# Toward Ambitious Goals

The fundamental role of the Shin-Etsu Group's research and development is to maintain global top-class quality, technology and cost competitiveness. In developing products, Shin-Etsu puts importance on the development of unique technologies that differentiate the Company from other competitors and adds value to products so that the Company may avoid simple price competition.

As a producer of materials, the Shin-Etsu Group has a basic policy of developing new products faster than competitors by emphasizing relationships of trust with customers, and meeting their needs in a timely fashion.

With top global market share in a large number of product categories, such as semiconductor silicon wafers, Shin-Etsu is in the advantageous position of obtaining the latest information from customers faster than any of its competitors.

**Yoshiaki Ono**
General Manager, Silicone-Electronics Materials Research Center,
Research & Development Department, Patent Department and New Products Department

In existing businesses, the Shin-Etsu Group is working to strengthen operations with a tripartite structure incorporating sales, research and production. With a focus on developing new products more quickly than competitors, sales and research staff work together as one team to build strong relationships with customers in order to grasp and follow up on individual customer needs.

Production divisions and research divisions cooperate closely to speed commercial production of newly developed products while working to maintain and enhance product quality. All R&D bases are located at production sites, which is another strength of the Shin-Etsu Group because it allows a smooth shift to commercial production.

New research initiatives, key drivers of the Company's continuous growth, begin with identifying new themes. New themes can be proposed at any time from any of Shin-Etsu's divisions, but come mainly from staff at the research centers. These new themes are selected by the New Z Committee, chaired by the Company president, based on standards of technical originality, market size, growth potential and profitability. Once a new theme is chosen, the most suitable members are gathered together from throughout the Company, a budget is set and a new project is initiated. The New Z Committee then regularly follows the progress of the projects, and commercialization begins. Currently, more than 10 research themes are progressing, with the aim of early commercialization.

Recognizing that intellectual property, such as patents and technological expertise, is an important management asset, the Shin-Etsu Group's research activities culminate in the acquisition of patents to protect its property rights. The Group is enhancing its studies and administration regarding patent application issues. Initiatives include determining whether the Group's technologies under development are ahead of other companies' and how such technologies can be managed with patents.

As of March 31, 2008, the Shin-Etsu Group as a whole held 4,622 domestic and 5,571 overseas patents. Of these, the Group obtained 101 patents in the U.S. in 2007, which is top-class among Japanese chemical companies.

### Number of Patents by Region

| | Number of patents acquired during 2007 | Cumulative number of patents acquired as of the end of fiscal 2008 |
|---|---|---|
| Japan | 620 | 4,622 |
| North America | 134 | 2,145 |
| Asia/Oceania | 301 | 1,526 |
| Europe | 223 | 1,889 |
| Other Areas | 0 | 11 |
| Total | 1,278 | 10,193 |

# Unique Ideas and a Spirit of Challenge Lead the Way to Further Growth on the Global Stage

The Shin-Etsu Group responds to customer demands for high functionality by continuously providing new materials with unique properties and superior capabilities. To create revolutionary new products, Group researchers combine their spirit of challenge and passion for research with Shin-Etsu's original technologies, know-how and customer trust cultivated over many years as a top manufacturer. We will continue striving to develop new materials going forward.

Kenichi Isobe (left), Kunihiro Yamada (right)
Silicone-Electronics Materials Research Center

## Curable Thermally Conductive Grease for Use in CPUs

CPUs, the hearts of computers, have achieved remarkably high performance through miniaturization. However, unexpected limits on miniaturization have emerged at the same time. Efficient dissipation of the heat generated by increasing current density was regarded as the most important factor in CPU evolution.

One method proposed for transferring the heat generated by a silicon chip to radiation fins was to attach a heat spreader over the chip. However, satisfactory performance was unattainable due to the great burden on the thermally conductive material between the chip and the heat spreader, and pumping out of the material from the gap as a result of package warpage during temperature cycling.

We started this project in response to demand from a top global customer for development of a new thermal interface material (TIM) that would neither lose its flexibility nor pump out even after prolonged exposure to high temperatures. By steadily persevering toward this difficult goal, we succeeded in developing the material to satisfy the customer's requirement. The success was attributable to the application of curing technologies, compounding technologies and evaluation technique, which the Shin-Etsu Group accumulated over many years, and our researchers' passion for development.

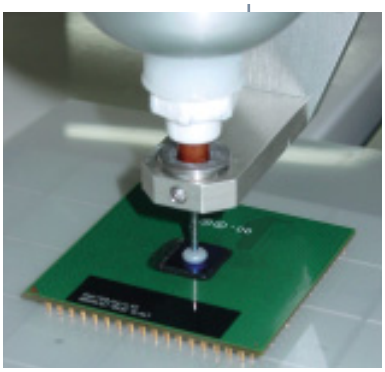
We successfully received production approval from the customer through strict audit in the process of commercialization of the material. This process leveraged the merits of our tripartite structure incorporating research, development and production.

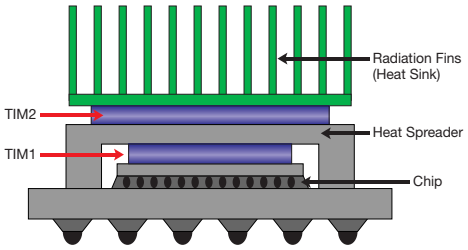
A compound, Shin-Etsu's curable thermally conductive grease for use in CPUs* is applied between chips and heat spreaders and heat cured, becoming a highly reliable thermal conductor. It is very flexible and highly stable due to the combination of a thermally conductive filler and silicone base polymer binder with superior low-temperature properties and heat resistance.

In addition to high thermal conductivity, the product can be used for thin film coating, and also has superior reworkability. We therefore expect demand to grow for a variety of applications, including in automobile engine control units and LCD television plasma display panels.

The Shin-Etsu Group will continue to demonstrate its advanced technological capabilities on the global stage.

*Kenichi Isobe and Kunihiro Yamada received the 2008 Imperial Invention Prize from the Japan Institute of Invention and Innovation for their valuable contribution to increasing the capability and lifespan of CPUs, which operate in harsh conditions.






Shin-Etsu's thermally conductive grease, a thermal interface material (TIM), is applied in the spaces between chips and heat spreaders and heat sinks in CPUs, as indicated by TIM1 and TIM2, above.

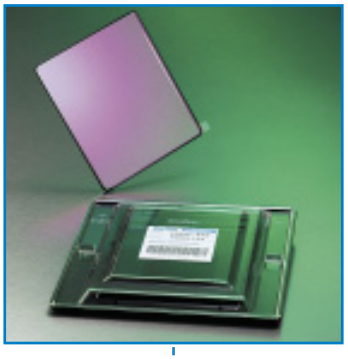
**The Shin-Etsu Group is a global leader in developing sophisticated technologies for the semiconductor industry. Throughout the semiconductor production process, Shin-Etsu technologies support greater integration and production efficiency.**

## 300mm Silicon Wafers

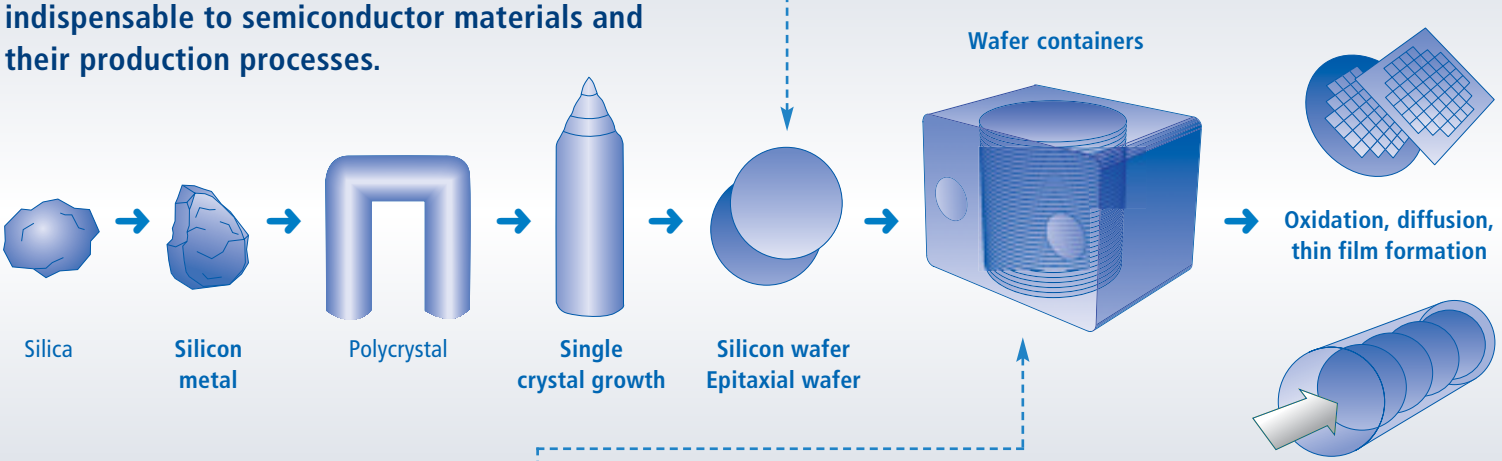
Shin-Etsu was the first company in Japan to design and produce silicon wafers, and began the world's first commercial production of 300mm silicon wafers in 2001. Shin-Etsu Handotai Co., Ltd. has established defect-free technology for single crystals, gaining strong customer trust for its commercial production capabilities and quality technologies, and has maintained its position as the world's largest manufacturer of silicon wafers.

## Pellicles

Shin-Etsu Chemical supplies high-quality pellicles for ArF and KrF excimer laser lithography. Shin-Etsu pellicles support customers' semiconductor device production with their excellent performance, such as high light-resistance, good transmission uniformity and low outgassing. In addition, Shin-Etsu has succeeded in the development of super large-size pellicles for the production of liquid crystal display (LCD) panels.



## Various products developed by Shin-Etsu are indispensable to semiconductor materials and their production processes.




## Wafer Containers

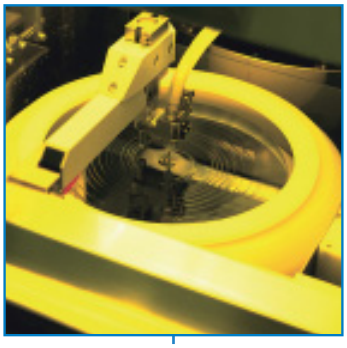
Group company Shin-Etsu Polymer Co., Ltd. has an excellent track record in front opening shipping boxes (FOSB) and front opening unified pods (FOUP). FOSB are used for shipping wafers from the wafer maker to device manufacturers and FOUP are used by device manufacturers to carry wafers in the production line. With core technologies, precision molding, environmental preservation and control technologies, and design skills that precisely meet customers' high-level requirements, Shin-Etsu Polymer has established a solid reputation in the semiconductor industry.

## Quartz Glass for Semiconductor Production Processes

Improvements in the degree of integration of semiconductors necessitates greater levels of purity and accuracy of quartz glass for semiconductor production processes, which can be achieved through means including increasing the diameter of silicon wafers and further miniaturizing production processes. The Shin-Etsu Group's synthetic quartz glass with dramatically improved heat resistance has an excellent reputation due to its ability to meet the needs of high-humidity processes in ultra-clean rooms.

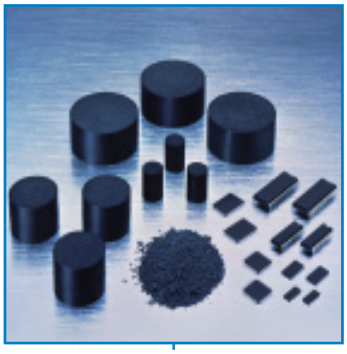
## Photoresists

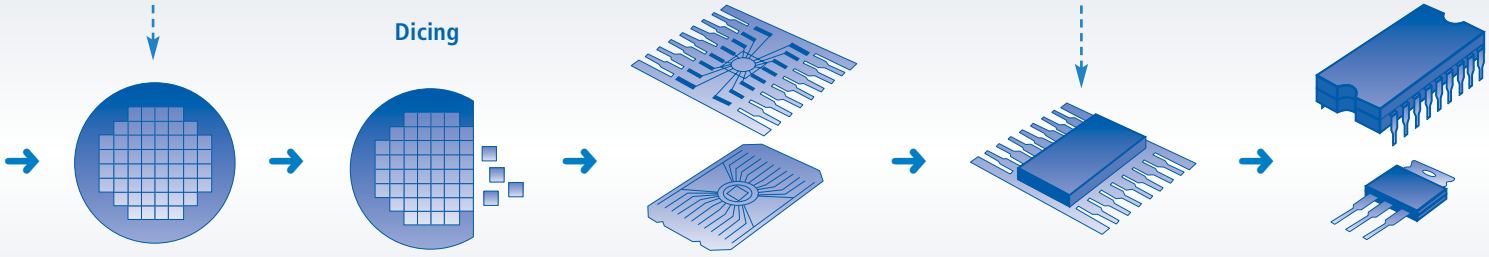
Shin-Etsu developed the first photoresist for use with the short wavelength KrF (krypton fluoride) excimer laser in 1996, and has become the leading manufacturer in this field. Sales have also begun for tri-layer materials used in post-45nm generation miniaturization processes. Shin-Etsu's strengths in this field include: 1) being the world's only photoresist manufacturer with an integrated production system from base polymers (raw materials) to the final resist products; and 2) its consultation process with customer engineers who make decisions relating to all aspects of production, from specifications to product delivery.



## Epoxy Molding Compounds

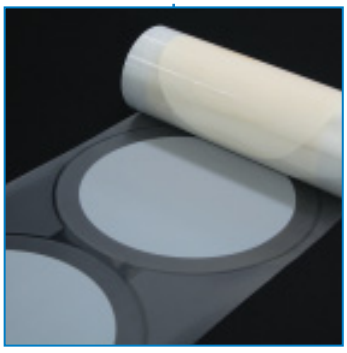
Shin-Etsu's epoxy molding compounds provide excellent reliability and moldability in order to fulfill the latest semiconductor package requirements. These high-performance encapsulation materials have been developed based on Shin-Etsu's own silicone low-stress technology, special filler technology and the Company's unique flame retardant technology, or "green compound technique." In addition, super-high Tg grade and very high thermal conductive grade materials are indispensable for meeting next-generation requirements.






## Dicing Die Attach Film

Dicing Die Attach Film (DDAF) is an adhesive die bond film with dicing film used in the dicing process. Stacked packages are mainstream. Traditional epoxy pastes cause the problem of bleeding and uneven bonding thickness in stacked packages. Shin-Etsu DDAF solves these problems and gives strong user support with its superior process ability and reliability.



## Silicone-based Thermal Interface Materials

As higher integration and faster performance of electronic devices are achieved, demand is rising for thermal interface materials for heat dissipation because of increasing heat generation inside IC devices. Shin-Etsu offers a lineup of various silicone-based thermal interface materials such as rubber sheet, grease-type, gel-type and liquid rubber-type products that possess excellent adhesiveness as thermally conductive materials to fill gaps between heat-generating units like CPUs and heat-sinks. Shin-Etsu responds to various needs for heat dissipation according to specific applications.