

## Research and Development in Progress

Research and development is a key asset that helps build the future of the Shin-Etsu Group. We employ more than 850 researchers and had invested ¥26 billion in R&D this fiscal year, equivalent to 3.2% of our total annual sales. This commitment is reflected in aggressive R&D activities, principally in eleven research centers operated by our Group companies.

Our R&D is guided by the following policies:

- ENSURING STRINGENT SELECTION AND FOCUS OF RESEARCH TOPICS BY DRAWING ON BOTH OUR UNIQUE TECHNICAL EXPERTISE AND INFORMATION FROM THE MARKET.
- ACHIEVING ORIGINALITY AND HIGH PROFITS.
- COMMERCIALIZING THE RESULTS OF OUR EFFORTS EFFICIENTLY IN A SHORT PERIOD OF TIME.

Our principal research topics can be divided into two broad groups.

The first consists of topics that involve our existing business segments, and hence are related to the core operations of the Group. We endeavor to keep the world-class technology and quality of existing products while maintaining or improving cost levels and employ the combined efforts of R&D specialists, production staff and our sales force to drive the innovative development of new materials and products of high originality and profitability.

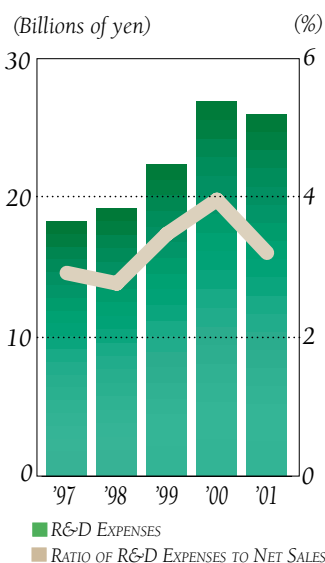
The second group of topics covers research into new areas of business for the Group, which will help sustain future growth. To be selected, research topics must pass a stringent examination by the Z Committee, which is chaired by our president. The strict process of evaluation and discussion considers such aspects as whether the topic leverages our existing technologies, the needs of the market and the future potential of the research area, including size of the market, potential profitability, and competitive products and technologies. The Z Committee process has produced some impressive results, such as photoresists for excimer lasers, which have been enjoying strong growth in recent years; pellicles for protecting photomasks; SIFEL<sup>®</sup>, a liquid fluoroelastomer using our proprietary technology; and optical isolators, which are optical telecommunications components.

We focus our basic research for new products not only on the semiconductor industry but also on information communications including optical and mobile communications. Certain themes, such as the environment, energy and food, will clearly be critical arenas in the 21st century, and we pay particular attention to these areas in searching for new research topics. In this way, we can design R&D initiatives that will create business able to register sustainable growth.

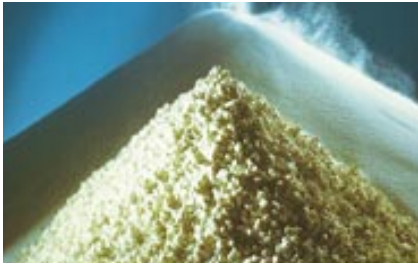
We work together with our customers to develop applications for the materials we develop. For greater efficiency, we contract certain basic research out to universities and research institutes.

The Shin-Etsu Group has always been quick to develop overseas business. That's why we have been committed to acquiring patents overseas as well as in Japan. As a result of our efforts, Shin-Etsu Chemical held 2,809 domestic and 2,832 overseas patents as of March 31, 2001, giving the company a total of 5,641 patents. In 2000, two Group companies—Shin-Etsu Chemical and Shin-Etsu Handotai—received 170 U.S. patents, ranking us first in that respect among Japanese chemical companies for the third consecutive year.

R&D EXPENSES AND RATIO OF R&D EXPENSES TO NET SALES



## Shin-Etsu Group's Research Facilities



PVC

### PVC Research Center (Shin-Etsu Chemical, Kashima)

This center conducts research into PVC manufacturing processes, to improve quality and productivity, in addition to conducting applied research. It is developing flexible copper-clad laminates that use the Company's unique plastic molding technologies.



Synthetic Pheromone

### Synthesis Technology Research Center (Shin-Etsu Chemical, Naoetsu)

Using our proprietary organic synthesis technologies, this center has developed cellulose derivatives, synthetic perfumes, synthetic pheromones, and special silanes. It also develops synthetic quartz for semiconductors.



Testing the tensile strength of Silicone Rubber

### Silicone-Electronics Materials Research Center (Shin-Etsu Chemical, Matsuida)

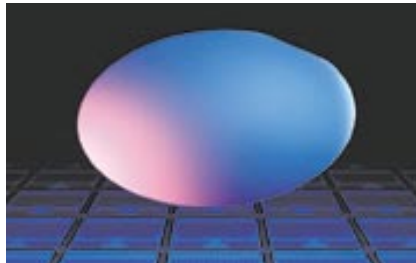
This is the largest research center in the Group, responsible for researching and developing silicones and organic electronic materials, such as junction coating resins (JCR), epoxy molding compounds (EMC) and optical fiber (OF) coating materials. The center is also in charge of developing SIFEL<sup>®</sup>, our new fluoroelastomer.



Rare Earth Magnets

### Magnetic Materials Research Center (Shin-Etsu Chemical, Takefu)

This center is engaged in research that ranges from the separation and refining of rare earths to their applications. The center focuses not only on the uses of rare earth metals and oxides but also on the development of rare earth magnets. In particular, the facility has earned high marks from customers for its magnetic field analysis and magnetic circuit design technologies.



Epitaxial Wafers

### Semiconductor Research Centers (Shin-Etsu Handotai, Isobe and Shirakawa)

These two centers are working together to improve the quality of silicon wafers in areas such as flatness. They are developing the technologies that will be required with the introduction of large-diameter and micro-devices. Recent results of this research include silicon-on-insulator (SOI) wafers and IG-NANA<sup>®</sup> annealed wafer.



Optical Fiber Preforms

### Advanced Functional Materials Research Center (Shin-Etsu Chemical, Isobe)

This center has called on accumulated expertise in single-crystal growing, fine processing and CVD technologies to develop an array of advanced materials, including oxide single crystals, synthetic quartz for preforms, and nonoxide ceramics. It is also developing pellicles for protecting photomasks, as well as optical components such as isolators.



Photoresists

### New Functional Materials Research Center (Shin-Etsu Chemical, Naoetsu)

The latest of our research facilities, founded on June 1, 2001, specializes in R&D of electronics-related materials such as photoresists. At present, the center is working on the development of next-generation ArF photoresists.



Synthetic Quartz Glass for UV steppers

### Research and Application Laboratory (Shin-Etsu Quartz Products, Koriyama)

This center is involved in all aspects of synthetic quartz glass R&D, and is currently developing quartz glass optical material for ArF-laser exposure equipment. This material, for use in next-generation lithographical technology for semiconductor production, has high homogeneity, high transmittance and other optical characteristics that do not change with laser irradiation.



iPAS

### Engineering and Technical Institute (ETI) (Shin-Etsu Polymer, Omiya)

This center excels in the applied research of manufacturing techniques and engineering technology. It has recently developed a new wiper rubber for automobiles. The center is currently researching a new printing system (iPAS), which can correspond to the input keys of a mobile terminal.

### Research and Development Institute (RDI) (Shin-Etsu Polymer, Omiya)

This center is involved in all aspects of plastic materials research. A recent result of this work is the production of a compound of silicone rubber and plastic, which is used for office automation (OA) apparatus parts.