

RESEARCH AND DEVELOPMENT ACTIVITIES

The Shin-Etsu Group has designated R&D as a crucial asset that will pave the way for future growth of the Group. Accordingly, we have established an organization consisting of more than 880 researchers and allocated ¥28.2 billion for R&D, corresponding to over 3% of total annual sales. The Group carries out its vigorous R&D activities primarily through 10 research centers operated by Group companies.

Guided by the basic research policies of the concentration and selection of research themes, achieving originality, raising value added, and achieving

speed, the Group aims to commercialize the results of its R&D efforts in a short period of time by undertaking more-efficient R&D activities to develop highly profitable and original materials and products through the fusion of its proprietary technological seeds with up-to-date information on market needs, which represent information from the market.

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



PVC 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 focused on the improved productivity and 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.



Specialty Chemicals Research Center
(Shin-Etsu Chemical, Naoetsu)
Using proprietary organic synthesis technologies, this center has developed cellulose derivatives, synthetic perfumes, synthetic pheromones, special silanes, and synthetic quartz.

Silicone-Electronics Materials Research Center

(Shin-Etsu Chemical, Gunma)
As a comprehensive research center for silicones and such organic electronics materials as junction coating resins, epoxy molding compounds, and optical-fiber coating agents, this is the Group's largest research center and engages in a wide spectrum of research, from basic research to application. This center is in charge of developing SIFEL, a new fluoroelastomer developed with the Group's proprietary synthetic technologies.



New Functional Materials Research Center

(Shin-Etsu Chemical, Naoetsu)
A base for the development of KrF photoresists for excimer lasers, which hold a top share of the world market despite their late entry into the market, this center is also presently working on the development of next-generation ArF photoresists.



new research themes that will lead to the creation of new businesses that are expected to contribute to future Group expansion.

We place top priority on present research in our existing principal business segments. While working to maintain or raise the levels of our world-class technologies, product quality, and cost competitiveness, we are stressing close interplay among marketing, research, and manufacturing to develop new products and applications that anticipate market needs and that will contribute to an expansion of sales and income.

Based on this close interaction, the Shin-Etsu Group research laboratories have been established at all manufacturing plants, with the aim of carrying out R&D activities in existing businesses even more efficiently.

The Z Committee, headed by the Company president, selects new areas of business for further research based on a strict evaluation and deliberation of a

wide range of factors, including the Company's existing seeds (innovation), the needs of the market, and the future potential of the research topics in terms of market size, profitability, and competing products and technologies.

Upon considering our seeds—including process and characterization technologies—we carry out new research as a project that brings together suitable researchers when necessary from throughout the Group and undertake these projects at the research laboratory where such work can be undertaken most efficiently.

The Z Committee has compiled a solid record of achievements that includes photoresists for excimer lasers, which have registered conspicuous growth over the past several years; pellicles for protecting photomasks from dust; and

SIFEL, a liquid fluoroelastomer developed using our proprietary technologies.

Our research into new areas of business will concentrate on telecommunications fields, including optical and mobile communications and semiconductor-related fields. As we search for new research themes, we will also focus on themes likely to be principal issues in the 21st century, including the environment, energy, and communication. By taking this approach, we can concentrate on R&D that will support the creation of businesses capable of supporting growth.

We also engage in joint research with other companies and universities. To this end, we vigorously carry out joint 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.

Legally recognized rights that protect the products and technologies of our R&D activities raise the value of our R&D as a management resource. Therefore, the Shin-Etsu Group considers "the acquisition of patents as the



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 pellicles for protecting photomasks from dust.



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 needed for the introduction of large-diameter and high flatness wafers. Recent results of research include silicon-on-insulator (SOI) wafers and IG-NANA annealed wafers.

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 not only on uses for rare-earth metals and oxides but also 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

finishing touch to its R&D" and is therefore concentrating on activities related to the acquisition of intellectual property rights. In particular, Shin-Etsu was one of the first companies in the industry to develop its overseas operations and has been working to acquire patents overseas. As of the end of March 2002, Shin-Etsu Chemical, the parent company, held a total of 5,401 patents, including 2,839 in Japan and 2,562 overseas. The entire Shin-Etsu Group held 4,025 patents in Japan and 3,645 patents overseas, for a total of 7,670 patents. In 2001, two Group companies—Shin-Etsu Chemical and Shin-Etsu Handotai—acquired 178 patents in the United States, enabling us to maintain a top ranking among Japanese chemical companies. Moreover, approximately 20% of PVC plastic produced throughout the world is manufactured under technology licensed from Shin-Etsu.