

# Research and Development Activities

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 ¥27.3 billion for R&D activities, which accounts for approximately 3.4% 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 concentration, originality, raising value added, and speed. The ultimate goal is to develop highly profitable 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.

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. Shin-Etsu makes every effort to understand its customers' needs by further improving and differentiating our present products. We also strive to accelerate the development of new products and applications by delivering optimal solutions, which will contribute to an expansion of sales and income. Based on this close interaction among related

divisions, we intend to carry out R&D activities in existing businesses more efficiently. For this reason, 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 recently established New Z Committee select new areas of business for further research based on a strict evaluation and deliberation of a wide range of factors including the existing seeds of the Company, the needs of the market, and the future potential of each research topic in terms of market size, profitability and other numerical factors. Upon considering our seeds, such as process technology, characterization and analysis technologies, we select those researchers most qualified to carry out each particular new project and create a team for the project. Each new project is undertaken at a research laboratory where such work can be undertaken most efficiently. The Z Committee has compiled a



## 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, a new fluoroelelastomer 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.

solid record of achievements that include photoresists for excimer lasers, which have registered conspicuous growth, and SIFEL, a liquid fluoroelastomer developed using our proprietary technologies.

Our research into new business areas will focus not only on the semiconductor industry but also on the IT sector including optical and mobile communications. 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 that address areas of growing concern such as the environment, energy, food and communications.

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 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.

The importance of R&D and its integral role in generating corporate revenue and earnings cannot be overstated. In this context, Shin-Etsu rewards researchers whose activities contribute significantly to the Company's performance.

Legally recognized rights that protect the products and technologies 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 industrial 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 2003, the entire Shin-Etsu Chemical Group in Japan held 4,009 domestic and 3,750 overseas patents, for a

total of 7,759. In 2002, two Group companies—Shin-Etsu Chemical Co., Ltd. and Shin-Etsu Handotai Co., Ltd.—acquired 177 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.



#### 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.



#### 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 filed analysis and magnetic circuit design technologies.



Isobe

#### 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. These centers are also progressing with the development of technologies for the introduction of large-diameter and high flatness wafers.



Shirakawa