

Toray Industries, Inc.

FY 2011

# Intellectual Property Report

April 1, 2011 — March 31, 2012

**TORAY**

Innovation by Chemistry

# Introduction

Under “AP-Growth TORAY 2020,” a long-term corporate vision, Toray Group is expanding our Green Innovation Business that contributes to solving today’s increasingly critical global environmental problems as well as resource and energy problems. At the same time, we focus more closely on further expanding our global business as the economic scale of emerging countries is set to surpass that of developed countries. By doing so, we are aiming to efficiently seize business opportunities and become a “corporate group that continually increases revenues and profits.”

As the first stage of the “AP-Growth TORAY 2020” long-term corporate vision, we are promoting a medium-term management program, “Project AP-G 2013,” running over the three-year period from fiscal 2011.

The key principles of “Project AP-G 2013” are to seek business expansion in growth business fields and regions and to boost competitiveness through cost reduction. Grounded in this basic idea, we are taking on issues we have selected for each business and product, but we are also pursuing three cross-organizational projects: our “Green Innovation Business Expansion Project,” “Asia and Emerging Country Business Expansion Project” and “Total Cost Reduction Project.”

Among these, we believe that innovation of technologies through research and technological development will be indispensable in promoting the “Green Innovation Business Expansion (GR) Project.” Therefore, we also promote the strengthening of our intellectual property capabilities as a crucial theme of this project based on our belief that intellectual property capability is one of the keys to innovation of technologies through research and technological development activities. Also, strengthening global intellectual property capabilities and intellectual property management is a crucial issue in implementing the “Asia and Emerging Country Business Expansion (AE) Project.”

By adopting a trilateral integrated approach that incorporates its business strategies, R&D strategies and intellectual property strategies to realize sustainable growth, Toray Group will strive to realize our corporate philosophy of “Contributing to society through the creation of new value with innovative ideas, technologies and products,” while continually working to raise Toray Group’s corporate value.

## Contents

Overview of Toray Group .....	2
Main Businesses .....	2
I Core Technologies and Management Strategies .....	3
II Business Strategies and R&D Strategies .....	6
III Toray Group Intellectual Property Strategies .....	9
IV Analysis of the Marketability and Competitive Advantages of Technologies .....	12
V R&D and Intellectual Property Organization, R&D Collaboration and Partnerships .....	17
VI Guidelines on Procurement and Management of Intellectual Properties, Management of Trade Secrets, Prevention of Technology Leakage .....	20
VII Contribution of Licensing-related Activities to Businesses .....	20
VIII Valid and Enforceable Patents, Patent Applications, External Commendations .....	21
IX Policies for Intellectual Property Portfolio .....	24
X Information on Risk Response .....	24

# Overview of Toray Group

## ■ Corporate Outline (as of March 31, 2012)

Name: Toray Industries, Inc.  
 Established: January 1926  
 Paid-in Capital: ¥147,873 million

No. of Group companies: 143 [Parent company and consolidated subsidiaries (60 Japanese and 83 overseas consolidated subsidiaries)]

No. of employees: 40,227 (consolidated), 6,976 (non-consolidated)

## ■ Corporate Philosophy

### Corporate Philosophy

Contributing to society through the creation of new value with innovative ideas, technologies and products

### Corporate Missions

#### For society

To establish ties and develop mutual trust as a responsible corporate citizen

#### For our shareholders

To provide our shareholders with dependable and trustworthy management

#### For our customers

To provide new value to our customers through high-quality products and superior services

#### For our employees

To provide our employees with opportunities for self development in a challenging environment

### Corporate Guiding Principles

Safety and Environment	Placing top priority on safety, accident prevention and environmental preservation, ensuring the safety and health of our employees, our customers and local communities, and actively promoting environmental preservation
Ethics and Fairness	Obtaining the trust of society and meeting its expectations by acting fairly while maintaining high ethical standards and a strong sense of responsibility and maintaining transparency in management
Customer Focus	Providing customers with new values and solutions, and achieving sustainable growth together
Innovation	Achieving continuous innovation in all corporate activities, and aiming for dynamic evolution and growth
Fieldwork and Initiative	Strengthening fieldwork abilities and initiative, the foundations of our corporate activities, through consistent learning from one another and constant self-driven efforts
Global Competitiveness	Pursuing competitiveness through global top quality standards and cost management, and achieving growth and expansion in the global marketplace
Global Coalition	Developing global coalition through integrated internal linkages and strategic alliances with external parties
Emphasis on Human Resources	Providing an environment where employees find value in their work, and building positive, energetic relationships between people and the organization

# Main Businesses

## ■ Fibers & Textiles:

Filament yarns, staple fibers, spun yarns, woven and knitted fabrics of nylon, polyester and acrylics; non-woven fabrics; suede-texture artificial leather, apparel products, etc.

## ■ Plastics & Chemicals:

(Excludes films and plastic products included in IT-related Products segment, listed below) Nylon, ABS, PBT, PPS and other resins and molded products; polyolefin foam; polyester, polypropylene, PPS and other films and processed film products; raw materials for synthetic fibers and plastics; zeolite catalysts; fine chemicals such as raw materials for pharmaceuticals and agrochemicals; veterinary medicines, etc.

## ■ IT-related Products:

Films and plastic products for information- and telecommunication-related products; electronic circuit materials and semiconductor-related materials; color filters for LCDs and related materials; materials for plasma display panels; magnetic recording materials; graphic materials and IT-related equipment, etc.

## ■ Carbon Fiber Composite Materials:

Carbon fibers, carbon fiber composite materials and their molded products

## ■ Environment & Engineering:

Comprehensive engineering; condominiums; industrial equipment and machinery; environment-related equipment; water treatment membranes and related equipment; materials for housing, building and civil engineering applications, etc.

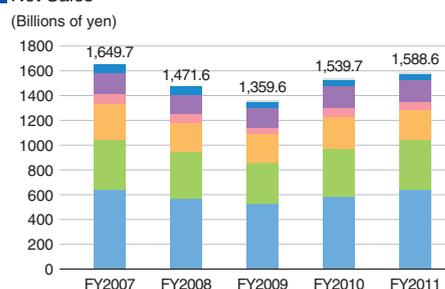
## ■ Life Science:

Pharmaceuticals; medical products, etc.

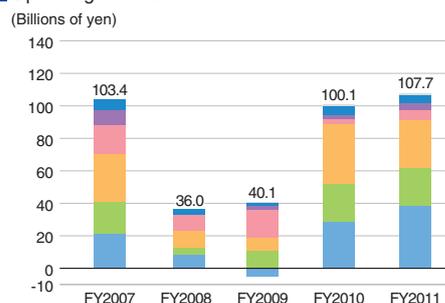
## ■ Others:

Analysis, physical evaluation, research and other services.

## ■ Net Sales



## ■ Operating Income



# I Core Technologies and Management Strategies

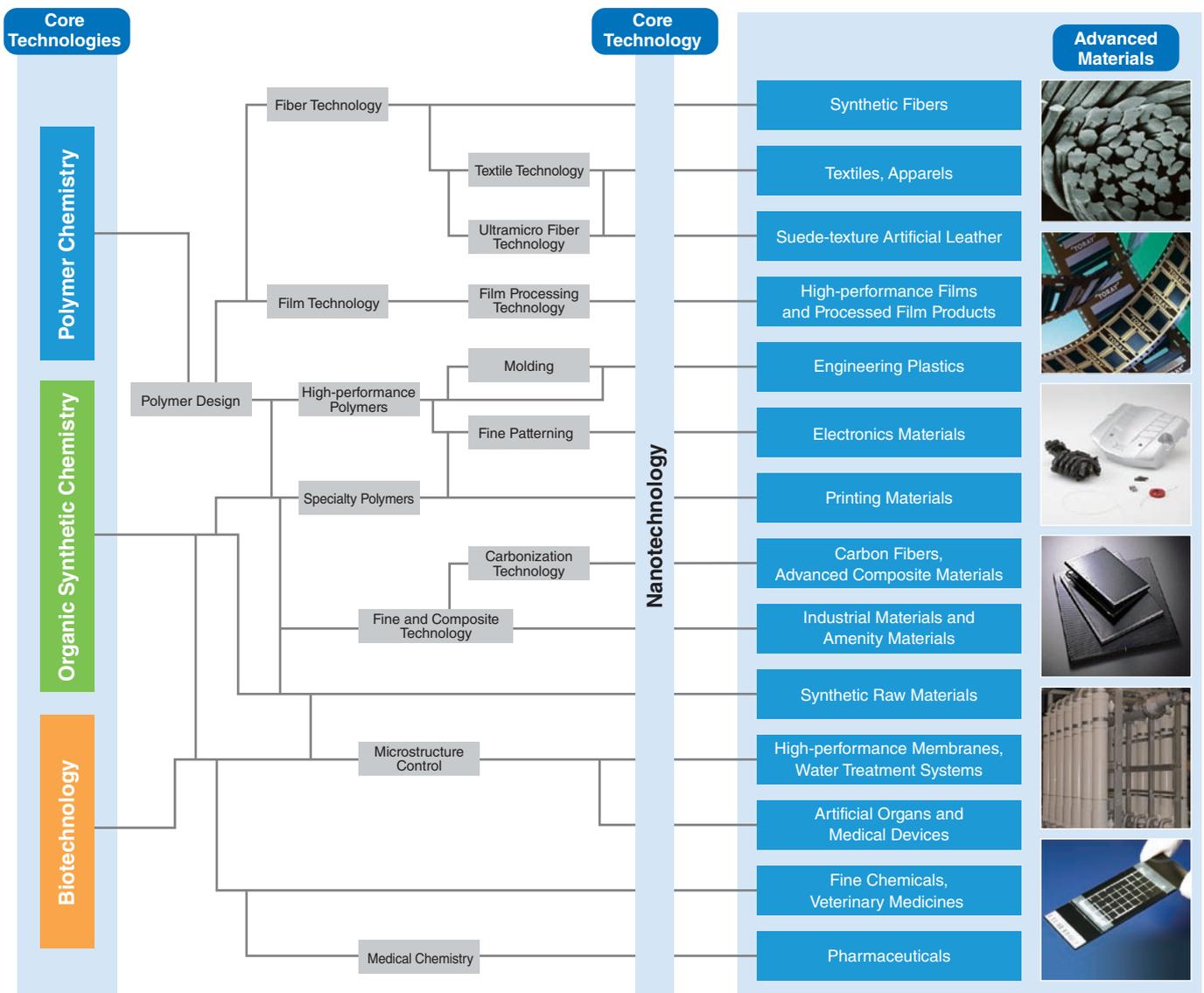
## 1 Core Technologies

Since its foundation, Toray has cultivated “organic synthetic chemistry,” “polymer chemistry” and “biotechnology” as core technologies. While developing these technologies, we have constantly expanded our businesses from fibers and textiles to films, chemicals and plastics. We have also developed businesses in the fields of electronics & information materials, carbon fiber composite materials, pharmaceuticals, medical products and water treatment. With the recent addition

of “nanotechnology,” we are now utilizing our four core technologies to develop and commercialize a diverse array of advanced materials for a wide range of industries.

Under the corporate slogan “Innovation by Chemistry,” Toray will continue striving to contribute to society through the creation of new value by using its four core technologies and their integrated technologies.

### ■ Toray Technologies and Businesses



# I Core Technologies and Management Strategies

## 2 Management Strategies

With Project IT-II, a medium-term management program, Toray overcame the economic crisis triggered by the collapse of Lehman Brothers in autumn 2008 and has significantly improved revenues since then.

In view of this achievement, in February 2011, Toray formulated the long-term corporate vision “AP-Growth TORAY 2020,” looking ahead to the next decade and a new medium-term management program, “Project AP-G 2013,” covering a three-year period.

In the “AP-Growth TORAY 2020” long-term corporate vision, we are aiming to become a “corporate group that continually increases revenues and profits,” a “corporate group that proactively contributes to social development and environmental stewardship” and a “corporate group that provides high value to all stakeholders” by further concentrating our efforts on expanding our Green Innovation Business that contributes to solving global environmental problems as well as resource and energy problems and further expanding our global business.

As the first stage of “AP-Growth TORAY 2020,” in April 2011 we began undertaking “Project AP-G 2013,” covering a three-

year period. In accordance with “Project AP-G 2013,” we are executing growth strategies needed for “business expansion in growth business fields and regions” based on the strong corporate structure we have built through IT-II reforms over the past two years. We will take advantage of the economic growth of Asia and emerging countries as well as expand existing businesses and create new businesses in four major growing business fields (environment, water-related and energy; information, telecommunications and electronics; automobiles and aircraft; and life science). Among these, Toray Group will focus on comprehensively and vigorously undertaking the so-called Green Innovation Business that contributes to solving environmental problems and resource and energy problems, which will become increasingly urgent and important as global-scale issues. At the same time, we will also focus on further strengthening our total cost competitiveness.

During the three-year period from fiscal 2011 through fiscal 2013 covered by “Project AP-G 2013,” we plan to allocate 350.0 billion yen for capital investments and 160.0 billion yen for R&D expenses.

### ■ Key Principle and Basic Strategies of “Project AP-G 2013” Medium-Term Management Program

#### Key Principle

Expand businesses in growth business fields and regions

Establish a robust business footing by cost reductions

#### Basic Strategies

1. Business expansion in growth business fields

5. R&D investment strategy

2. Business expansion in growth countries and regions

6. Developing and securing human resources

3. Capital investment strategy

7. Bolstering competitiveness

4. M&A and business alliance strategies

8. Ongoing promotion of business structure reform

# I Core Technologies and Management Strategies

As Group-wide, cross-organizational themes of “Project AP-G 2013,” we will comprehensively and proactively promote three projects, namely the “Green Innovation Business Expansion (GR) Project” that aims to expand business that contributes to solutions for global environmental issues and resource and energy issues; “Asia and Emerging Country Business

Expansion (AE) Project” that strives to take advantage of economic expansion in rapidly growing Asia and emerging countries and expand business in these countries and regions; and “Total Cost Reduction (TC-II) Project” to further reinforce our robust business footing.

## ■ Group-Wide Projects to be Promoted through “Project AP-G 2013”

### Green Innovation Business Expansion (GR) Project

Toray Group will use its “strengths in chemistry” to develop its Green Innovation Business on a global scale to provide solutions to global environmental issues and energy and resource issues, address the trend toward independence from petroleum resources and contribute to the realization of a sustainable low-carbon society.

### Asia and Emerging Country Business Expansion (AE) Project

Toray Group will seek to aggressively develop and expand business in Asia and emerging countries in other regions that are expected to realize major economic growth and take advantage of economic expansion in these countries and regions.

### Total Cost Reduction (TC-II) Project

Toray Group will continue cost-reduction initiatives to reinforce the robust business footing required to achieve its objective of becoming a corporate group that continually increases revenues and profits.

# II Business Strategies and R&D Strategies

## 1 Basic Strategies by Business Categories

As a common task for Toray Group, we are working to expand our advanced materials businesses and businesses (Green Innovation Business) that can contribute to solving global environmental problems as well as resource and energy problems, with our efforts focused on four major growing business fields (environment, water-related and energy; information, telecommunications and electronics; automobiles and aircraft; and life science). At the same time, we are promoting each business by implementing strategies appropriate for the business categories below. Traditionally, we have referred to our Fibers & Textiles and Plastics & Chemicals businesses as Foundation Businesses because these are positioned as stable businesses that support Toray's foundation. However, we have repositioned this category as Foundation Businesses that drive Toray's steady business growth. Similarly, we renamed the previous Strategically Developing Businesses as the Intensively Developing and Expanding Businesses because these are positioned as businesses for concentrated development and for expanding business.

The Fibers & Textiles and Plastics & Chemicals businesses,

positioned as Foundation Businesses, aim to actively expand business revenue and profits, mainly in growth business fields and regions, and will support a steady expansion of business for the entire Toray Group in the future.

IT-related Products and Carbon Fiber Composite Materials, designated as Strategically Expanding Businesses, strive to strategically and proactively expand business and drive a medium- and long-term expansion in revenue and profits by implementing measures that include intensively allocating management resources and strengthening responses to such growth markets as information and telecommunications, automobiles and aircraft, and new energy.

Life Science, which includes pharmaceuticals, medical products, and bio-tools, and Environment Businesses, centered on water treatment, are positioned as Intensively Developing and Expanding Businesses. We are making efforts to develop and expand these businesses through prioritized allocation of management resources to establish these businesses as our next pillar for revenue and profit growth to follow "Strategically Expanding Businesses."

### ■ Business Categories

#### Foundation Businesses

##### **Fibers & Textiles, Plastics & Chemicals**

Steadily drive business expansion and profit growth of the Group

#### Strategically Expanding Businesses

##### **IT-Related Products, Carbon Fiber Composite Materials**

Drive revenue and profit growth over the medium- and long-term and achieve strategic and aggressive business expansion

#### Intensively Developing and Expanding Businesses

##### **Environment (Water Treatment), Life Science**

Develop as the next driver for revenue and profit growth to follow IT-related products and carbon fiber composite materials

## II Business Strategies and R&D Strategies

### 2 R&D Segments

The research and development activities of Toray Group are divided into seven segments, one for each business domain, as follows: Fibers & Textiles; Resins & Chemicals; Films; Electronics & Information Related Products; Carbon Fiber Composite Materials; Life Science (pharmaceuticals and

medical products); and Water Treatment.

The “Business Categories, R&D Segments and Segments” chart shows the relationship between business categories and R&D / segments.

#### Relationship between Business Categories, R&D Segments and Segments

Business Categories	R&D Segments	Segments	Basic Materials	Advanced Materials
Foundation Businesses	Fibers & Textiles	Fibers & Textiles	Synthetic Fibers Resins Chemical Materials Films	High Function Fibers & Textiles
	Resins & Chemicals Films	Plastics & Chemicals		High Function Resins Functional Particles New Energy Materials
Strategically Expanding Businesses	Electronics & Information Related Products	IT-related Products		High Density Recording Materials High Function Films Display Materials Semiconductor-related Materials
	Carbon Fiber Composite Materials	Carbon Fiber Composite Materials		Carbon Fiber Composite Materials
Intensively Developing and Expanding Businesses	Life Science	Life Science		Pharmaceuticals and Medical Devices Bio-tools
	Water Treatment	Environment & Engineering		High Function Separation Membranes, etc.

### 3 Research and Development Strategies

Under our medium-term management program, “Project AP-G 2013,” which began in April 2011, we are conducting R&D in accordance with the following basic strategies.

- (1) We will contribute to the realization of a sustainable society by providing solutions to global-scale problems associated with the environment and an aging population with declining birthrates. These solutions will use the “power of chemistry” including the “polymer chemistry,” “organic synthetic chemistry,” “biotechnology” and “nanotechnology” we have cultivated since our founding. To do this, we will be a source of innovation derived from strong basic research with its core in five growth business fields: 1) making energy usage more efficient, 2) new energy resources, 3) bio-based polymers, 4) water treatment and 5) health care.
- (2) We have positioned the E&E Center (Environment & Energy Center) and the A&A Center (Automotive & Aircraft Center) as collaborative bases for technology development that are also open to outside institutions for the purpose of promoting Toray Group’s new growth strategies for

realizing a sustainable low-carbon society. These centers are promoting technological development that will drive a dramatic expansion of businesses in the fields of Environment and Energy and Automobiles and Aircraft.

- (3) We strive to create innovative solutions by promoting open innovation that straddles industry, government and academia and extends globally and further promote collaboration and integration of research efforts with external organizations.
- (4) We will strengthen the global development of R&D functions, collaborate with leading companies and institutions overseas, and utilize outstanding resources in each country and integrate different cultures to cultivate new research domains.
- (5) We will strategically promote patent rights for the results of our R&D investments with initiatives that include promoting intellectual property capabilities and promoting global patent applications that emphasize constraints.

## II Business Strategies and R&D Strategies

### 4 Scheme for R&D and Commercialization

Toray has consistently created and commercialized numerous advanced materials by utilizing strengths in R&D that include its 1) history and culture of creating innovative technologies (emphasis on basic research); 2) numerous specialist organizations; 3) integrated research and technological development organization; 4) technological integration through industry-government-academia joint research; and 5) advanced analytical capabilities (strong links to the Toray Research Center Inc.).

To fully utilize these strengths, since 1985 Toray has been building a “research and technological development organization centering on the Technology Center.” The role of the Center is to plan company-wide strategies and key projects for research and technological development.

Each research and technological development department conducts research and development in its own area of responsibility. At the same time, they collaborate with each other and integrate their technologies across

divisional boundaries in order to promote innovative research and deepen and deploy fundamental technologies, find solutions to urgent issues and take other pertinent actions. Additionally, utilizing high-caliber personnel, the development of global research bases is underway to further strengthen collaborations with advanced users and leading-edge research institutions worldwide.

To speed up all processes, from development to commercialization, we will enhance functions to support processing technologies, facilities and equipment technologies and management for our vital projects as we progress with the creation of large-scale businesses.

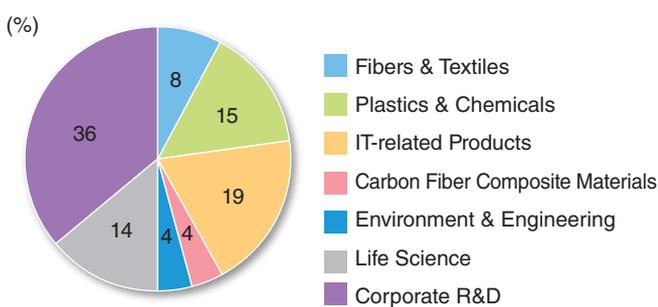
In undertaking the medium-term management program “Project AP-G 2013” to promote Toray Group’s new growth strategies for the realization of a sustainable and low-carbon society, we are bolstering initiatives for combining the total strengths of the Technology Center and for promoting collaboration and integrating research efforts.

### 5 R&D Expenditures

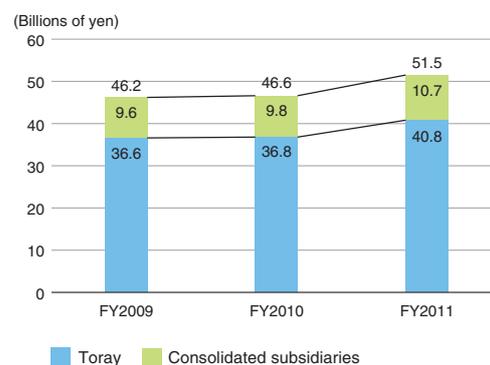
In FY 2011, Toray Group R&D expenses amounted to ¥51.5 billion (total R&D expenses of parent company Toray were ¥40.8 billion). By segment, we allocated 8% of these expenditures to Fibers & Textiles, 15% to Plastics & Chemicals

Chemicals, 19% to IT-related Products, 4% to Carbon Fiber Composite Materials, 14% to Life Science and 36% to corporate R&D (all percentages approximate).

■ FY 2011 R&D Expenses by Segment



■ R&D Expenditures (past three years)



# III Toray Group Intellectual Property Strategies

## 1 Basic Policies on Intellectual Property

Toray has formulated and executes the following four intellectual property strategies as its basic policies on intellectual property.

### (1) Intellectual property strategies, as a part of the strategy trinity, that conform to management principles

Toray regards intellectual property as one of its vital management resources. Based on this rationale, we believe that any intellectual property strategy cannot exist in isolation from business strategies and R&D strategies and that all three strategies must thus be mutually and organically integrated. Therefore, Toray has designated its intellectual property strategies as one of the most important elements of its management strategies.

### (2) Promoting the procurement of rights

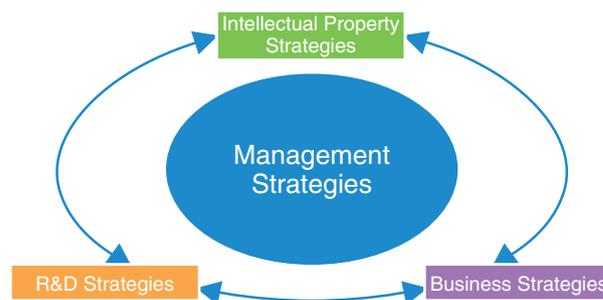
In terms of intellectual property, it is necessary to actively acquire patent rights to protect our products and technologies and ensure profits. Therefore, holding as many useful patent rights as possible and building patent portfolios are our most important tasks. At the same time, we also pay close attention to the efficient acquisition of patent rights by raising the quality of each patent and not making needless applications.

### (3) Respecting the rights of others

Executing business while infringing on the patent rights of other parties is not legally permissible. In keeping with the spirit of adhering to such related laws and ordinances, for many years Toray has operated a system for comprehensively investigating the relations between its own products and technologies and the patents owned by other companies, and we thoroughly educate employees to prevent infringement on the patent rights of other parties.

### (4) Rightful enforcement of our own rights

When Toray's patent rights are infringed upon by another party, we take proper steps by exercising our patent rights. We not only demand that infringement cease, but depending on the circumstances we also receive monetary profits from licensing as well as use our patent rights for cross-licensing with the patent rights of other parties.



## 2 Promotion of Patent Applications and Procurement of Patents in Line with Our Business Strategies

Toray Group focuses concerted efforts on obtaining patents in all of its R&D segments, with the key focus on advanced materials.

Toray has conventionally concentrated its patent applications and procurement of patents on synthetic fibers, films and engineering plastics in the basic materials businesses, which have led to high market share and profitability. In implementing the "Green Innovation Business Expansion (GR) Project" within the "Project AP-G 2013" medium-term management program, we are presently concentrating on patent applications and procurement of patents, particularly for businesses that provide solutions to problems that are increasingly urgent and important as global-scale issues, with focus on four major growing business fields (environment, water-related and energy; information, telecommunications and electronics; automobiles and aircraft; and life science). We are working to build patent portfolios with emphasis on these growth business fields. We expect the patent portfolios we build to support our businesses in these growth business fields in the future.

Additionally, we will build and execute intellectual property strategies that support business expansion in growth countries and regions and that facilitate the conducting of Toray Group R&D and businesses globally. Specifically, we will first of all promote Toray's overseas patent applications and patent procurements. In particular, under the "Asia and Emerging Country Business Expansion (AE) Project" within the "Project AP-G 2013" medium-term management program, we will proactively focus especially on patent applications and patent procurements in these regions where we aim to achieve business expansion in the future. In addition, we will promote patent applications and patent procurements from overseas affiliated companies to ensure the appropriate protection of inventions created in our R&D bases in each country under the promotion of globalization of our R&D.

In accordance with the intent of the "Total Cost Reduction (TC-II) Project" within the "Project AP-G 2013" medium-term management program, we are undertaking various initiatives detailed below for continuing to enhance efficiency and promote our patent capabilities.

# III Toray Group Intellectual Property Strategies

## 3 Selection and Concentration in Patent Administration

In the course of shifting to a "Selection and Concentration in Patent Administration" policy, Toray has designated "Rank-A Projects" as top priority issues in the administration of patents. Under this approach, we appoint a leader and supervising executive for each project and provide additional support through regularly scheduled follow-ups by technical division executives. The following three "Rank-A Projects" categories are currently being pursued.

- (1) "Rank-A Patent Procurement Projects," with the objective of establishing patent portfolios for new technologies and related peripheral technologies through applications and procurement of patents;
- (2) "Rank-A Defense Projects," targeting early clarification of relations with patent rights owned by other companies that are influential on Toray's important research and technology development, and prompt determination of countermeasures to address patents of other companies

- having a major impact on Toray's business; and
- (3) "Rank-A Rights Enforcement Projects," structured to cope with infringement of Toray patents by other companies through proper enforcement of Toray's rights, efforts to curb such infringement by other companies, and to obtain rightful compensation for practice of Toray's patented inventions by other companies.

Rank-A Projects are established in many technologies in major fields which are typified by advanced materials businesses in the four major growing business fields (environment, water-related and energy; information, telecommunications and electronics; automobiles and aircraft; and life science).

In filing new patent applications, including those covered by the Rank-A Projects, we stringently select inventions to file that can make contributions to Toray's business by means of strengthening collaboration between technical and/or sales and marketing departments, and the Intellectual Property Division.

## 4 Promotion of Patent Capabilities

To the present, Toray Group has been promoting its patent capabilities through initiatives to strengthen its research and technology foundation and has implemented such measures as increasing incentives, improving the quality of patents and enhancing and strengthening patent education.

Additionally, in keeping with the intent of the "Total Cost Reduction (TC-II) Project" within the "Project AP-G 2013" medium-term management program, we are carrying out new initiatives for curbing costs and promoting our patent capabilities.

### (1) Increasing incentives for inventions

For invention incentives, Toray has long maintained a compensation system for employee inventions. This system includes fixed-sum compensations at the time of patent application and registration (including overseas patents in both cases) and performance compensations based on profits acquired through the use of patented inventions and from license fees. However, we have revised these internal rules to effectively respond to the amended Patent Law as well as recent trends in court rulings in areas concerning employee inventions.

Through this type of flexible internal system, we are raising incentives for inventions to promote the creation of excellent inventions and thereby enhance Toray's competitiveness.

In FY 2006, we established an award system for not only inventors but also others in Toray who make a valuable contribution to patent-related activities. We expect that our multifaceted system of incentives will lead to further vitalization of activities related to intellectual properties. Many of our affiliated companies have a similar compensation system.

### (2) Improving the quality of patents

With a view toward the strict judgments rendered by courts and the Patent Office concerning inventive steps and quality of disclosure of patent specifications since around 2000, Toray believes that high-quality patents should have patentability that can stand up to such judgments, be easy to enforce at the same time and be useful as tools for executing business.

From this viewpoint, Toray not only conducts thorough prior art searches before filing patent applications, but also it provides inventors with opportunities to communicate with patent practitioners to perfect patent application documents, and with various tools to facilitate improvements in the quality of the documents. For example, prior art searches are undertaken by patent searchers assigned to technical departments charged with the primary role of patent searches.

Of particular note, we have enhanced education of the patent searchers and built a database for sharing know-how in performing searches more efficiently and thereby stringently selecting inventions for which to file patent applications based on their ability to stand up to the strict judgments of the Patent Office.

Our efforts extend beyond merely raising the quality of each individual patent and we have formulated and utilize the Manual for Building a Patent Portfolio that condenses know-how for raising the quality of the overall patent portfolio for protecting a specific theme.

To promote advantageous business development through the effective use of Toray's patents when another company enters one of our markets, we built a patent database arranged by product so that sales and marketing departments can easily ascertain Toray patents that could be used to defend against the entry of competitors.

# III Toray Group Intellectual Property Strategies

## (3) Enhancing and strengthening patent education

Multifaceted and multilevel education in patents is given to general managers through to new employees and frontline sales staff, with the aim of improving patent-consciousness and fostering practical skills of staff in the sales and marketing and technical departments.

To ensure the efficacy of this patent education, we conduct an annual Patent Operational Assessment Qualification Test for researchers and engineers. The test objectively assesses their legal knowledge of patents as well as practical skills. The results of the tests are reflected in the performance evaluations of employees working in technical areas.

## (4) Cultivating global human resources for intellectual property

Intellectual property-related problems are becoming increasingly sophisticated, complex and globalized, and the capability requirements of members of our Intellectual Property Division are thus becoming increasingly stringent.

Accordingly, to raise the legal and patent affairs capabilities of members of this division, Toray is encouraging the acquisition of a patent attorney qualification, which is a national license for handling procedures at the Patent Office and courts. Concurrently, to raise capabilities to deal with global issues as well as capabilities for supporting overseas affiliated companies, we are actively implementing such measures as providing support for strengthening the foreign language capabilities of staff and dispatching staff to overseas affiliated companies.

## 5 Brand Strategy

In proactively undertaking its corporate brand strategy, Toray Group exercises strict control over all intellectual properties that symbolize Toray Group corporate activities. The intellectual properties include the “Toray Industries, Inc.” company name, the **‘TORAY’** corporate symbol, the “Toray” business trademark and the corporate domain names such as “toray.co.jp” and “toray.com” which represent the significance of our corporate existence and our originality.

Toray Group strives to elicit accurate social evaluations of its corporate image in order to raise its aggregate corporate brand value, with the aim of enhancing employee engagement and customer confidence and bolstering its ability to attract outstanding personnel.

To this end, we pursue the following three initiatives.

- (1) Enhance employee brand awareness and employee loyalty.
- (2) Strengthen and use the appeal of our corporate brand and corporate image externally.
- (3) Clarify corporate brand targets and coordinate business domain brands and product brands.

The corporate symbol **‘TORAY’**, denoting the drive and spirit of Toray Group, expresses Toray’s willingness to communicate with internal and external members, together with its aspiration to excel as a distinctive presence within society. This symbol is registered as a trademark for the primary businesses of Toray Group in over 150 countries around the world for which we have established exclusive use

rights. We have also adopted stringent defensive measures to deal with unauthorized use by third parties.

One of our missions is to forge a broad understanding by society of Toray Group’s goals in preserving the global environment and contributing to the creation of a recycling-oriented society. To this end, we have established **ecodream** as a general brand name for all Toray Group Green Innovation business activities and products. Toray Group makes concerted efforts to enhance environmental preservation activities.

For fiscal 2012, we are considering a full-scale promotion of NANOALLOY® innovative microstructure control technology as a technology brand. It vastly enhances the characteristics of polymers by making nanometer-order alloys of multiple polymers. NANOALLOY® is a ground-breaking technology for which Toray holds the basic patent and major manufacturing and use patents, and we plan to follow a strategy of making the technology more visible and promoting it by developing the brand.

Toray Group has obtained and is properly managing some 1,200 product brands that are protected by approximately 9,800 trademark rights. In all of our businesses, we actively promote product brand strategies as an important part of strengthening our business foundation.

A collection of Toray’s logos for our main products is shown below.



# IV Analysis of the Marketability and Competitive Advantages of Technologies

## 'TORAY'

### Innovation by Chemistry

With "Innovation by Chemistry" as its corporate slogan, Toray Group creates innovative new materials and technologies based on the core technologies of organic synthetic chemistry, polymer chemistry, biotechnology and nanotechnology to create new value and offer it to society. Our perspective is to protect our planet and ensure safety and confidence for people's lives.

Toray Group has established the "AP-Growth TORAY 2020" long-term corporate vision and, to achieve it, the three-year medium-term management program, "Project AP-G 2013." We launched both in April 2011.

Under "Project AP-G 2013," we are strengthening our stable earnings foundation and pursuing expanded revenues and profits from the Foundation Businesses of Fibers & Textiles and Plastics & Chemicals, and undertaking a growth strategy focusing on business expansion in growth business fields and regions. Based on this growth strategy, we are endeavoring to capture the economic growth of Asia and emerging countries and expand business in four major growing business fields (environment, water-related and energy; information, telecommunications and electronics; automobiles and aircraft; and life science).

As part of this, Toray Group has launched the "Green Innovation Business Expansion (GR) Project" for contributing to solving environmental problems and resource and energy problems, which will become increasingly urgent and critical as global-scale issues, and is comprehensively and vigorously

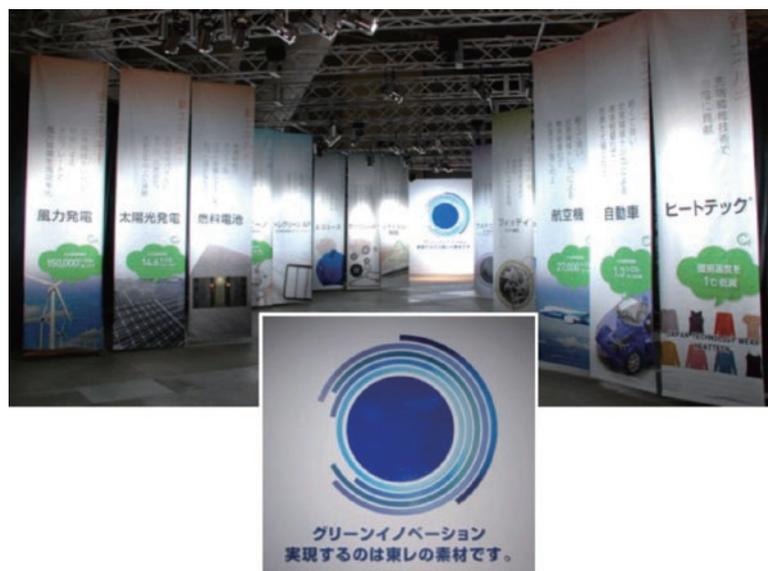
undertaking Green Innovation R&D (making energy usage more efficient, new energy resources, bio-based polymers and water treatment). We are pursuing technology and product development—with a target of increasing Toray Group products' contribution factor to reducing CO<sub>2</sub> (cumulative effect of reducing CO<sub>2</sub> emissions over the entire product life cycle) to 200 million tons/year by about 2020—and sales growth.

In September 2011, we held the Toray Advanced Materials Symposium at Tokyo International Forum on the theme of "Advanced Materials and Technologies for Sustainable Growth in the 21st Century." Charismatic guest lecturers from a number of core technology fields were invited, including Dr. Shinya Yamanaka, (known for his research on iPS cells), Dr. Takuzo Aida (who has researched Aqua Material, ultimate polymer materials made mostly of water), Dr. Robert H. Grubbs (authority on catalyst reactions and the 2005 Nobel Laureate in Chemistry) and Sir Harold W. Kroto (the 1996 Nobel Laureate in Chemistry for discovering fullerene carbon compounds). The event was enlivened by their presentations on the current state of and future trends in innovation with advanced materials and technologies.

Concurrently, we held the Toray Advanced Materials Exhibition 2011 in the exhibition hall at Tokyo International Forum. Following the theme "Green Innovation with Toray Materials," this event introduced visitors to Toray's advanced materials and technologies helping to solve global environmental problems and put the focus on Toray Group as the achiever of Green Innovation.

Based on the basic policy of LCM (Life Cycle Management), Toray Group conducts R&D focused on the development of a sustainable recycling-oriented society.

#### ■ Epilogue to Toray Advanced Materials Exhibition 2011



# IV Analysis of the Marketability and Competitive Advantages of Technologies

## 1 Fibers & Textiles

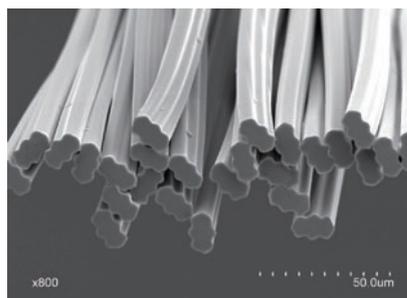
Toray has built a solid position in the Fibers & Textiles field, supplying a host of products—from filament yarns and staple fibers of three major synthetic fibers (nylon, polyester and acrylic) to textiles—for a wide range of applications from apparel to industrial. In this business field, we are strengthening our stable profit base and expanding profits as a Foundation Business. At the same time, R&D is focused on the creation and expansion of high-performance products and advanced fiber and textile materials by pursuing ultimate performance.

As achievements in this area, we have developed and begun sales of MICROMAFIN™, an ultrafine nylon fiber with a very smooth texture and delicate feel to the skin, and BODYCOOL™, a nylon microfiber with a flattened octofoil cross section, each yarn of which features minute surface asperities of a few microns, which rapidly wicks away moisture and feels cool on contact (the fiber does not cause the skin to feel clammy, leaving it feeling refreshed). Also, as the second new product utilizing the NANOMODY™, fiber modification technology through the use of nanotechnology, Toray established a basic post-processing technology that enables functional chemical molecules to penetrate and diffuse through the interior of polyester fibers, thus achieving excellent hydrolysis resistance that stands up to sterilization washing. Potential applications include use in uniforms.

Recently, our intensive pursuit of nanotechnology and precision multi-component fiber spinning technology has succeeded in creating “Innovative Nanofiber” technology that

forms fibers into unprecedented slender dimensions and shapes. We have created nanofibers of extreme thinness (300 nm class) that would have been considered impossible in the past, and modified cross sections ranging from perfectly round to irregular ones that are among the first of their kind in the world, including triangular and hexagonal cross sections. These offer exceptional moisture absorption and gas adsorption and can help improve the mechanical properties (elasticity and resilience) of woven and knitted fabrics, greatly diminish their surface friction and vastly enhance their wiping properties. Anticipated applications are in a wide range of areas, such as high-function apparel and materials, the latter including filters, medical materials and battery materials. Going forward, Toray will develop products and applications taking advantage of this “Innovative Nanofiber” technology, aiming for early commercialization.

### ■ BODYCOOL™ in Cross Section (Tufted Cloud Cross Section)



## 2 Resins & Chemicals

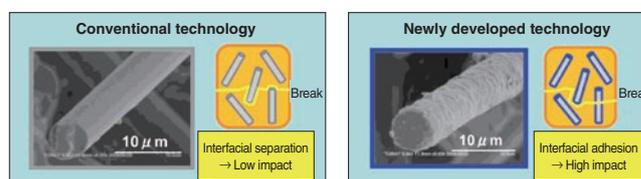
In plastic resins, Toray has exploited advances in polymerization and molecular designs, polymer alloys, composites, polymer processing and other fundamental technologies to achieve excellent performance and function in ABS (acrylonitrile butadiene styrene) resin, nylon resin, PBT (polybutylene terephthalate) resin, PPS (polyphenylene sulfide) resin, liquid-crystalline polyester resin and other engineering plastics. This is paving the way for the use of such plastics in electric and information devices, as well as automobile parts. In the field of chemicals, we offer chemical solutions that contribute to new product development and Toray Group's advanced materials through synthesis of carbon nanotubes (CNTs), polymer particles, fine polymers and so on, based on the fundamental technologies of organic synthesis, inorganic synthesis and catalysts.

As one result of these efforts, we aim to increase annual production capacity with 5,000 tons of TORELINA® PPS resin, to begin operating in January 2013. Here, polymer technology that reduces the amount of gas from the PPS resin by 60% will be applied. Less gas means less residue adhering to dies during molding, so customers can expect to do less die maintenance and enjoy higher productivity. Toray's annual

production capacity for PPS resin will rise to 19,000 tons.

One accomplishment recently came from the pursuit of nano-structure design control, which led to the development of a new carbon fiber and resin compositing technology for carbon fiber reinforced thermoplastics. Controlling the interface structure at the nano-level ensures interfacial adhesion of a higher level than ever and makes it possible to increase bending strength more than 30%. Using this new technology, we are developing carbon fiber reinforced pellets with PPS resin, PP resin and our proprietary NANOALLOY®, which combined with our lineup of nylon 6 and ABS resin carbon fiber reinforced pellets lets us offer a wide range of resin materials.

### ■ Wettability of Carbon Fiber and PP Resin



## IV Analysis of the Marketability and Competitive Advantages of Technologies

### 3 Films

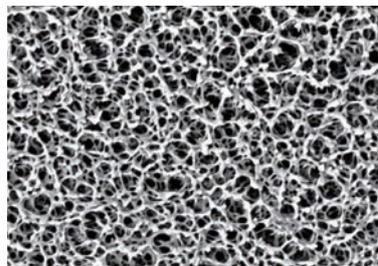
In films, Toray was the first in Japan to commercialize biaxially oriented polyester film and has been leading the world in the field of high-performance and high-function films by advancing the technologies of the polyester film together with biaxially oriented polypropylene film. We are also the global pioneer in the development and commercialization of biaxially oriented polyphenylene sulfide and aramid films. To date, we have utilized our original film thickness control technology; special drawing technology; surface forming technology backed by film laminating methods; coating, cleaning and static electricity control technologies; and NANOALLOY® technology. We have used these optimal functions to support various industrial applications in such areas as flat panel displays, packaging applications for retort foods and magnetic materials applications for computer memory backups.

As a recent achievement, our pursuit of aramid polymer molecular design technology and nano-scale phase separation structure design control technology has led to the successful development of microporous aramid film with high flame retardance and heat resistance that is among the world's best. The aramid microporous film so derived forms a highly uniform fine mesh structure. It has high porosity and its form, dimensions and pore structure remain the same even at a high

temperature of 200°C. Thus we are developing it primarily for applications in the energy field, such as separators for lithium ion secondary batteries for electric and hybrid electric vehicles.

We have also developed a fingerprint resistant film. Marks from fingers do not easily stick to this film, and even when they do, they are hard to be visible. The new film has a uniform layer of oil-repellent material, with a randomly nano-scale wrinkle structure on the surface. This makes the film more resistant to fingerprints than conventional technologies, while maintaining high transparency and sheen. Our aim is to achieve applications such as touch panels, decorative molding materials and more.

#### ■ Microporous Aramid Film Surface Photomicrograph



### 4 Electronics & Information Related Products

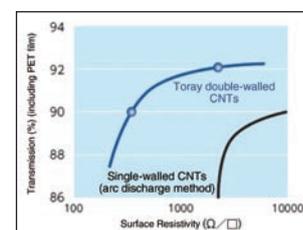
In Electronics & Information Related Products, Toray mobilizes its fundamental technologies in such areas as polymer design of thermal resistance and optical functionality, organic synthetics, particle dispersion, thin layer-film forming and photolithography to develop semiconductor buffer coatings, insulator and flexible substrate materials for optical devices and packaging, high-k insulator materials, ceramic substrate materials, color filters for liquid-crystal displays (LCDs), plasma display rear panel forming technology and organic electroluminescent (EL) light-emitting materials.

As a recent achievement, we established mass production technology for transparent conductive film consisting of a film evenly coated with double-walled CNTs (carbon nanotubes), intended for electronic paper applications such as e-book readers and digital signage. By polarizing treatment to the outer CNT layer, we have achieved uniform CNT dispersion without coagulation. The result is more than 90% light transmittance with enough conductivity for practical applications. The film also has greater flexibility than the currently common ITO (indium tin oxide) film, so that breakage is avoided even if the film is bent or stretched. Color reproduction as a display is also excellent, since the film itself is achromatic.

Also, our pursuit of polyimide molecular design technology and cross-linking technology has resulted in the successful development of low temperature curable positive-type photosensitive polyimide material, which is curable at 170°C, for next-generation semiconductor buffer coating applications. The material cures sufficiently at 170°C but does not react at the heat treatment temperature of 120°C, which is used for pattern processing. Residual stress after curing is reduced by half, which is expected to lead to semiconductors that are faster, finer and denser. Toray is stepping up the pace of application suggestions as we build up sales of the material as a new series in the PHOTONEECE® line of photosensitive polyimide coatings.

#### ■ Transparent Conductive Film

CNT Transparent Conductive Film    Transparent Conductivity



## IV Analysis of the Marketability and Competitive Advantages of Technologies

### 5 Carbon Fiber Composite Materials

Toray Group is the world's largest manufacturer of carbon fibers and supplies TORAYCA® carbon fibers and woven fabrics. We also supply intermediate materials such as prepregs and molding technologies of carbon fiber composite materials. Here, we target applications in the fields of aircraft, aerospace, sports equipment, civil engineering, construction, automobile, electronic & information devices and energy industry instruments. Under "Project AP-G 2013," this is a core business area for Green Innovation, which is contributing to global CO<sub>2</sub> reductions as it makes aircraft and automobiles lighter and therefore more fuel efficient, produces clean energy from windmills, and also reduces the weight of high-pressure tanks for natural gas and hydrogen.

In response to the expansion of carbon fiber composite materials, we will be investing a total of about 45 billion yen in four key regions (Japan, the United States, France and Republic of Korea) to add carbon fiber production equipment with 6,000 tons of annual capacity, with the new production starting up in turn from 2014 to 2015. This large increase in equipment will expand the Group's total annual production capacity to 27,100 tons, which will allow us to provide a stable supply for industrial and sports applications even as we supply more to the aviation industry now

#### ■ The TEEWAVE® AR1 and the Structure of the CFRP Monocoque



### 6 Life Science

In pharmaceuticals, Toray has commercialized the natural interferon beta product FERON™ (based on biotechnology) and the world's first oral prostacyclin derivative product DORNER® (based on organic synthesis technology). We furthermore developed TRK-820, an antipruritus drug that is a highly selective κ (kappa) opioid receptor agonist. Toray is an authorized manufacturer and dealer of the drug, which is sold in Japan through Torii Pharmaceutical Co., Ltd. under the trade name REMITCH®\* CAPSULES 2.5 μg, an oral antipruritus drug for hemodialysis patients.

One result of this is that Toray has signed an exclusive development and marketing license agreement for TRK-820 in North America with Mitsubishi Tanabe Pharma Corporation for antipruritic applications, and clinical development will begin for the treatment of hemodialysis-related pruritus. Toray has also signed a TRK-820 licensing agreement with Fresenius

that Boeing is ramping up production of the Boeing 787.

We have additionally conferred the title of "Toray Chair" on Professor Ignaas Verpoest, an international authority on composite materials at Katholieke Universiteit Leuven in Belgium, and have begun collaborative research with him on carbon fiber composite materials. This is aimed at accelerating Toray's R&D in Europe and will also boost Toray's international recognition, as Professor Verpoest will engage in activities under the Toray title.

A recent result was the completion of the TEEWAVE® AR1 next-generation electric concept car designed by Gordon Murray Design Limited, a world leader in automotive design (its founder, Gordon Murray, originally designed Formula One race car bodies). For the vehicle's structure, we adopted a resin transfer molding (RTM) monocoque made of carbon fiber reinforced plastics (CFRP). Each part is built to the optimal design (for example, the hood and roof are built of thermoplastic CFRP well suited for short-cycle molding), reducing body weight to about 975 kg, or only about two-thirds of the 1,520 kg in a conventional electric vehicle. Toray will continue to learn more by building the TEEWAVE® AR1 and pursue joint development with manufacturers of automobiles and their parts.

Medical Care AG & Co. KGaA of Germany, the world's largest provider of dialysis services and related devices. In Europe, where Toray has been developing the drug as an injectable solution instead of the oral agent, Fresenius Medical Care will exclusively market the product once Toray receives approval for it in the region.

Toray has also acquired 20% of the shares of MicroBiopharm Japan Co., Ltd., a subsidiary of Mitsui & Co., Ltd. MicroBiopharm Japan owns proprietary production technology created by combining biotechnology with fermentation technology. For Toray, this investment is an opportunity to discover new drugs and strengthen our manufacturing infrastructure.

In medical products, our offerings include FILTRYZER®, TORAYSULFONE® (hemodialysis membranes with excellent biocompatibility and biogenic substance separation function) and TORAYMYXIN® (hemoperfusion absorption column for

## IV Analysis of the Marketability and Competitive Advantages of Technologies

removing endotoxin). These unique products are earning high admiration for their quality and performance. Toray also owns the 3D-Gene<sup>®</sup> diagnostic protein analysis chip technology, which has a high degree of sensitivity to enable the easy detection of minute amounts of disease marker proteins in blood or urine.

One recent result is that Toray, working with Japan's National Cancer Center, developed an innovative method for identifying biomarkers in the blood. The method uses microRNA, small RNA molecules consisting of about 20 to 25 nucleotides, as biomarkers. When combined optimally with 3D-Gene<sup>®</sup> technology, the method can comprehensively detect the type and amount of microRNA, which is found in minute amounts in blood. Compared to current methods, diagnosis can be made easily and with high reproducibility and stability, thus boosting expectations for its use in clinical practice.

Toray has also successfully developed a ground-breaking antithrombogenic material for catheters (thin tubes for medical use) with a high degree of hemocompatibility by pursuing

functional polymer design technology and nanotechnology. Joint model testing by the Percutaneous Transvenous Mitral Commissurotomy (PTMC) Research Center and Kyoto University has proved that blood clot formation on the catheter surface is inhibited even if the catheter is left in more than 20 times as long time as conventional ones. Toray succeeded in dramatically improving hemocompatibility by localizing functional polymers that simultaneously block the adhesion of platelets to the devices and the activation of blood coagulation proteins, which are the main causes for blood clot formation.

\*\*REMITCH<sup>®</sup> is a registered trademark of Torii Pharmaceutical Co., Ltd.

### ■ REMITCH<sup>®</sup> CAPSULES 2.5 $\mu$ g



## 7 Environment/Water Treatment

To help solve water shortages and water pollution problems around the world, we are working in the water treatment field by developing reverse osmosis (RO), nanofiltration (NF), ultrafiltration (UF) and microfiltration (MF) membranes, based on organic synthetic chemistry, polymer chemistry and nanotechnology, for such uses as producing ultrapure water and seawater desalination achieved by making selective separation possible. We are also endeavoring globally to propose sustainable water resource systems.

One achievement is that Toray has won an order for RO membrane elements for a seawater desalination plant in Singapore. The plant will have the largest water production capacity in Asia outside of the Middle East and the latest order gives Toray an approximately 70% share of Singapore's tap water business market, a gain of about 10%.

Moreover, our "Advanced Reverse Osmosis Membrane with Fine Pore Structure: Development and Industrialization" won the 2010 award of the Society of Polymer Science, Japan. Our development of RO membranes with both excellent water permeability and boron and ion removal capabilities was praised for its technical ingenuity and innovation, social significance, market impact and ripple effect.

For Toray, the global environment is a pivotal part of our overall business strategy. As such, we are conducting R&D on biomass-origin polymers and expanding our business in biomass-origin materials, especially polylactic acid (PLA), in order to help achieve a sustainable low-carbon society.

As one accomplishment, Toray will begin joint research with Ajinomoto Co., Inc. on commercializing bio-based nylon. The 1,5-pentanediamine produced from plant materials by Ajinomoto will be polymerized by Toray to make a bio-based nylon. The two

companies have already carried out successful test production and are evaluating use of the material in fiber and resin applications.

One recent result has been Toray's successful test production, for the first time in the world, of fully renewable bio-based PET fiber. The raw material used in the process is completely bio-based para-xylene. It is synthesized by US-based Gevo, Inc., a leading renewable chemicals company. Though it is still at the laboratory level, we have polymerized fully renewable bio-based PET using as raw materials terephthalic acid derived from bio-based para-xylene and ethylene glycol made from commercially available bioethanol, and we have further deepened the new technology and successfully developed fiber material from it.

In new energy resources fields, such as components relating to photovoltaic modules, we are progressing with diverse research focused on the cells, back sheets and other solar materials, and their related equipment. Regarding cells, we combined our core technologies of polymer chemistry and organic synthetic chemistry to develop a new polymeric donor material, which is a key material in organic thin-film photovoltaic cells. We are also further accelerating our R&D on key materials for fuel cells and rechargeable lithium-ion batteries, which will be crucial components in next-generation automobiles.

### ■ Fully Renewable Bio-Based PET Fiber



# V R&D and Intellectual Property Organization, R&D Collaboration and Partnerships

## 1 R&D and Intellectual Property Organization

As of 1985, Toray has built a research and technological development organization centering on its Technology Center. The role of the Center is to draft company-wide strategies and key projects for research and technological development.

We are also reinforcing global research and technological development capabilities to deal with changes in the business environment in recent years, and further globalizing ourselves as the growth markets of emerging countries become more and more important. This means not just the type of business expansion that entails moving production from Japan, but transforming overseas bases into “independent development enterprises” that pursue development in line with local needs.

As our R&D is becoming increasingly global, so is our Intellectual Property Division. As an independent organization under the direct control of the President, the Intellectual Property Division is strengthening the intellectual property capacity of the entire Toray Group based on intellectual property strategies that are linked with management strategies.

### (1) Building our basic research structure

In 2010, Toray established the new Advanced Materials Research Laboratories within the Basic Research Center, which is the basic research department of the Research & Development Division. We set up four research units, namely, New Energy Materials, Bio-based Polymers, Advanced Medical Materials and Basic Polymer units. We also reorganized a portion of the research functions at three domestic bases (Shiga, Nagoya and Mishima) and at two overseas bases (Shanghai, China and Seoul, Republic of Korea) into the aforementioned units. At the Advanced Materials Research Laboratories, under our global “research unit” structure, we are striving to strengthen our basic research capabilities in “polymer chemistry,” which is one of our core technologies, and promoting basic research in next-generation advanced materials that will lead the paradigm shift in society that is typified by responses to global environmental issues as well as promoting basic research in polymers for creating epoch-making key materials. Specifically, we will engage in the creation of new energy materials such as innovative battery components as well as non-fossil-resource derived polymer materials and advanced medical materials and other innovative advanced materials. We will promote growth strategies needed for business expansion in growth business fields and regions under the medium-term management program “Project AP-G 2013.” We will take advantage of economic growth in Asia and emerging countries while creating new businesses particularly in four major growing business fields (environment, water-related and energy; information, telecommunications and electronics; automobiles and aircraft; and life science).

At the Basic Research Center, Toray will promote basic research in materials fields at the Advanced Materials Research Laboratories, basic research in biotechnology, nanotechnology

and fields where these are integrated at the New Frontiers Research Laboratories and groundbreaking drug discovery research at the Pharmaceutical Research Laboratories. Toray will strive to strengthen the Group’s basic research capabilities and will work to create innovative advanced materials.

### (2) Establishment of E&E Center as an integrated technology development base for accelerating Green Innovation

In January 2011, Toray established the E&E Center (Environment & Energy Center) as an integrated technology development base for environment and energy fields. In October 2011, the Environment and Energy Development Center was completed within the Seta Plant (Otsu, Shiga Prefecture) to serve as the core organization of the E&E Center.

The establishment of the E&E Center is a part of measures for accelerating Green Innovation at Toray Group, with focus particularly on reinforcement of research and technological development in the environment and energy fields. Toray positions the E&E Center as an integrated collaboration base in the environment and energy fields for the entire Group. It intends to strategically integrate the Group’s R&D functions in these fields to fundamentally bolster its technological development capabilities that leverage the overall Group strengths and push forward with the creation and expansion of new businesses.

E&E Center will collaborate with Toray’s Global Environment Business Strategic Planning Department established in 2009 under the direct control of the President and promote open innovation, a strategic imperative in these fields, to promote dynamic creation of new businesses and innovation of business models.

The priority theme of the core organization Environment and Energy Development Center is the creation and expansion of businesses for “new environment-related materials” such as biomass materials and energy-saving housing materials as well as innovative new components related to “new energy,” especially solar cells, fuel cells and lithium-ion batteries. The center will build a structure that enables functions ranging from planning of technological development strategy to technological development-related affairs and technical marketing in an integrated manner.

Along with A&A Center (Automotive & Aircraft Center) completed in April 2009, Toray positions E&E Center as Toray Group’s new growth engine for achieving a sustainable low-carbon society. Leveraging these centers, Toray will develop and expand businesses in advanced materials and technologies in the core fields of automobiles and aircraft as well as environment and energy.

### (3) Reform of R&D system in China

Toray has reformed our R&D bases in Shanghai and Nantong to strengthen the R&D system essential to growing our business in China.

We established headquarters for the Chinese R&D base Toray Fibers & Textiles Research Laboratories (China), or TFRC, in 2002

# V R&D and Intellectual Property Organization, R&D Collaboration and Partnerships

in Nantong, followed by a Shanghai branch in 2004, and have conducted R&D at these two locations since then. On January 1, 2012, we spun the Shanghai branch into an independent entity, known as Toray Advanced Materials Research Laboratories (China), or TARC. Thus research is taking place at the two companies TFRC (in Nantong City, Jiangsu) and TARC (Shanghai).

The chief functions of TARC are 1) to conduct R&D that will expand our Chinese business (i.e., provide product development and technical service for Chinese customers) as based on Group strategies in each business field except Fibers & Textiles, and additionally 2) to serve as the China branch of our Advanced Materials Research Laboratories (in Shiga), which performs basic research.

To promote further growth of Toray Group business in the Chinese market, which we expect to grow dramatically in the future, our local staff are paying close attention to Chinese customers' unique needs and working to develop new products and technologies suited to local needs. We are additionally strengthening our customer response with technological support. To do this, we are not only further strengthening research fields we have long engaged in (resins, films, water treatment, amenities, etc.), but also doing film processing research and starting new research and technological development services in carbon fiber

composite materials, electronics & information materials and so on.

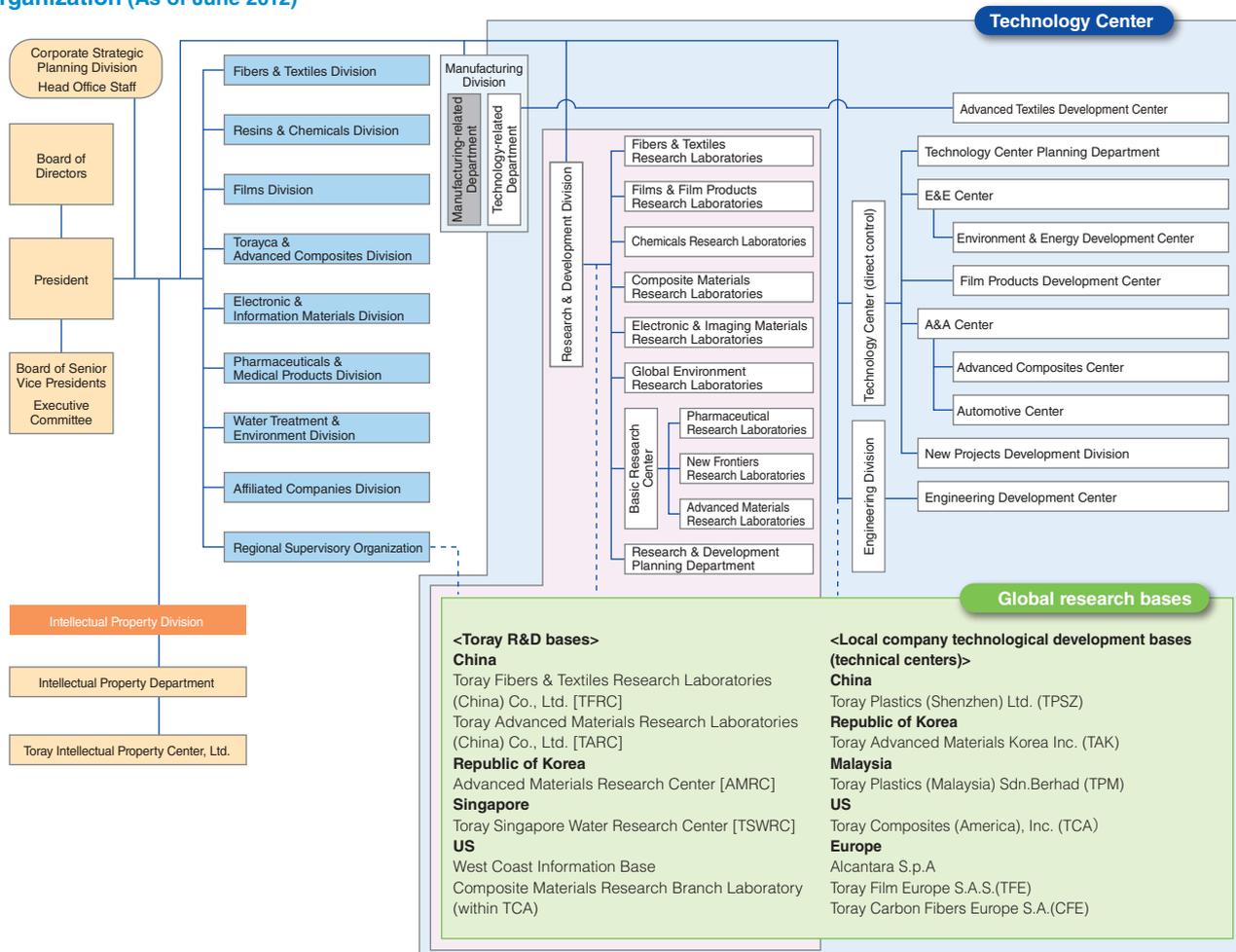
We hire excellent research talent from China to do basic research. They work closely with our Advanced Materials Research Laboratories in Japan to create advanced materials concerned with Green Innovation.

Because our Shanghai base offers relatively easy access to important Chinese customers and is close to elite universities, we will further strengthen its organization as an R&D center in China in fields other than fibers and textiles.

We are also enhancing TFRC and positioning it to specialize as a fiber and textile R&D base. Toray has established an organization in Nantong that brings production and R&D together, and we will take advantage of this integrated entity in our R&D.

In the medium-term management program "Project AP-G 2013" that we are currently pursuing, Toray seeks to turn itself into a corporate group with sustainably growing business revenues and profits. One of our basic strategies is charted in the "Asia and Emerging Country Business Expansion (AE) Project," which works to capture the growth of Asia and emerging countries in other areas where major growth is expected to occur. We are taking up the challenge of the AE Project in part through the recent reform of our R&D organization in China as we endeavor to expand business in fields and regions that will grow remarkably in future.

## Organization (As of June 2012)



# V R&D and Intellectual Property Organization, R&D Collaboration and Partnerships

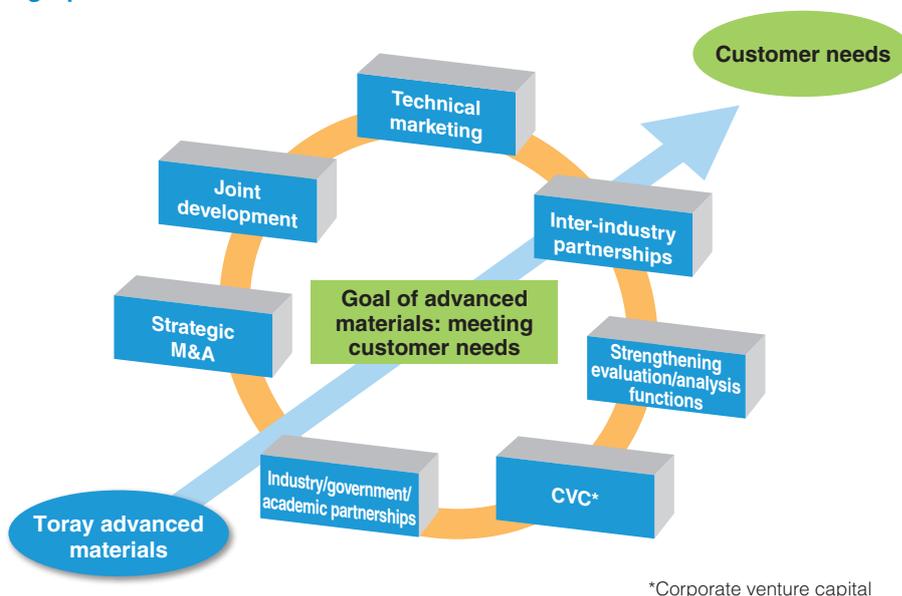
## 2 R&D Collaboration and Partnerships

Through open innovation, the practice of making full use of the advanced technologies we have developed and advanced materials we have created and working in partnership with a variety of organizations, Toray offers solutions to its customers. At the E&E Center and A&A Center, which were established as technological development bases in the growth fields of Environment and Energy and Automobiles and Aircraft, we bring together the Group's collective strength to conduct faster research and technological development and work with

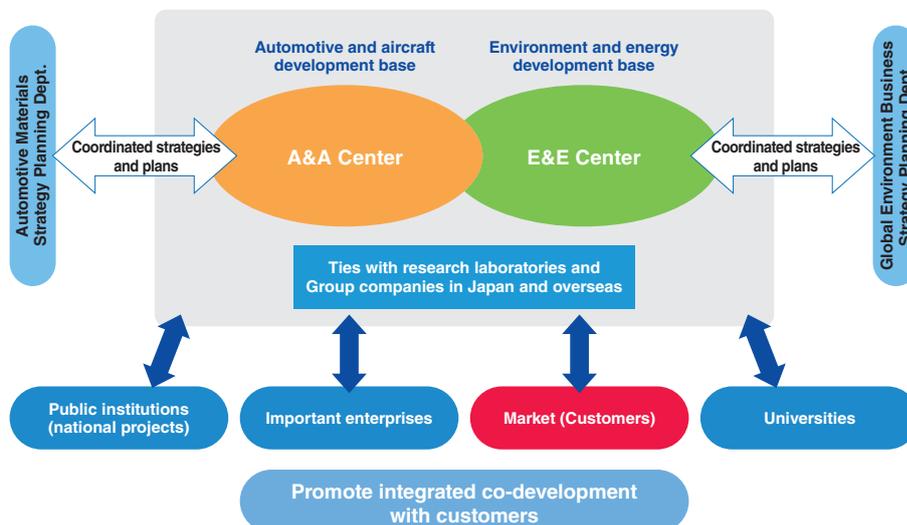
customers in development partnerships that facilitate new product development, commercialization and business growth.

In the area of biomass materials, research in fiscal 2011 resulted in the successful polymerization of fully renewable bio-based polyethylene terephthalate and test production of fiber and film from it in collaboration with US firm Gevo. Another result was the signing of a joint development agreement with Ajinomoto Co., Inc. to commercialize bio-based nylon.

### ■ Pursuing Open Innovation



### ■ Initiatives for Technology and Product Development at A&A Center and E&E Center



# VI Guidelines on Procurement and Management of Intellectual Properties, Management of Trade Secrets, Prevention of Technology Leakage

## 1 Procurement and Management of Intellectual Properties

For procurement and management of patents, Toray adheres to its Patent Management Regulations and Patent Management Standards. These rules are permanently accessible on our intranet. Trademarks are handled in a similar manner with internal rules, including Trademark Management Regulations; Trade Name, Corporate Symbol and Brand Management Regulations; and Trademark Management Standards. These rules are disclosed throughout Toray.

For patents, we have set up a patent committee within each business to discuss details and complete all required procedures. Participants in these committees are patent practitioners of Toray Intellectual Property Department and Toray Intellectual Property Center, Ltd., a subsidiary handling Toray Group's intellectual property issues, as well as members of the research, technology and business (sales) departments in each business sector. In this way, we adopt an integrated

approach to the management of intellectual properties, research development and business strategies.

The patent committees provide a particularly useful forum for making key policy decisions to determine the technological areas on which patent applications are focused, inventions for which applications should be filed, existing applications for which requests for examination are to be filed and patent rights that should be maintained or abandoned. Discussions likewise extend to the enforcement of existing patent rights and other key concerns.

We also established a brand committee system as the organization overseeing important trademarks and brands in our business fields. Members of the Toray Intellectual Property Department and other operational staff participate in managing brand strategies of each sales and marketing division.

## 2 Management of Trade Secrets and Prevention of Technology Leakage

In 2007, Toray established its own Confidential Information Management Regulations for making adjustments to previously existing information management systems. We took this step due to the need for measures to enable stricter and more systematic information management and to prevent information leakage in response to the growing needs for 1) prevention of unfair competition; 2) protection of personal information; 3) security trade administration; and 4) protection of classified information. We took this opportunity to also tighten our management of electronic information, which has become increasingly important to cope with risks in information leaks.

These additional measures supplement our existing Electronic Information Security Standards.

We also conduct regular internal audits and other measures to ensure the proper management of classified business information and technical information and prevent information leaks. Regular internal audits also permit effective management and prevent leakage of trade secrets. With the implementation of the Confidential Information Management Regulations, we have rearranged and strengthened details and are working to thoroughly manage and prevent the leakage of trade secrets and technical information.

# VII Contribution of Licensing-related Activities to Businesses

Toray Group actively promotes the procurement and enforcement of intellectual property rights as a way to distinguish its products and technologies and establish a competitive edge in the marketplace. At the same time, we consider cross-licensing as an important strategy in maintaining continuity and expanding the sphere of our business. As Toray promotes open innovation that globally

involves industry, government and academia, Toray will more than ever before utilize its intellectual property as extremely valuable tools to maintain its advantageous position.

Although generating income through licensing is not considered to be an optimal approach for doing business, it bears mentioning that patent fee revenues have constituted a profitable arm of our corporate operations for many years.

# VIII Valid and Enforceable Patents, Patent Applications, External Commendations

## 1 Valid and Enforceable Japanese Patents

(Total for Toray Industries, Inc. and 40 Japanese and overseas affiliates at the end of March 2012)

Toray Group takes an aggressive approach to obtaining patents with high potential for use in developing advanced materials, and will firmly maintain this stance in the future.

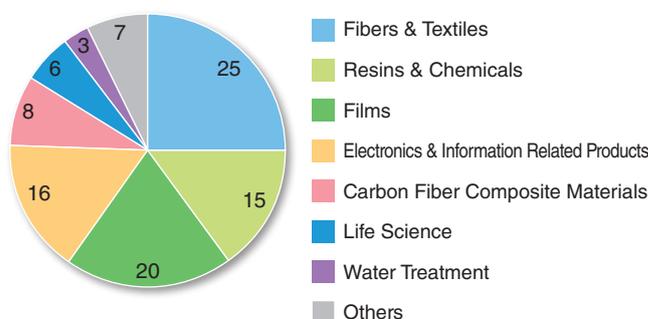
In recent years, we have engineered a pronounced shift in emphasis from quantity to quality, which translates into greater emphasis on improving the quality of patents. This has resulted in a more stringent focus on cost awareness and operational efficiency in determining whether or not to file patent applications or to file a request for examination for our patent

applications as well as when rendering judgments on whether to maintain or abandon existing patent rights.

At the end of March 2012, the number of valid and enforceable patents in Japan was 4,359, of which 1,808 (41.5%) were in current use within the Group; 1,879 (43.1%) were scheduled to be used in the future; and 672 (15.4%) were patents for defense and other purposes. The following chart breaks down these patents by specific R&D segment.

### Number of Valid and Enforceable Japanese Patents at the End of March 2012

Fibers & Textiles	1,095
Resins & Chemicals	656
Films	862
Electronics & Information Related Products	682
Carbon Fiber Composite Materials	362
Life Science	257
Water Treatment	140
Others	305
<b>Total</b>	<b>4,359</b>



## 2 Valid and Enforceable Foreign Patents

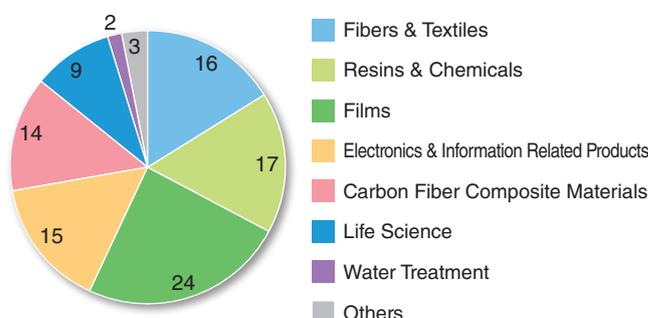
(Total for Toray Industries, Inc. and 40 Japanese and overseas affiliates at the end of March 2012)

At the end of March 2012, the number of our valid and enforceable patents in countries other than Japan was 4,468, with the following chart breaking down these patents by specific R&D segment.

The large proportion of foreign patents for Films, Carbon Fiber Composite Materials and Life Science compared with that of Japanese patents owned in those areas reflects Toray's goal of expanding its operations globally in these businesses.

### Number of Valid and Enforceable Foreign Patents at the End of March 2012

Fibers & Textiles	728
Resins & Chemicals	743
Films	1,081
Electronics & Information Related Products	681
Carbon Fiber Composite Materials	608
Life Science	417
Water Treatment	76
Others	134
<b>Total</b>	<b>4,468</b>



### 3 Japanese Patent Applications

(Total for Toray Industries, Inc. and 40 Japanese and overseas affiliates in FY 2011)

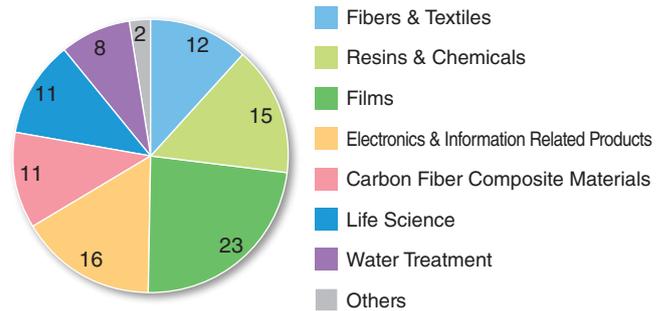
During FY 2011, the number of applications was 1,550, with the following chart breaking down these applications by R&D segment.

The relatively large proportion of patent applications in Films, Carbon Fiber Composite Materials, Life Science and

Water Treatment compared with that of the domestic patents owned in those areas reflects Toray Group's policy of actively applying for new patents in its Strategically Expanding Businesses and Strategically Developing Businesses.

#### Number of Japanese Patent Applications in FY 2011

Fibers & Textiles	182
Resins & Chemicals	236
Films	363
Electronics & Information Related Products	250
Carbon Fiber Composite Materials	178
Life Science	174
Water Treatment	130
Others	37
<b>Total</b>	<b>1,550</b>



### 4 Foreign Patent Applications

(Total for Toray Industries, Inc. and 40 Japanese and overseas affiliates in FY 2011)

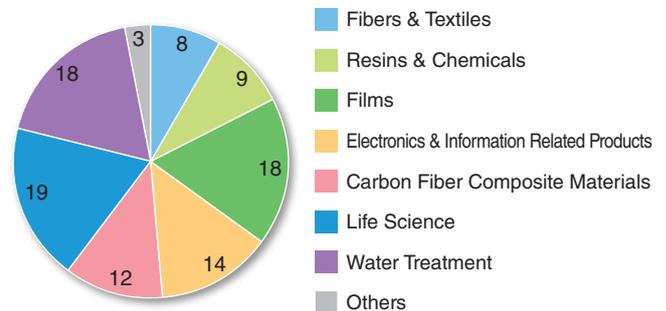
During FY 2011, the number of applications for overseas patents was 3,448, with the following chart breaking down these applications by R&D segment.

Particularly noteworthy, the relatively large proportion

of patent applications in Life Science and Water Treatment compared with domestic patent applications are an indication that we aim to expand our global business in these fields.

#### Number of Foreign Patent Applications in FY 2011

Fibers & Textiles	266
Resins & Chemicals	285
Films	557
Electronics & Information Related Products	428
Carbon Fiber Composite Materials	366
Life Science	587
Water Treatment	568
Others	91
<b>Total</b>	<b>3,148</b>



## 5 External Commendations

### ■ Commendations Received in FY 2011

#### Local Commendations for Invention

Commendation	Region	Subject of Commendation	R&D Segment
The Prize of the Director-General of Shikoku Bureau of Economy, Trade and Industry	Shikoku	Preform for fiber-reinforced composite materials	Carbon Fiber Composite Materials
The Encouragement Prize of the President of Japan Patent Attorneys Association	Kinki	Fashion materials with soft texture and windbreak performance	Fibers & Textiles
The Encouragement Prize for Invention	Kanto	DNA chip having columnar substrate structure	Life Science
The Encouragement Prize for Invention	Chubu	Carbon fiber reinforced base material	Carbon Fiber Composite Materials
The Encouragement Prize for Invention	Chubu	Dry-type high performance dialyzers for blood treatment	Life Science
The Encouragement Prize for Invention	Chubu	Method for producing polyamide	Resins & Chemicals

Toray received an Invention Prize at the National Commendation for Invention in fiscal 2012. It has now won such awards in three of the last four years, following the Prime Minister Prize in fiscal 2009 and the Prize of the Chairman of the Japan Chamber of Commerce and Industry in fiscal 2010.

#### Other External Accommodations

Commendation	Awarding Institution	Subject of Commendation	R&D Segment
Award of the Society of Polymer Science, Japan (Technology)	Society of Polymer Science, Japan	Advanced Reverse Osmosis Membrane with Fine Pore Structure: Development and Industrialization	Water Treatment
The 8th LCA Japan Forum METI Industrial Science and Technology Policy and Environment Bureau Director-General's Award	LCA Japan Forum	LCM-based environmental management promotion and technique diffusion	Shared
Cho-monodzukuri Grand Award Health and Medicine Equipment Components Award	Nikkan Kogyo Shimbun	"TORAYMYXIN®" PMX-01R	Life Science
Japan Society for Artificial Organs Technology Award	Japan Society for Artificial Organs	Antithrombogenic dialyzer	Life Science
The 20th Polymer Materials Forum Excellent Presentation Award	Society of Polymer Science, Japan	Creation of an antithrombogenic hollow fiber membrane	Life Science
The 42nd Senken Gosen Award Grand Prix	Senken Shimbun	Development and sale of complexed wool/polyester material with new feel	Fibers & Textiles
The 42nd Senken Gosen Award New Frontier Division Award	Senken Shimbun	Development and sale of material durable enough for sterilization washing	Fibers & Textiles
The 4th Monodzukuri Japan Grand Award Excellence Award	Ministry of Economy, Trade and Industry	Development of high-strength fine PPS staple fibers for bag filters	Fibers & Textiles
The 41st Japan Industrial Technology Grand Prize Prime Minister's Award	Nikkan Kogyo Shimbun	Development of carbon fiber and prepreg for Boeing 787	Carbon Fiber Composite Materials
The 26th Dokusosei o Hiraku Advanced Technology Award Special Award	FujiSankei Business i	R&D on A-VaRTM innovative forming technology for CFRP aircraft parts	Carbon Fiber Composite Materials

## IX Policies for Intellectual Property Portfolio

As noted in Part III of this report, Toray Group manages its intellectual property portfolio with a close eye on the future profitability and technical innovation of each technology and product.

We have established “Rank-A Projects” for technologies assigned particularly high importance, with invention

activities promoted on a prioritized basis. These projects promote activities of the formation of patent portfolios through the creation of patent maps to thoroughly comprehend technologies and patents of other companies, and establishment of subsequent strategies for enforcement of patent rights.

## X Information on Risk Response

As part of its defense-oriented intellectual property activities, Toray regularly researches and examines the patents of its competitors in each technology. Our policy likewise requires mandatory confirmation of competitors’ patents before any new product is commercialized and judgments of whether we might infringe on any of the patents. If any patents having an impact

on our business are identified, the next step is to plan and execute countermeasures to remove such impacts.

At the present time, there are no intellectual property related lawsuits in the courts deemed capable of having a serious impact on the business interests of Toray Group.

### Note

The plans, prospects and strategies referred to in this report are merely assumptions based on available information at the time of issuance of this report. They are subject to revision in the event of changes to Toray Group’s operating conditions, the emergence of new technical innovations and changes to the intellectual property environment.

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Contact us at: Toray Industries, Inc.

Investor Relations Department

1-1, Nihonbashi-Muromachi 2-chome, Chuo-ku, Tokyo 103-8666, Japan

Phone: +81-3-3245-5113

Fax: +81-3-3245-5459