

## Basic Policy

All division R&D and corporate R&D activities in each Kuraray segment, business division, and group companies are closely coordinated and guided by our corporate mission to open new fields of business using pioneering technology and contribute to improving the natural environment and quality of life.

To continue building on the reinforced business structure achieved under the GS-21 Medium-term Business Plan, Kuraray launched the "GS-Twins" Medium-term Action Plan in fiscal 2009 focused on creating and expanding new businesses and laying the foundation for new growth. The three-year medium-term business plan aims to further advance the Company toward its 10-Year Corporate Vision of becoming "a specialty chemical company with a strong presence."

The Corporate R&D division administers operations of the Kurashiki Research Laboratories, Tsukuba Research Laboratories, and Kuraray Research and Technical Center (USA).

## Main R&D Activities

**CHEMICALS and RESINS**  
(FY2009 R&D Expenses: ¥4,313 million)

Kuraray is a global leader in the vinyl acetate chain products of Poval polyvinyl alcohol (PVA), polyvinyl butyral (PVB), and EVAL ethylene vinyl alcohol (EVOH resin). The Company closely coordinates the worldwide operations of its domestic and overseas R&D departments with a focus on development of new product applications, new products, and new production technology.

In gas barrier materials, we are conducting global development operations to expand the application ranges of *EVAL SP* and *KURARISTER*, both of which provide superior gas barrier properties. *EVAL SP* is a new EVOH resin offering high levels of flexibility, elasticity, and rubber-equivalent plasticity. *KURARISTER* is a transparent barrier film for use in food packaging retorts. We are also developing markets for super-barrier (scavenger) materials and a variety of innovative products.

In the thermoplastic elastomers, the Company is advancing

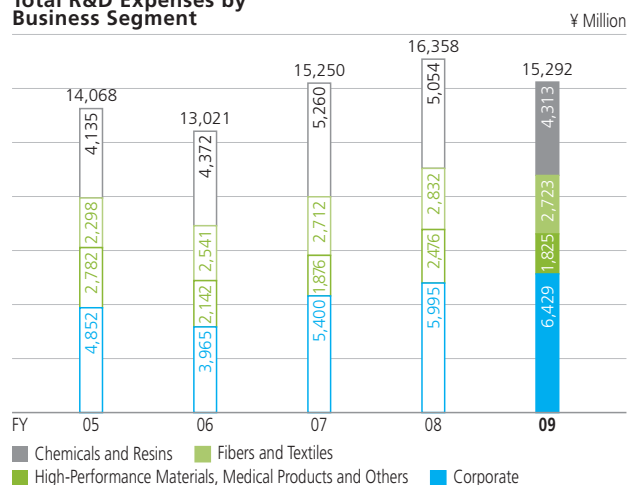
development of new acrylic thermoplastic elastomer materials with excellent transparency and flexibility. The Niigata Plant is currently being expanded to serve as the Company's hub of elastomers production.

The new facility, which will have an annual production capacity of 5,000 tons, is scheduled to commence operations in the autumn of 2011.

R&D activities in thermoplastic elastomers include developing commercial applications for the *SEPTON Q* Series, a lightweight material with excellent anti-abrasion and hydrolysis properties that is finding an ever-widening range of applications, such as for sports shoes. In this way, we are achieving a high level of product differentiation for our thermoplastic elastomers.

R&D in methacrylic resin concentrates on developing new products and applications emphasizing the distinctive properties of our polymers and in strategic areas for ongoing business growth in the electronic display industry.

**Total R&D Expenses by Business Segment**



Note: Data for the year ended March 31, 2003, reflects the conversion to an in-house company system so as to combine Companywide R&D expenses. Data for prior years has not been restated.

## FIBERS and TEXTILES

(FY2009 R&D Expenses: ¥1,825 million)

R&D in PVA fibers is centered on development to expand the market and adding functionality for new applications for fiber-reinforced cement (FRC).

Research in the high-strength polyarylate fiber *VECTRAN* aimed to further enhance product performance and develop applications to exploit its high-strength, low water absorbency, and other characteristics.

R&D activities in the man-made leather *CLARINO* included the completion of the first stage of facility construction for volume production and the ensuing start of operations in October 2009 incorporating the next-generation, environmentally friendly *CLARINO* Advanced Technology Systems (CATS) production process.

R&D in the non-woven fabric *FELIBENDY* included the commercialization as an elastic autohesion wrap and as a flooring material for use in lightweight tatami mats, emphasizing its sound absorbency and insulation characteristics. R&D of *FELIBENDY* is continuing in order to take advantage of its insulation and other attributes for applications as a material for housing interiors.

## HIGH-PERFORMANCE MATERIALS, MEDICAL PRODUCTS, and OTHERS

(FY2009 R&D Expenses: ¥2,723 million)

R&D related to the heat-resistant polyamide resin *GENESTAR* aims at developing new products and applications to meet the growing demand for electrical and electronic applications and to keep pace with our steadily growing business in the automobile industry.

In the medical products business, the Company's development activities in bone transplant products led to the creation of artificial bone graft, and commercialization efforts stepped up during the year following the product's official approval.

In the water treatment field, the Aqua Business Promotion Department was established in April 2009 to gather together the Group's environmental technology with the aim of greatly expanding our water environment business operations. We continue to focus on developing applications emphasizing the special characteristics of our materials in the four business segments of ultrapure water production and recycling, industrial wastewater treatment and recycling, valuable substance recovery, and seawater treatment. Business development also



**Setsuo Yamashita**  
Director and Senior Executive Officer  
General Manager of the New Business Development Division

“ Persistence and commitment to differentiation is a Kuraray attribute. ”

Kuraray's business is guided by a corporate culture centered on "Contributing to the world and individual well-being through actions that others are unable to produce." Our approach of concentrating on a single technology with the aim of developing a full range of applications has produced an ongoing flow of successful products that are contributing to the world. For example, when we originally developed *KURALON*, we overcame many obstacles to achieve the in-house development of poval, which is the primary material for *KURALON*. The technology we accumulated over the years has since enabled us to apply poval to optical-use films for liquid-crystal displays. Poval is currently one of the Company's main sources of revenue. The persistence and commitment with which we strive to differentiate our

products is a unique characteristic of Kuraray. Offering effective solutions for global-scale challenges is currently a key theme driving our creation of new businesses. We are focusing our new business development in three core fields: environmental (water treatment, gas separation, etc.), energy (development of materials for photovoltaic cells, fuel cells, etc.) and the optical and electronics field (LED materials, illumination components, etc.). Success in new businesses requires more than simply possessing quality products and technologies. Backed by a clear understanding of market needs and effective operational organizations and structures that inspire and maximize the diverse talents of our staff, we aim to create new businesses which will rapidly become significant new revenue sources for the Company.

includes equipment and systems sales. Particular effort during the year focused on anaerobic and aerobic reactor equipment for the industrial wastewater treatment segment and recovery systems for silicon and other materials used in semiconductor manufacturing processes in the valuable substance recovery segment. In the seawater treatment segment, the Company continued its efforts for the development of ballast water management system\*, and exhibited the newly developed system at the SEA JAPAN 2010 International Maritime Exhibition in April.

## CORPORATE RESEARCH and DEVELOPMENT

(FY2009 R&D Expenses: ¥6,429 million)

Corporate R&D during the year focused on creating and fostering new businesses in the promising growth fields of electronic and optical materials, environmental, and energy fields. In April 2009, we established a new organizational operating matrix of research laboratories focused on cultivating and strengthening our technology platforms and project teams concentrating on accelerating product realization. The organization is designed to facilitate our research and development activities and commercialization.

In optical technology, we are applying our optical design and precision machining technologies to the development of LED backlit boards incorporating edge-lighting techniques. Highly

energy efficient, slim, and lightweight, this technology has growth potential in the LCD TV panel and lighting segments that utilize LED as a light source.

The Company used its accumulated expertise in polymerization and polymer alloy technologies to develop a new rigid acrylic-type film that is more resistant to cutting than acrylic films made from rubber compounds and also offers high transparency and discoloration resistance.

In the electronics field, we used our proprietary film-forming technology to develop the new VECSTAR line of liquid crystalline polymer film products offering superior heat resistance (necessary for high-temperature soldering processes) and optical reflectivity. The VECSTAR polymer film is also being developed for its superior electrical and low-moisture absorbency properties, which make it ideally suited for high-speed transmission and flexible printed circuit board applications.

In February 2010, the Company absorbed Kuraray Luminas Co., Ltd., which is involved in the development of inorganic electroluminescence (EL) materials and light-emitting elements, into its main business operation for the purpose of accelerating development of inorganic EL technology and related business areas by integrating Kuraray's development technology and sharing information on market trends.

### \*Ballast Water Management System (BWMS)

Kuraray's *MICROFADE* ballast water management system saves power and space and substantially reduces the volume of chemical agents used in the post-process sterilization of seawater to eliminate marine organisms by utilizing special high-precision filters for vastly improved organism removal in the front-end process.

Ballast water is seawater drawn into specialized tanks to maintain balance

on cargo ships, which often carry the water from a port in one country and discharge it in another. This practice has become an international issue, however, because it impacts ecosystems by introducing non-indigenous aquatic organisms contained within the ballast water. To address this problem, a binding international agreement has been adopted that is expected to make ballast water management systems mandatory for all ocean-going cargo ships in 2017.

#### Ballast Water Treatment Mechanism

