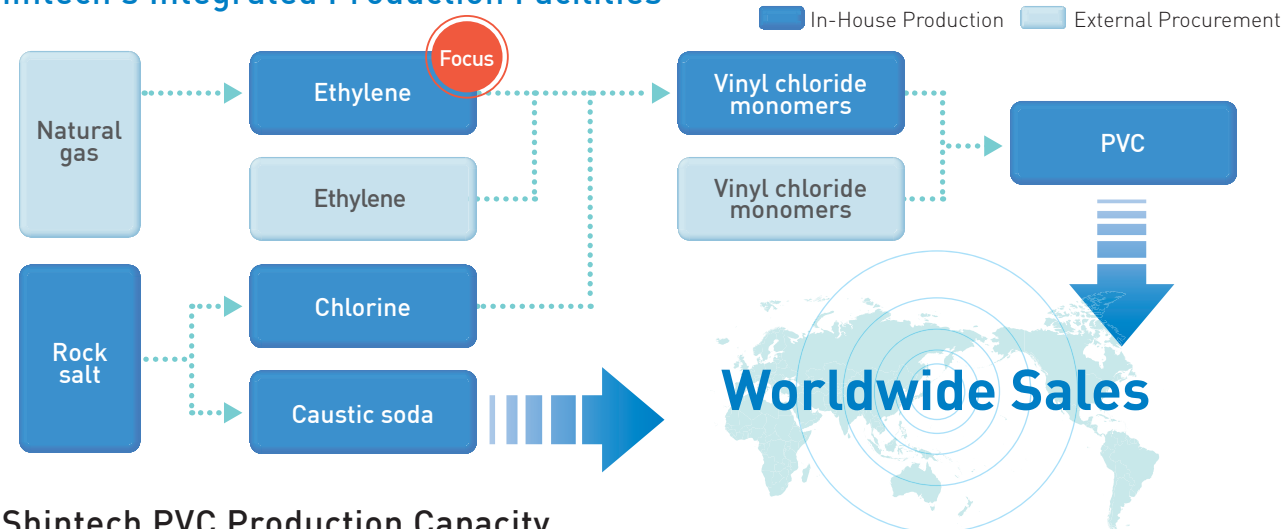
In 2020, operations began at Shintech's ethylene plant. Ethylene is a core raw material used in PVC. Previously, Shintech procured all its ethylene requirement from external sources, but it is now capable of supplying about half internally. This capability will help stabilize its raw material procurement. Shintech is the first Japanese company to produce ethylene in the United States.



Focus

Ethylene plant started operations in 2020

## Shintech's Integrated Production Facilities

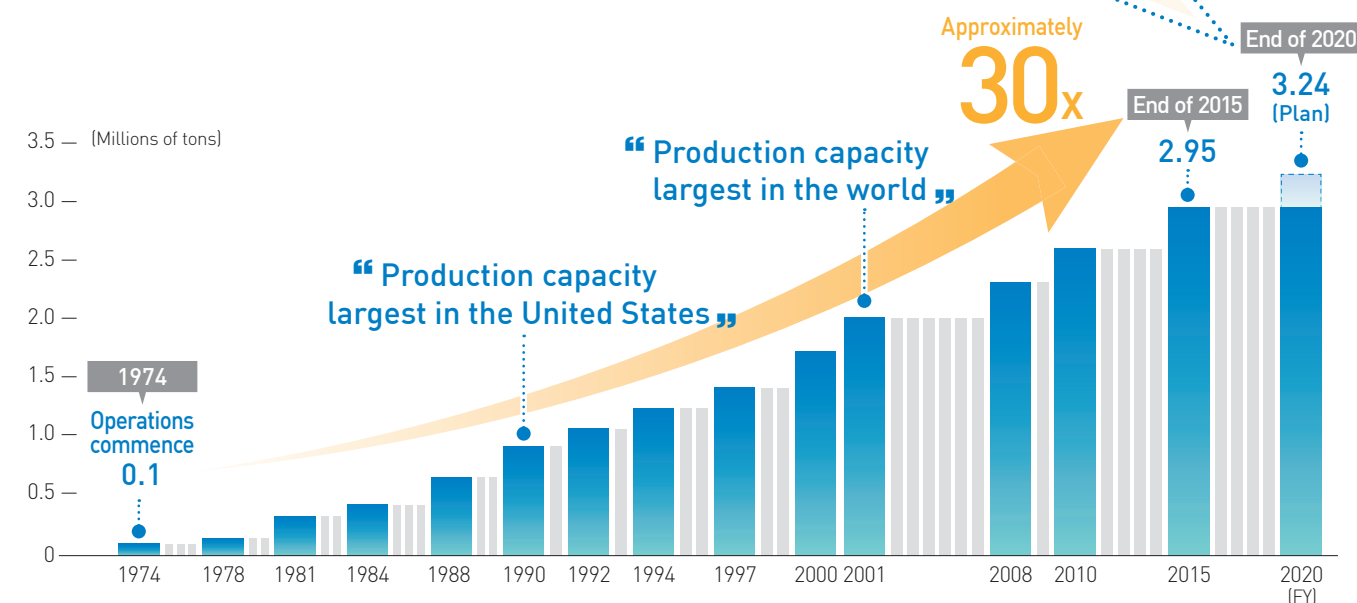


## Shintech PVC Production Capacity

## TOPICS

### Increase in PVC Production Capacity

In response to the global PVC demand growth, Shintech is striving to increase its production capacity by the end of 2020. Once these efforts are complete, Shintech will be capable of producing 3.24 million tons of PVC annually, about 10% more than at present. The Group will endeavor to provide its customers with a stable supply of PVC while meeting ongoing demand increases.

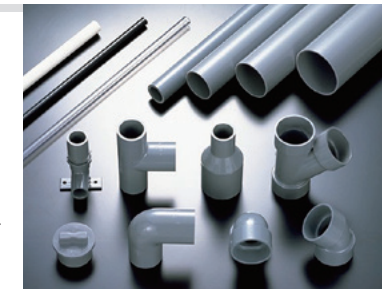


## Applications

### PVC

#### PVC Pipes

Useful life of PVC water and sewerage pipes is more than 50 years, contributing to a long working life for infrastructure systems.



#### Plastic Greenhouses for Agriculture

PVC is easy to recycle. In Japan, more than 50% of the PVC sheet used for agricultural greenhouses is recycled.



#### Electric Wire Coating Material

PVC, which is superior in insulation properties, durability and pliability, and is hard to damage, is used as a coating material for electric wires.



#### PVC-Framed Windows

PVC is an excellent insulator that can reduce the amount of heat lost through windows by 70%. These insulation properties help conserve energy by improving the efficiency of heating and air conditioning.



#### Siding Materials

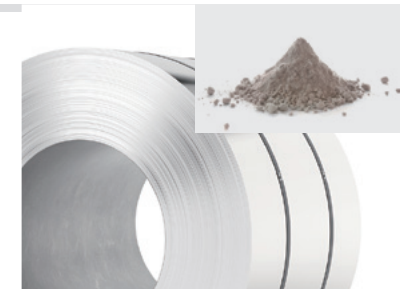
These decorative materials made from PVC are lightweight and easy to use for construction. They also provide excellent resistance to weather, shocks and corrosion.



### Caustic Soda

#### Alumina

Aluminum hydroxide, made by dissolving bauxite with caustic soda, is a raw material for alumina (aluminum oxide).



#### Paper and Pulp

Caustic soda is used for digesting and bleaching wood chips in the dissolved pulp manufacturing process.



#### Soaps and Detergents

Caustic soda is used as a raw material for soaps and synthetic detergents.



#### Super-Absorbent Polymers

These absorption agents are an essential element of paper diapers. Caustic soda is one of the raw materials used to manufacture super absorbent polymers.



### Sodium Hypochlorite

#### Sodium Hypochlorite

Used to disinfect and protect the safety of foodstuffs and tap water, this material also helps prevent the spread of infectious diseases.





# Semiconductor Silicon Business

## Business Overview

The Shin-Etsu Group is the world's leading manufacturer of silicon wafers used as substrates for integrated circuits. Consistently leading the way in terms of wafer purification and flattening technologies, the Group provides the market with superior products while continuing to steer the silicon wafer industry through achievements such as its early mass production of 300mm wafers and silicon-on-insulator (SOI) wafers that realize high speed and low power consumption. Furthermore, the Group has received high praise from customers throughout the world for its high-precision, single-crystal and high-end processing technologies; high-quality epitaxial growth technology for cutting-edge image sensor and logic devices; and quality management and evaluation analysis techniques. As IoT, AI and 5G communications-related technologies develop, the Group will refine its technologies and improve quality while continuing to provide a stable supply of advanced silicon wafers that support the development and production of semiconductor devices.



## Contributing to the Achievement of SDGs Through Product Supply

As a basic material supporting our modern high-speed information society, silicon wafers contribute to the improvement of electronic device performance, the miniaturization of electrical equipment and energy conservation. Silicon wafers are a particularly essential material in the automotive field, where they are utilized to reduce environmental impact, improve safety and fully automate vehicle operation. Furthermore, they are useful for the stable supply of electric power, mainly to electronic equipment, as power semiconductors can minimize power consumption and accommodate high voltage and high currents. Group products also are used to accurately regulate motor drive controls from high to low speeds and used as power-saving transistors enabling the efficient transfer of power from generators to transmission lines.



Semiconductor device installed in a final product

### Silicon Wafers

Electrical components for digital equipment and automotive parts

These items are used as a substrate material for semiconductor devices in smartphones, personal computers and other electronic devices; data centers; and automobiles.



### Compound Semiconductor Products

LED components

Used in a wide range of applications including outdoor displays, traffic lights, in-vehicle stop lamps and sensor light sources.



## Applications

### Communication/Computers



Smartphones



Tablet-Type Devices



Personal Computers



Data Center

### Automobile



Hybrid Cars



Electric Vehicles



Car Navigation Systems



Electronic Toll Collection System

### Consumer



Televisions



Game Devices



Smart Watches



Digital Cameras



Drum-Type Washing Machines



Energy-Saving Air Conditioners



Rice Cookers



Microwave Ovens

### Industry



Industrial Robots



Bullet Trains



Bank ATMs



Vending Machines

### Other



# Silicones Business

## Business Overview

The Shin-Etsu Group became the first Japanese company to commercialize silicone in 1953. Since then, the Group's share of the Japanese and global markets has risen, due to quality, technological capabilities and meticulous response to the needs of the market. Silicone is a highly functional material that has both organic and inorganic characteristics and many superior features. The Group has more than 5,000 silicone products that are used in a wide range of industries, including electronics and electric applications, automobiles, construction, cosmetics, healthcare and food.



## Contributing to the Achievement of SDGs Through Product Supply

Silicone primarily consists of silicon (Si), which is the second-most abundant element found in the outer layer of the earth's crust, behind oxygen. It is associated with a low dependence on petroleum resources and a low environmental footprint. Furthermore, it contributes to the achievement of sustainable societies, as it is used in solar power generation and other environmentally friendly products, including electric vehicles, eco tires and LED lights.

### TOPICS

### Production Capacity Enhancement through Large-Scale Capital Investment Worth ¥110.0 Billion

The Shin-Etsu Group is conducting large-scale capital investment worth ¥110.0 billion in stages at global locations. With this investment, the Group is strengthening its capacity to produce silicone monomer, an intermediate material, while responding to growth in demand for high-value-added silicone products used in fields that are expected to continue growing, including the automotive, cosmetics and healthcare fields. The Group is further enhancing its global supply system for silicone products, which are used in a wide variety of fields.



### Silicone Representative Configurations



### Major Characteristics of Silicone

|                                  |                      |
|----------------------------------|----------------------|
| Heat resistance                  | Adhesion properties  |
| Cold resistance                  | Defoaming properties |
| Electrical insulation properties | Water repellency     |
| Release properties               | Weather resistance   |



### Applications

#### Cosmetics

Improving the usability and functionality of various cosmetics to meet the diverse needs of the marketplace.



#### Buildings

Widely used as waterproof sealing material around window glass.



#### Lithium-Ion Batteries

Used in thermal interface materials found in lithium-ion batteries for electric vehicles and other devices.



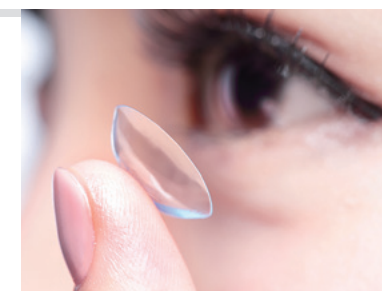
#### Plastic Products

Utilized in resin modifiers, which raise the performance and effectiveness of plastic products.



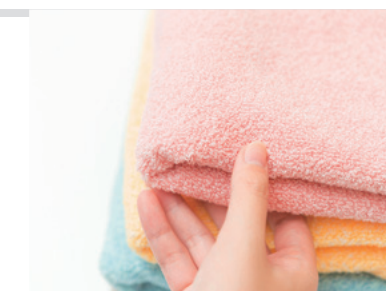
#### Contact Lenses

Essential as a material for contact lenses because of its oxygen permeability characteristics.



#### Textile Treatments

Adds functional attributes, including soft texture and water-repellency.



#### CPAP\* Devices

Silicone is used in masks attached to CPAP devices, which help treat sleep apnea. Silicone is soft and easy on the skin, making these masks comfortable.



\*Continuous positive airway pressure

#### Ship-Bottom Paints

Helps raise fuel efficiency by preventing marine organisms from attaching to ship drafts and contributes to the conservation of marine environments due to its high product safety.



#### Eco Tires

Silicone can lower rolling resistance and help improve fuel efficiency as a tire modifier.



#### Toys

Utilizing the safety and transparency of silicones, it is used as a material for toys.



Photograph provided by SEGA TOYS CO., LTD.



# Electronics and Functional Materials Business

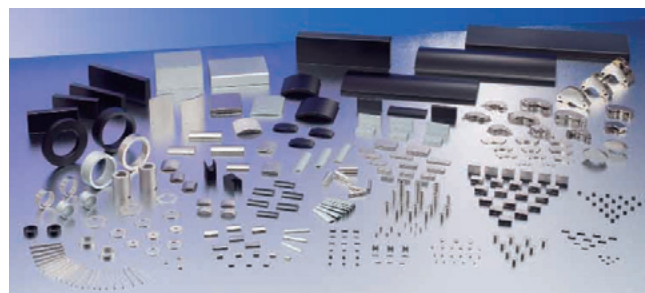
## Business Overview

We supply rare earth magnets, which are essential for reducing the size and weight of motors used in a variety of devices, including hybrid cars, electric vehicles, industrial equipment and home appliances. In addition, we provide photoresists, photomask blanks, encapsulation materials, pellicles and other products used in the semiconductor manufacturing process. Furthermore, we respond to the needs of advanced information societies by supplying products such as optical fiber preform and high-grade synthetic quartz used in large-scale photomask substrates for LCD and other flat-panel displays.



## Contributing to the Achievement of SDGs Through Product Supply

Rare earth magnets have about 10 times the magnetic force of conventional ferrite magnets and are used to reduce the weight of motors and increase electrical power regeneration. These magnets help reduce greenhouse gas emissions while increasing the power efficiency of a variety of products, including environmentally friendly vehicles and energy-saving air conditioners.



Various types of rare earth magnets in shapes such as squares, rings and cylinders

## TOPICS

### Enhancing the Rare Earth Magnet Manufacturing Plant in Vietnam

Vietnam-based Shin-Etsu Magnetic Materials Vietnam Co., Ltd., started operation in 2013, initially separating and refining raw materials. Afterward, taking our business continuity plan (BCP) into account, it became the first Group company to implement material process outside Japan, including melting, molding and sintering. In response to growing demand for environmentally friendly vehicles and energy-saving air conditioners, it is strengthening manufacturing capabilities associated with material-related production processes. Furthermore, the company is enhancing its integrated production system, which covers processes ranging from raw material refinement to final product manufacturing, by adding processing operations, while aiming to improve its stable supply system.



Shin-Etsu Magnetic Materials Vietnam Co., Ltd.



## Major Products and Applications

### Rare Earth Magnets

Rare earth magnets are used in such products as automobile motors, power generators, compressor motors for air conditioners, industry robots and motors for the hard disk drives of digital home appliances, thus helping to save energy. Shin-Etsu Chemical is engaged in the manufacture of these magnets from separation and refinement of rare earths as raw materials to processing. Furthermore, it is reliably supplying high-quality rare earth magnets with advanced features by means of the development of its own grain boundary diffusion method, which reduces the amount of heavy rare earth used, while maintaining high performance.

#### Industrial robot

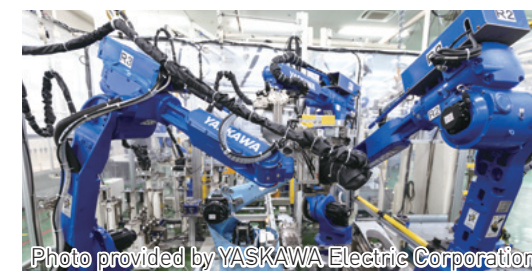


Photo provided by YASKAWA Electric Corporation

#### Energy-saving air conditioner



#### Hard disk drive



#### Plug-in hybrid car (Mercedes-Benz S560e)

These cars have drive motors that are equipped with rare earth magnets and help conserve energy and reduce CO<sub>2</sub> emissions.



### Encapsulant Materials for Semiconductor Devices

Highly pressure-resistant and reliable liquid, sheet and tablet-shaped epoxy encapsulants are used in encapsulating materials for semiconductor devices, insulating materials for power modules found in environmentally friendly vehicles and energy-saving home appliances. They contribute to reduced product size and weight reduction.



### Low Dielectric Materials

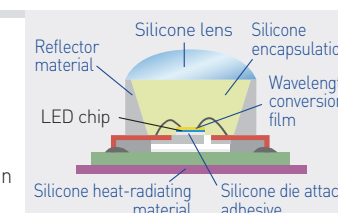
#### SLK Resin

SLK resin has the lowest dielectric dissipation factor of any thermosetting resin and achieves extremely low levels of transmission loss when utilized as encapsulants for organic substrates for 5G and other high-speed communications technologies and for semiconductor devices.



### Packaging Materials for LED

These silicone-based materials offer superior transparency and heat resistance and are utilized in a wide variety of devices, including high-brightness lighting and LEDs used in automobiles.



LED Structure (blue characters are products provided by Shin-Etsu)

### Optical Fiber Coatings

Extremely fine optical fibers have a cross-sectional diameter of only 125 microns. These coatings are used to protect delicate surfaces of optical fibers and to improve their strength.



### Quartz Fabric

Quartz fabric has dielectric characteristics that are ideal for use with high-frequency bands. A toughening agent (prepreg molding material) for high-speed communication equipment and antenna substrates, quartz fabric also is used in a wide variety of resin substrates, including thermoplastic and heat-curable resin substrates. It greatly contributes to improved communication performance in the high-frequency and high-speed transmission domains.



### High-Purity Silane for Semiconductors

High-purity silane is used in manufacturing process of semiconductor insulating films, epitaxial wafers and other commodities. Using sophisticated refinement technologies, we ensure stable supply of this product.





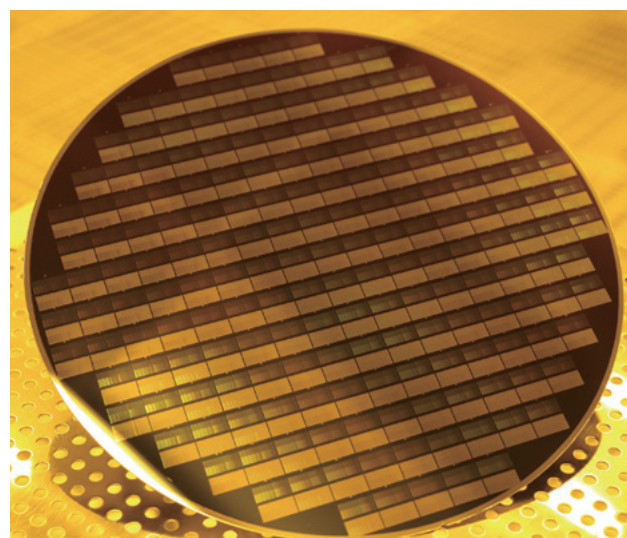
# Electronics and Functional Materials Business

## Major Products and Applications

### Photoresists

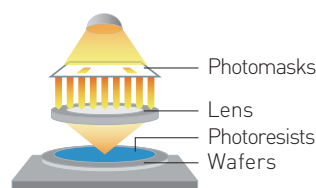
Shin-Etsu Chemical, by utilizing its strengths as a materials maker, carries out integrated manufacturing from synthesis process of raw material polymer to compounding. We make photoresists (KrF, ArF) for excimer lasers that are used as photosensitive material for etching on semiconductor circuits, and our thick film i-line photoresists are used widely for thin-film magnetic heads and MEMS applications. Furthermore, for cutting-edge miniaturization processes we have lineups of multilayer material products. These are used as essential key materials in lithography processes for semiconductor manufacturing, and they help to enable the high integration, high speed and high functions of semiconductors. To steadily capture the growth of the photoresist market, we established a new plant in Taiwan, one of the main areas of demand.

In combination with our existing Naoetsu Plant in Japan, we now have two production bases. As a result, we will be able to disperse business risk and strengthen our business foundation.



### Photomask Blanks

Photomask blanks are the base material of photomasks, which are used as the patterning templates when IC patterns are printed on silicon wafers during the semiconductor lithography process. The light-shading layer is formed on the surface of synthetic quartz, which is the substrate of photomask blanks. Targeting improvement in the quality and performance of key raw materials, Shin-Etsu Chemical has developed innovative technologies for mass producing the most advanced photomask blanks, including multilayer film structures that provide the single-nanometer coverage essential for manufacturing devices and silicon nitride-permeable membrane structures. The Company also responds to the needs of device manufacturers with half-tone phase shift photomask blanks.



### Liquid Fluoroelastomers SHIN-ETSU SIFEL®

We were the first company in the world to succeed in developing the SHIN-ETSU SIFEL® liquid fluoroelastomers, which by using silicone addition-reaction technology can be made into a form that hardens into a flexible, solid synthetic rubber upon heating. SHIN-ETSU SIFEL® possesses excellent process ability and such superior properties as resistance to oils, solvents and chemicals together with good durability against heat and stability at cold temperatures.

SHIN-ETSU SIFEL® contributes to the improvement of products in a wide range of fields, including the automotive, aircraft, electronics and optical applications.



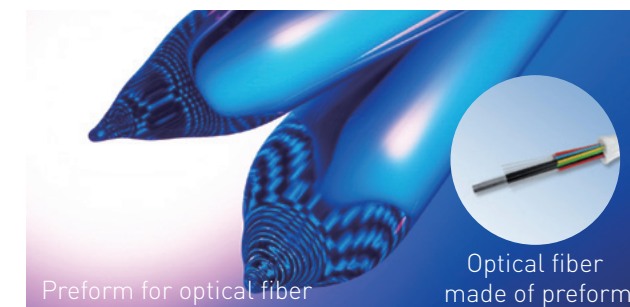
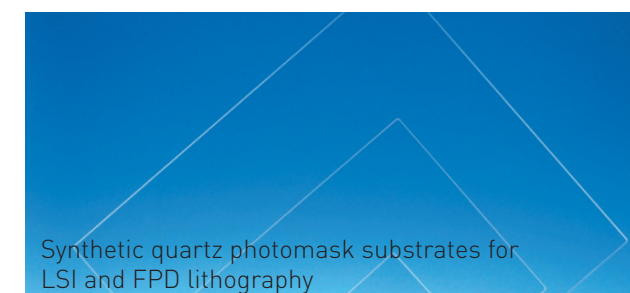
### Fluorinated Anti-Smudge Coating

Fluorinated anti-smudge coating is applied to the surface of eyeglasses and cover glasses/protective films for smartphones. A nano-scale fluorinated thin layer formed on the surface repels water and oil, and stains such as fingerprints can be wiped off easily. Due to its low dynamic friction, fluorinated coating contributes to improving the operability of smartphones. In addition, the Company supplies a fluorinated anti-smudge additive that can obtain excellent surface properties by adding to hard coatings.



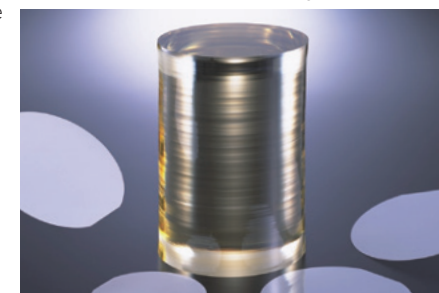
### Synthetic Quartz

Synthetic quartz, the key raw material of optical fiber, provides superior light transmission. In an ordinary glass plate, light attenuates in about two meters. However, synthetic quartz allows light to reach a distance of about 100 km. The Group was the first in the world to mass produce synthetic quartz, which is higher in purity than natural quartz. Due to these attributes, it is used as an optical fiber, a photomask substrate for semiconductor lithography and a stepper lens for semiconductor lithography. In addition, it is used as a large-scale photomask substrate for flat panel display (FPD) lithography. Synthetic quartz contributes to the development of an advanced information society.



### Oxide Single Crystals (Lithium Tantalite: LT)

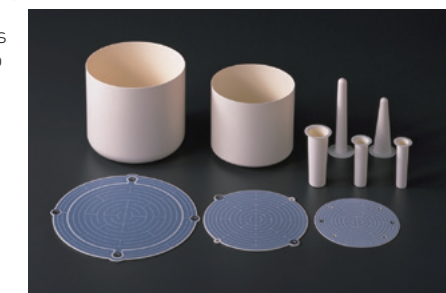
Lithium tantalite (LT) is used in mobile communication devices such as SAW\* devices, which screen electromagnetic waves and pick up only specific frequencies. Oxide single crystals are currently contributing to the popularization of smartphones and serve an important role in our modern, increasingly information-drive n society.



\*Surface Acoustic Wave

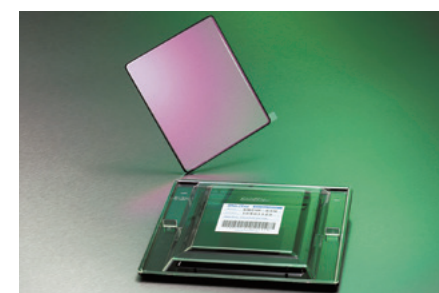
### Pyrolytic Boron Nitride (PBN)

PBN is a high-purity ceramic with excellent chemical resistance and strength at high temperatures. Shin-Etsu Chemical was the first company to successfully produce PBN domestically. In addition to making use of PBN's excellent characteristics in crucibles for compound semiconductors and molecular-beam epitaxy, PBN's application fields are expanding to such areas as MOCVD systems and organic EL systems.



### Pellicles

The Company provides high-quality pellicles for ArF and KrF excimer laser lithography. Its pellicles support customers' semiconductor device production with their excellent performance, such as high light resistance, good transmission uniformity and low outgassing. In addition, it has succeeded in the development of superlarge pellicles for the production of liquid crystal display (LCD) panels.



### Anode Material of Lithium Ion Batteries

SiO is a greatly promising material as an anode material of next-generation lithium-ion batteries that have high capacity and excellent power properties. The Company has succeeded in putting electrical conductivity on SiO particles via our own proprietary method.





# Specialty Chemicals Business

## Business Overview

Cellulose derivatives, environmentally friendly materials made from natural polymer cellulose, are a core product of the Specialty Chemicals Business. Cellulose derivatives are versatile, with applications ranging from such fields as pharmaceuticals and foods to materials for construction and civil engineering work, coatings, ceramics and toiletries. Currently, we have the largest share of the cellulose derivatives market in Japan and meet global needs as the world's foremost manufacturer with bases in Japan, Europe and the United States. In addition, we provide synthetic pheromones used for agricultural pest control and the functional resin POVAL. We also provide a variety of other products, including silicon metal, a main ingredient in silicones and synthetic quartz.



## Contributing to the Achievement of SDGs Through Product Supply

Industrial cellulose derivatives reduce the separation of concrete in water, enabling concrete to be poured without polluting water. This contributes to environmental preservation by preventing water pollution. Synthetic pheromones are very safe, environmentally friendly and eliminate agricultural pests. They are useful for making food safer through the reduction of insecticides and agricultural chemicals sprayed in fields.

### TOPICS

#### Construction of New Cellulose Derivatives Plant Completed

In the autumn of 2019, construction of a new cellulose plant at Shin-Etsu Chemical's Naoetsu Plant was completed. This new plant will specialize in cellulose derivatives (METOLOSE®), the Naoetsu Plant's core product, and will produce cellulose products at an even higher level of quality using improved and new technologies. With the addition of this new plant, the Company will be able to offer an increasingly diverse product lineup, with particularly numerous varieties of pharmaceutical and food application and will aim to further expand its cellulose business.



The completed New METOLOSE® Plant

## Major Products and Applications

### Cellulose Derivatives

Cellulose derivatives provide a variety of functions such as controlling the location where the drugs dissolve in the body and dissolving drugs slowly. They are also used as a binder for the molding process to manufacture exhaust gas purifiers for automobiles. This technology contributes to the prevention of global warming.



### Synthetic Pheromones

Synthetic pheromones prevent male pests from finding their partners. Obstructing their mating process in this fashion reduces the volume of agricultural pests.



### Aroma Chemicals

Leaf alcohol is widely used in a variety of products, including aroma products, cosmetics and foodstuffs.



### Silicon Metal

Silicon metal is a key raw material of silicone, semiconductor silicon and synthetic quartz. Simcoa Operations Pty. Ltd., our group company, manufactures silicon metal in Australia.



### Polyvinyl Alcohol (POVAL)

JAPAN VAM & POVAL Co., Ltd., manufactures and sells this material. Due to its properties as a water-soluble synthetic resin, it is used in a wide range of applications such as adhesives, various types of films, fiber treatment agents, paper processing agents, and additives for cosmetics and pharmaceuticals.



### SOLBIN®

This is a denatured resin supplied by Nissin Chemical Industry Co., Ltd., with excellent adhesion and solubility. Used in products such as paints, inks and adhesives.



# Processing, Trading & Specialized Services Business

## Business Overview

Shin-Etsu Polymer Co., Ltd., develops and supplies products that are easy to use and highly functional products making use of materials processing technologies.

Shin-Etsu Engineering Co., Ltd., is involved mainly in the design and construction of the Group's manufacturing plants, and its engineering technology has a strong reputation with customers outside the Group.



## Contributing to the Achievement of SDGs Through Product Supply

The construction material (corrugated rigid polycarbonate sheets) manufactured by Shin-Etsu Polymer Co., Ltd. is used as an exterior roofing material. Using more than 50% reclaimed raw materials, this product contributes to recycling.

### TOPICS

#### Enhancement of Production Capacity at Shin-Etsu Polymer India

Shin-Etsu Polymer Co., Ltd., is strengthening its ability to supply automotive input devices, which are core products. To respond to growth in demand associated with accelerating vehicle electrification, the company will expand its automotive key switch production facilities in India. By establishing a sturdier production system, Shin-Etsu Polymer will respond to expansion in demand within India and export goods to Europe while aiming for further business growth.



Shin-Etsu Polymer India, which is expanding its facilities (Building No. 3, at right)

## Major Products and Applications

### Shin-Etsu Polymer Co., Ltd.

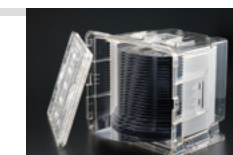
#### Input Devices

Providing input devices such as automobile dashboard audio and air conditioners.



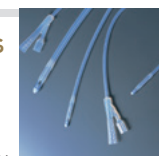
#### Wafer Cases

Providing cases for shipping silicon wafers and for intra-process wafer conveyance at device manufacturers.



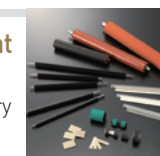
#### Silicone Catheters

Using our silicone processing technologies, we are providing increasingly intricate catheters.



#### Various Rollers for OA Equipment

Providing semi-conductive developing rollers and fuser rollers with proprietary processing technologies including conductivity, foaming and compositing technologies using silicone rubber as a raw material.



#### shupua

This glass is made with extremely transparent silicone rubber.



### Shin-Etsu Engineering Co., Ltd.

#### Engineering

Shin-Etsu Engineering conducts plant design and construction and equipment maintenance for the Shin-Etsu Group.



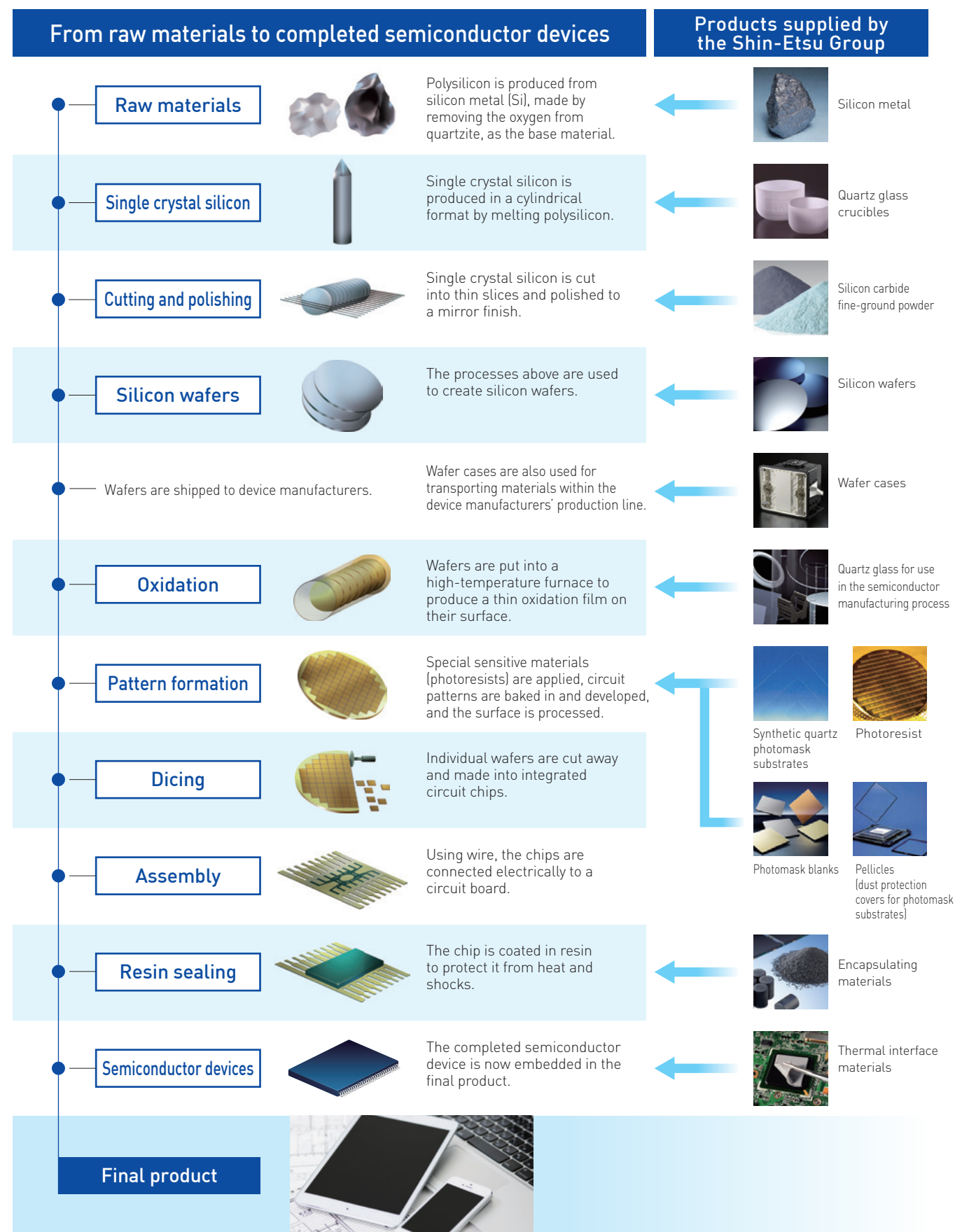
#### Vacuum Assembling Equipment

Shin-Etsu Engineering also designs and manufactures vacuum assembling equipment for LCD panels, enabling large-scale liquid crystal panel production.





# Semiconductor Manufacturing Process and Products of the Shin-Etsu Group



## R&D and Quality Management Initiatives

### R&D

Given the growing need today to realize the sustainable development of human society and the improvement of its quality while minimizing the burden on the environment, it is essential to maximize efficiency. Technologies such as the high-speed processing of data, automatic driving, IoT, 5G and AI should be utilized and continue to evolve for these purposes. We believe we have a significant role to play in this regard. We will make efforts so that many of our products will contribute to these objectives and will pursue tangible results in developing new products to this end.

### 5G Products

In anticipation of vigorous demand growth, we are striving to develop new 5G products and expand our product lineup.

#### Quartz Fabric

We are developing quartz fabric, which is optimal for use as a core material used in circuit boards that enable ultra-high-speed communication. This fabric is composed primarily of extremely thin threads of quartz glass, which enables film thinning on multilayer substrates and is effective in terms of preventing device malfunction caused by radioactivity, as it generates extremely low levels of alpha radiation. Quartz fabric also is garnering expectations as a component of fiber-reinforced plastic used in 5G antennas and other products.



#### Low Dielectric Constant Thermosetting Resins (SLK series)

The SLK series is high strength and has a low modulus and low dielectric constant. In fact, its dielectric constant and dielectric loss tangent are lower than those of any other thermosetting resin when used with superhigh-frequency 5G (10–80 GHz). It is also ideal for use in materials such as flexible copper-clad laminate (FCCL) and adhesives.

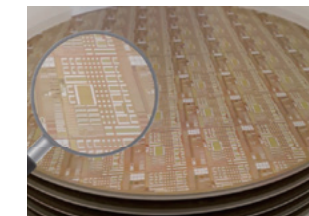


#### Heat Dissipation Sheets

To achieve the increasing levels of heat dissipation required by 5G technology, we have developed new heat dissipation sheet products, such as adhesive sheets fitted with heat dissipating material and sheets that can be bonded onto surfaces after being melted and subsequently hardened. We are aiming to roll out these products in the power semiconductor and automotive fields, which require high levels of reliability.

### Gallium Nitride (GaN)

Semiconductors that utilize gallium nitride are expected to experience high demand due to their sophisticated properties and energy efficiency. These characteristics are required for the development of mobility technologies, such as electric cars, and 5G. Moving forward, the Shin-Etsu Group will aim to supply high-caliber GaN products.



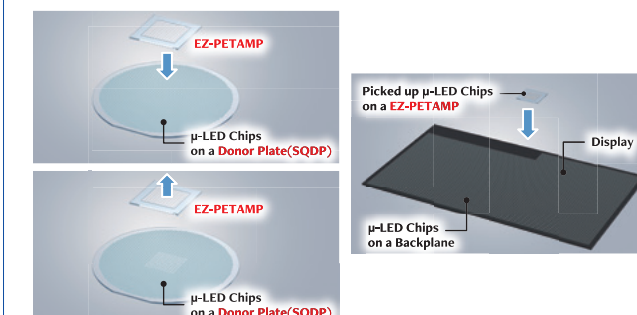
### Micro LED Display Manufacturing Materials

As spontaneous light-emitting displays with microscopic LED elements allocated to each screen pixel, micro LED displays are referred to as the "ultimate display." These displays provide high contrast, brightness and reliability, while conserving energy. To enable mass production of micro LED displays, the Company has developed the following process materials:

1. A MicroLED transfer stamp that has formed a dry adhesion layer free of an adhesive agent on the ultra-flat substrate, and
2. A temporary support substrate that will make possible various processes such as cleaning processes and transfer processes while holding the substrate.

In addition, we are providing encapsulants, underfill and other process materials.

#### Micro LED Mass Transfer Processes



### Quality Management

As a materials manufacturer, we believe that stably supplying the quality products that we have promised to our customers is our most important thing. We have assembled an extensive lineup of products that we deliver to customers throughout the world, including raw materials used in industrial goods and materials utilized in state-of-the-art products. To respond to the unique demands related to each of these products, we have adopted the latest analytical equipment and evaluation equipment and are developing our own original quality control technology. At the same time, we are revising our manufacturing processes and employing a statistical methodology to reduce fluctuation in quality. Moving forward, we will remain an ideal partner to our customers as we swiftly respond to their diverse needs and endeavor to provide them with a consistent and stable supply of quality products.