

## RESEARCH AND DEVELOPMENT ACTIVITIES



### **PVC & Polymer Materials Research Center**

**(Shin-Etsu Chemical, Kashima)**

This center supports the technologies of Shin-Etsu Group PVC manufacturing bases worldwide, with research into the manufacturing process focusing on improved productivity and consistent quality of PVC products, in addition to applied research. Further, the center is developing flexible copper-layered laminates that use the Company's proprietary plastic molding technologies.



### **Silicone-Electronics Materials Research Center**

**(Shin-Etsu Chemical, Gunma)**

As a comprehensive research center for silicones and organic electronics materials, this is the Group's largest research center and engages in a wide spectrum of research, from basic research to application. This center is also in charge of developing SIFEL<sup>®</sup>, a new fluoroelastomer developed with the Group's proprietary synthetic technologies.



### **Specialty Chemicals Research Center**

**(Shin-Etsu Chemical, Naoetsu)**

Using proprietary organic synthesis technologies, this center is working to develop a variety of cellulose derivatives, synthetic perfumes, synthetic pheromones, and specialty silanes. The center is also active in the development of synthetic quartz substrate materials.



### **New Functional Materials Research Center**

**(Shin-Etsu Chemical, Naoetsu)**

A base for the development of KrF photoresists for excimer lasers, in which the Group holds a top share in the world market, this center is also presently working on the development of next-generation ArF photoresists.

The Shin-Etsu Group has designated innovative R&D as a crucial asset that will pave the way for future growth. Accordingly, we have established an organization consisting of more than 900 researchers and allocated ¥26.3 billion for R&D activities, which accounts for approximately 3.2% of total annual sales. The Group carries out its vigorous R&D activities primarily through 10 research centers operated by Group companies nationwide.

Our R&D activities are guided by the fundamental policies of selection and concentration, originality, raising value added, and speed. The ultimate goal is to develop high-value-added and original materials and products through the fusion of proprietary technological seeds with up-to-date information on market needs, and to commercialize the results of these R&D efforts in the shortest period of time by undertaking more efficient R&D activities.

Our principal research themes can be broadly divided into two categories. The first category comprises research themes related to existing mainstay businesses that support the Group. The second comprises new research themes that will lead to the creation of new businesses that are expected to contribute to the long-term growth

and future expansion of the Group. Both of these themes require a time horizon of several years.

We place top priority on present research in our existing principal business segments. Based on the close interplay among marketing, research, and manufacturing, we are working to maintain and raise the levels of our world-class technologies, product quality, and cost competitiveness. We also strive to accelerate the development of new products and applications by making every effort to understand our customers' needs, strengthen existing businesses and peripheral operations, and delivering optimal solutions, which will contribute to an expansion of sales and income. To carry out R&D activities in existing businesses more efficiently, the Shin-Etsu Group research laboratories have been established at all manufacturing plants.

In the area of new research themes, the Z Committee headed by the Company president and the New Z Committee select new areas of business for further research based on a process of strict evaluation and deliberation. Upon considering our seeds, such as process technology, characterization and analysis technologies, we select



**Advanced Functional Materials Research Center**

**(Shin-Etsu Chemical, Gunma)**  
Based on its accumulated single-crystal-growing, fine-processing, and thin-film technologies, this center is undertaking development in a wide range of advanced materials that includes oxide single crystals and synthetic quartz. In addition, this center is in charge of developing optical components for isolators and others.



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

Based on cooperative ties, these centers are working to support improvements in the quality of silicon wafers in such areas as crystallization and flatness. They are also progressing with the development of technologies for the introduction of large-diameter and high-flatness wafers.

*Isobe*



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

Supporting our rare earth-related businesses, this comprehensive research center engages in a wide spectrum of research ranging from the separation and refining of rare earths to their applications. This center also concentrates on uses for rare earth metals and oxides, and on the development of rare earth magnets that use rare earth as a raw material. In particular, this facility has earned high acclaim from customers for its magnetic field analysis and magnetic circuit design technologies.



*Shirakawa*

those researchers most qualified to nurture each particular new project along the new research theme. The Z Committee has compiled a solid record of achievement that includes photoresists for excimer lasers and SIFEL®, a new fluoroelastomer.

Amid acceleration in technological innovation, our research into new business areas will focus on the semiconductor and information communications industries. In an effort to ensure competitive advantage in the 21st century and create new businesses that will drive our future growth, we will actively pursue new research themes in growing markets such as the environment, energy and food.

Moreover, the Shin-Etsu Group engages in joint research initiatives with other companies and universities. To this end, we vigorously carry out research with customers on the application of those materials we develop. To further enhance the efficiency of our R&D activities, we also commission portions of our basic research to universities and research institutes.

In our R&D activities, we must concentrate research efforts on the generation of corporate revenues and earnings. In this context, Shin-Etsu has established an incentive and bonus scheme that

rewards researchers whose activities contribute significantly to the Company's performance.

Legally recognized rights that protect the results of our R&D activities raise the value of our R&D commitment as a management resource. Accordingly, the Shin-Etsu Group considers "the acquisition of patents as the finishing touch to its R&D activities" and concentrates on the acquisition of intellectual property rights.

In particular, Shin-Etsu has been a pioneer in its industry in the development of overseas operations. Consequently, we have established an outstanding track record in the acquisition of overseas patents. As of the end of March 2004, the entire Shin-Etsu Chemical Group in Japan held 4,075 domestic and 4,204 overseas patents, for a total of 8,279. In 2003, two Group companies—Shin-Etsu Chemical Co., Ltd. and Shin-Etsu Handotai Co., Ltd.—acquired 173 patents in the United States, placing us second among Japanese chemical companies. Moreover, approximately 20% of PVC plastic produced throughout the world is manufactured under technology licensed from Shin-Etsu.