

FY 2016

Intellectual Property Report

April 1, 2016 — March 31, 2017



Introduction

In February 2011, Toray Group formulated a long-term corporate vision called “AP-Growth TORAY 2020” (abbreviated as “Vision 2020”). It is a unified roadmap for management activities that focuses on the next roughly 10 years and seeks to ensure that we remain a corporate group of high value for all stakeholders that continually increases revenue and profit by actively fulfilling our role in social development and environmental stewardship. We implemented the medium-term management program, “Project AP-G 2013” that covered the three-year period beginning in FY 2011 as the first stage of the vision and had been promoting the medium-term management program, “Project AP-G 2016” since FY 2014 as the second stage.

In February 2017, we established the medium-term management program, “Project AP-G 2019” that covers the three-year period beginning in FY 2017 as the third stage of Vision 2020. Within “Project AP-G 2019,” there are three basic strategies. The first of these is “Business Expansion in Growth Business Fields,” under which we promote “Expansion of Green Innovation Business” and “Expansion of Life Innovation Business.” The second basic strategy, which targets our overseas business as a whole, is “Expansion and Advancement of Global Business,” under which we work to continually expand and advance our “AE (Asia, Americas, Europe, and Emerging Regions) Project.” The third basic strategy is “Strengthening Competitiveness,” under which we promote “Total Cost Reduction,” “Strengthening Corporate Structure” and “Strengthening Sales and Marketing.”

Among these, we believe that innovation of technologies through R&D will be indispensable in promoting the “Green Innovation Business Expansion (GR) Project” and the “Life Innovation Business Expansion (LI) Project.” Therefore, we also promote the strengthening of our intellectual property capabilities as a crucial theme of these projects. Also, strengthening global intellectual property capabilities and intellectual property management is a crucial issue in implementing the “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.

Toray Industries, Inc. President Akihiro Nikkaku serves as the chairman of the Committee on Intellectual Property of KEIDANREN (Japan Business Federation) and expert member of the Cabinet’s Intellectual Property Strategy Headquarters. He provides advice for Japan’s intellectual property policies and participated in the establishment of the government’s “Intellectual Property Strategic Program 2017” and has served as chairman of the Industrial Property Council since 2014. He will continue to engage in activities to promote intellectual property policies that will contribute to the enhancement of Japan’s industrial competitiveness.

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Overview of Toray Group

■ Corporate Outline (as of March 31, 2017)

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

No. of Group companies: 158 parent company and consolidated subsidiaries (60 Japanese and 98 overseas consolidated subsidiaries)
 No. of employees: 46,248 (consolidated), 7,220 (non-consolidated)

■ Corporate Philosophy

Corporate Philosophy

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

Corporate Missions



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; ultra-microfiber non-woven fabric with suede texture, 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; 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:

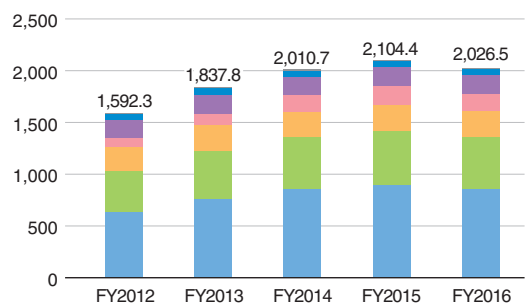
Pharmaceuticals, medical devices, etc.

■ Others:

Analysis, physical evaluation, research and other services, etc.

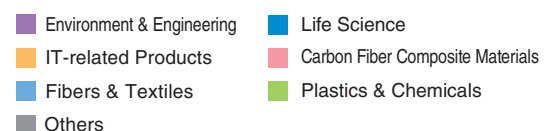
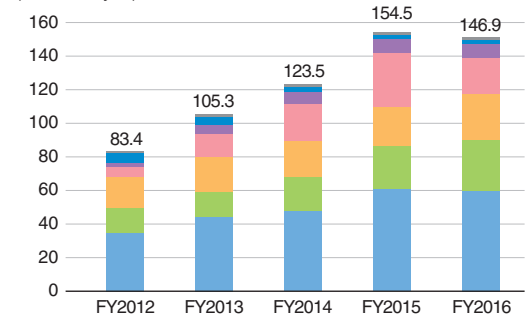
■ Net Sales

(Billions of yen)



■ Operating Income

(Billions of yen)



I Core Technologies and Management Strategies

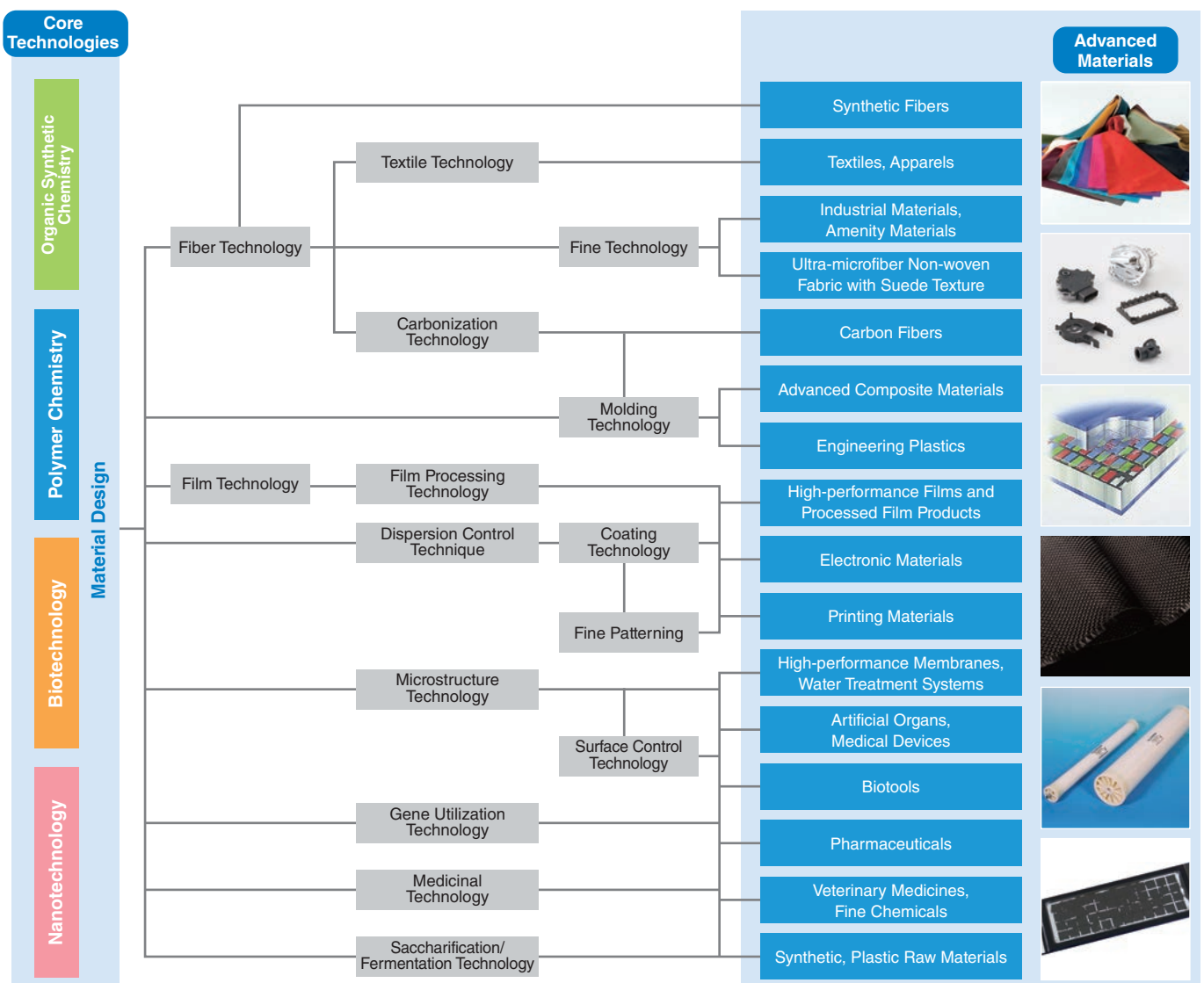
1 Core Technologies

Toray Group's core technologies are "organic synthetic chemistry," "polymer chemistry," "biotechnology" and "nanotechnology." Based on 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

devices and water treatment. At the same time, we are growing and combining these four core technologies to create and commercialize a diverse array of advanced materials.

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

Toray Group Technologies and Businesses



2 Management Strategies

In February 2011, Toray Group formulated the long-term corporate vision “AP-Growth TORAY 2020,” looking ahead to the next decade and a medium-term management program, “Project AP-G 2013,” covering the three-year period beginning in FY 2011, which served as the first stage. Since FY 2014, we have been promoting “Project AP-G 2016” as the second stage.

In the long-term corporate vision, “AP-Growth TORAY 2020”, we are aiming to become a “corporate group that continually increases revenues and profits” and a “corporate group that provides high value to all stakeholders” by promoting further global business expansion and pouring efforts into expanding the Green Innovation Business.

Under the medium-term management program, “Project AP-G 2016,” we worked comprehensively and vigorously

to implement our growth strategy and strengthen our corporate structure in the midst of major changes in domestic and overseas business environments. We also promoted investment in each business field to expand globally and were able to achieve steady results in R&D that will lead to the big new products and technologies of the future.

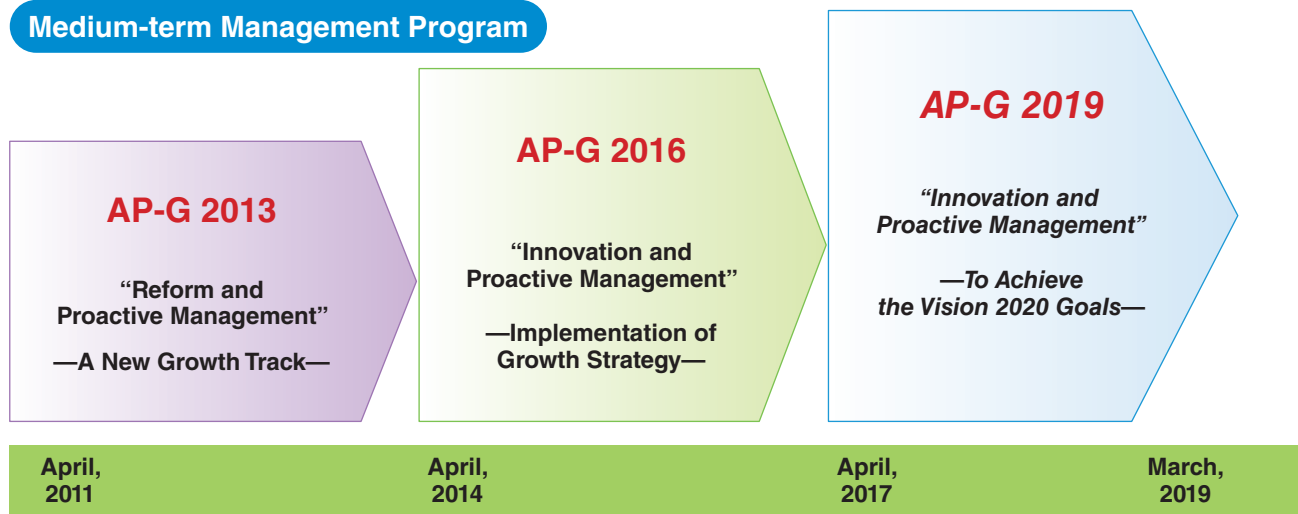
In February 2017, we established the new medium-term management program, “Project AP-G 2019” that covers the three-year period from FY 2017 to FY 2019 as the third stage of “AP-Growth TORAY 2020” and began working on it in April. Under “Project AP-G 2019,” we are continuing our previous efforts while also promoting new efforts in line with environmental changes to further enhance investment and R&D in the aim of business expansion.

■ Long-term Corporate Vision and Medium-term Management Program

Long-term Corporate Vision

AP-Growth TORAY 2020 (Vision 2020 (abbr.))

Medium-term Management Program



As Group-wide, cross-organizational themes of “Project AP-G 2019,” we are vigorously promoting four Group-wide 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; the “Life Innovation Business Expansion (LI) Project” that aims to expand business that improves healthcare quality, eases the burden on medical institutions, and contributes to health and longevity; the “AE (Asia, Americas Europe and Emerging Regions) Project” that aims to expand the global business by capturing opportunities for revenue and profit in growth countries and regions; and the “Total Cost Reduction (TC-III) Project” to ensure our robust business footing.

Up until FY 2016, Toray had been operating under a business structure consisting of six segments, namely Fibers & Textiles, Plastics & Chemicals, IT-related Products, Carbon Fiber Composite Materials, Environment & Engineering and Life Science. However, in recent years the growth fields that have gained public attention have been growing more diverse, so the ways the products of our Group are used are also becoming more diverse and complex. As such, we hope to establish appropriate management strategies and allocation of resources by adding new segment classifications. In conjunction with this, we will do away with the Plastics & Chemicals and IT-related Products segments as of FY 2017

and establish a new Performance Chemicals segment.

Up until now, we had categorized products for information and communication electronics like flat screen televisions, computers and smartphones as IT-related Products. At the same time, information and communication technology will progress dramatically in the years ahead, and against that backdrop, we believe that technologies like IoT, big data and AI will revolutionize society and industry. Products and technologies related to information, communication and electronics will become more deeply and widely integrated in the infrastructure that supports society and industry, and growth fields will diversify into transportation, environment, resources and energy, health and longevity, etc., so the applications of our Group products will also become increasingly diverse and complex. We determined that setting out from the starting point of IT-related Products will not keep us in step with the times when considering the direction in which things are heading.

Providing the new technologies and materials that will make revolution possible is a major business opportunity for Toray and will drive new growth. By diversifying the applications of the core technologies and business platform we have developed through our business expansion efforts within the IT-related Products segment, we will create new businesses and products and contribute to solving social challenges.

■ Segment Changes

Business Categories	Existing Segments	New Segments
Core Growth Driving Businesses	Fibers & Textiles	Fibers & Textiles
	Plastics & Chemicals	Performance Chemicals
Strategically Expanding Businesses	IT-related Products	
	Carbon Fiber Composite Materials	Carbon Fiber Composite Materials
Intensively Developing and Expanding Businesses	Environment & Engineering	Environment & Engineering
	Life Science	Life Science

See the URL below for details on “Project AP-G 2019.”
http://www.toray.com/ir/individual/ind_015.html

II Business Strategies and R&D Strategies

1 Basic Strategies by Business Category

The Fibers & Textiles Business and part of the Performance Chemicals Business, positioned as Core Growth Driving 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.

Performance Chemicals 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 automobiles and aircraft, and new energy.

Life Science, which includes pharmaceuticals, medical devices and biotools, 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.”

■ Basic Strategies by Business Category

Core Growth Driving Businesses

Fibers & Textiles and Part of Performance Chemicals

Steadily drive business expansion and profit growth of Toray Group

Strategically Expanding Businesses

Performance Chemicals, 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 the Strategically Expanding Businesses

2 R&D Segments

The R&D 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 devices); and Water Treatment.

The “Business Categories, Segments and R&D Segments” chart shows the relationship between business categories, segments and R&D segments. As of FY 2017, the Plastics & Chemicals and IT-related Products segments have been combined into the Performance Chemicals segment.

Relationship between Business Categories, Segments and R&D Segments

Business Categories	Segments	R&D Segments	Advanced Materials
Core Growth Driving Businesses	Fibers & Textiles	Fibers & Textiles	High-functional Fibers High-functional Textiles
	Performance Chemicals	Resins & Chemicals	High-functional Resins Functional Particles New Energy Materials
		Films	High Density Recording Materials High-functional Films Display Materials Semiconductor-related Materials
Strategically Expanding Businesses		Electronics & Information Related Products	
	Carbon Fiber Composite Materials	Carbon Fiber Composite Materials	Carbon Fiber Intermediate Materials Composites
Intensively Developing and Expanding Businesses	Life Science	Life Science	Pharmaceuticals and Medical Devices Biotools
	Environment & Engineering	Water Treatment	High-functional Separation Membranes, etc.

3 R&D Strategies

In the medium-term management program, “Project AP-G 2019” covering the three years from FY 2017 to FY 2019, we are prioritizing “Green Innovation” and “Life Innovation” and promoting the strategies below to create new technologies and materials and bring forth the intrinsic value of those technologies and materials.

- (1) During the three-year period from FY 2017 to FY 2019, we will invest ¥220 billion in R&D (with 50% going towards R&D related to “Green Innovation” and 25% towards “Life Innovation”).
- (2) We will accelerate collaboration between the Technology Center and the R&D teams of our subsidiaries and affiliated companies and promote technical collaboration

and personnel exchange between locations in order to maximize the efficiency of and results from R&D across the Toray Group.

- (3) We will strategically promote global intellectual property initiatives including strengthening of patent applications for intellectual property with an emphasis on defense, as well as strengthening of the barriers to entry by protecting our know-how.
- (4) We will implement pioneering research in pursuit of the ultimate *mono-zukuri* (manufacturing) to create the new materials, devices and systems that should be realized at the R&D Innovation Center for the Future that will be completed in 2019.

4 Scheme for R&D and Commercialization

Japan is a trade, manufacturing and scientific/technical innovation oriented nation. As such, the creation of new industries based on science and technology is essential for sustainable development in Japan. In order to create Japanese-style innovation, it will be necessary to maintain a way of doing things consistent with the characteristics of Japan and Japanese people rather than conforming to the Western way of doing things or current trends. Efforts from a long-term perspective based on a broad view of the times are important.

Since its foundation, Toray Group has adhered to the philosophy that “R & D is the key to the Toray of tomorrow.” With this in mind, we have consistently pursued R&D into advanced materials better matched with the demands of the times. Toray’s strengths which allow it to draw on its R&D capabilities are: 1) a history and culture of creating innovative technologies (with an emphasis on basic research); 2) engaging in long-term and persistent efforts to pursue advanced materials and technology to the limit; 3) having specialist organizations in numerous fields; 4) having an integrated R&D organization; 5) actively engaging in industry-government-academia joint research; 6) having strategic partnerships with industry leaders; and 7) possessing advanced analytical capabilities (with links to the Toray Research Center Inc.). These strengths have enabled us to develop and commercialize a wide range of advanced materials.

However, development and commercialization of materials takes a certain amount of time. For that reason, coming up with one theme after another, starting with a theme that will generate profit in the immediate future, and engaging in management centered on research and technological development from a long-term perspective, or pipeline management, is important.

Toray began full-scale research on carbon fibers in 1961. Commercial production was launched 10 years later in 1971, and today, the material is used in many aircraft, including Boeing 787 Dreamliners. Even as many overseas chemical companies withdrew from or downsized their development of carbon fibers, Toray saw their value as a material and created a business using them in applications such as fishing rods and golf shafts, persistently engaging in development while generating cash flows and honing the technology, seeing

their application in aircraft in the long term. The ability to see the value of such materials and maintain resolve is precisely what gives Toray its basic stance and strength in R&D. All of Toray Group’s R&D functions are consolidated into a single organization called the “Technology Center.” Experts from many fields come together at this “integrated R&D organization,” and this makes it easier for new technologies to be born from the fusion of technologies.

Moreover, this “integrated R&D organization” is able to exert collective strength by utilizing technology and knowledge from many fields to solve challenges affecting a single business field. It also has the characteristic of being able to quickly roll out various advanced materials and technology to multiple businesses.

Toray Group’s R&D team continues to use the catchphrase, “the Deeper, the Newer,” which is also the DNA of the Group’s researchers and engineers. This expression comes from Kyoshi Takahama, a Japanese poet from the early 20th century. The concept underlying the catchphrase is that when you dig deep into something, the result will be new discoveries and inventions. This concept is the essence of our pursuit of technology to the limit. Through extreme pursuit based on a broad view of the times and societal demands, we will produce innovations having social and economic value.

In order to protect production technology expertise and job creation, advanced materials created through R&D in Japan are first produced at Japanese plants. After that, products matching overseas demand are developed overseas based on the basic technology created in Japan for manufacture and sale overseas. The profit made overseas go back to advanced R&D in Japan to create the next advanced materials.

This cycle will enable sustainable growth through the fusion of Japanese-style innovation and global development.

In undertaking the medium-term management program “Project AP-G 2019” to promote Toray Group’s new growth strategies and placing further emphasis on the “Green Innovation” and “Life Innovation” businesses, 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 2016, Toray Group R&D expenses amounted to ¥59.2 billion (total R&D expenses of parent company Toray were ¥41.9 billion). By segment, we allocated 9% of these expenditures to Fibers & Textiles, 14% to Plastics & Chemicals,

19% to IT-related Products, 11% to Carbon Fiber Composite Materials, 5% to Environment & Engineering, 8% to Life Science and 34% to corporate R&D (all percentages approximate).

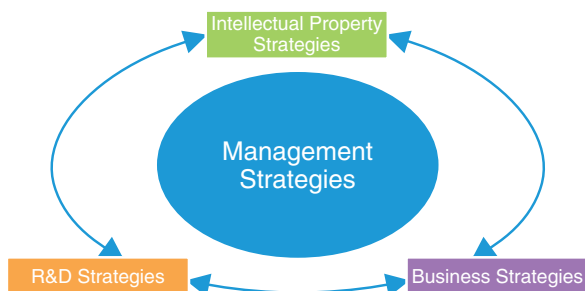
III Toray Group Intellectual Property Strategies

1 Basic Policies on Intellectual Property

Toray Group 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 Group 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, the Group 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 patent Toray Group's products and technologies and to 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 patenting by raising the quality of each patent and not making needless applications.

(3) Respecting the rights of others

Executing business while infringing on 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 patents owned by other companies, and we thoroughly educate employees to prevent infringement on patent rights of other parties.

(4) Rightful enforcement of our own rights

When the Toray Group'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 patent rights of other parties.

2 Intellectual Property Strategies in Line with Our Business Strategies

As one of the five key initiatives of the medium-term management program, "Project AP-G 2019," Toray Group has declared its intention to secure profitability by promoting the creation of innovative new technologies and materials with "Green Innovation" and "Life Innovation" as priority fields and initiatives to bring forth the inherent value of those technologies and materials. Specifically, we will promote intellectual property strategies consisting of the five points below in order to build barriers to entry that will protect those results and firmly maintain our technological advantage.

- 1) Promoting Toray Group's global intellectual property strategies
- 2) Firmly maintaining our technological advantage through strategic patent applications and other such efforts and rolling them out at subsidiaries and affiliated companies in Japan and overseas
- 3) Executing intellectual property strategies that are organically linked to our business
- 4) Strengthening utilization of our brand and trademarks
- 5) Developing human resources to support global intellectual property activities

We are vigorously promoting intellectual property activities as described below based on these strategies.

(1) Promoting Toray Group's global intellectual property strategies

As we always have, we will build and execute intellectual property strategies in cooperation with Toray Group R&D and businesses to support business expansion in growth countries and regions. Specifically, we will promote Toray's patent applications and patenting in countries other than Japan. In particular, under the "AE (Asia, Americas, Europe and Emerging Regions) Project" within the medium-term management program, "Project AP-G 2019," we will proactively focus especially on patent applications and patenting in these regions where we aim to achieve business expansion in the future. In addition, we will promote patent applications and patenting from overseas subsidiaries and affiliated companies to ensure the appropriate protection of inventions created in our R&D bases in each country, which are growing in importance with the globalization of our R&D.

We will also establish and promote Group-wide intellectual

property strategies for each business field. We will strengthen collaboration between companies within Toray Group and work to establish solid patent and trademark management systems at each company and strengthen them.

(2) Firmly maintaining our technological advantage through strategic patent applications and other such efforts and rolling them out at subsidiaries and affiliated companies in Japan and overseas

In the past, we primarily filed patent applications and established rights in our core growth driving business fields such as synthetic fibers, films and engineering plastics and enjoyed a high market share and profitability.

Today, in keeping with the “Green Innovation Business Expansion (GR) Project” and “Life Innovation Business Expansion (LI) Project,” which are part of the medium-term management program, “Project AP-G 2019,” we have placed emphasis on these two fields and enhanced our efforts at patent applications and patenting of rights. We are working to build patent portfolios with emphasis on these growth business fields. We expect the patent portfolios we build, together with avoiding careless disclosure of technical information through the publication of patent applications, to support our businesses in these growth business fields as a powerful barrier to entry in the future. We will also spread these efforts to our subsidiaries and affiliated companies in Japan and overseas.

(3) Executing intellectual property strategies that are organically linked to our business

Toray Group has been using intellectual property rights as a tool for giving our business an advantage by protecting the results of our R&D. Not only that, we will promote the execution of intellectual property strategies linked to our business, delving further into the individual challenges within individual business activities. Specifically, we will strengthen participation in the patent activities of business divisions and work on intellectual property education that includes patents and trademarks according to the needs of the individual business divisions.

(4) Strengthening utilization of our brand and trademarks

As described below, we aim to enhance the value of our technology through technology brands, including NANOALLOY™, an innovative microstructure control technology. Additionally, as online transactions rapidly increase even in the BtoB business field, imitations of Toray Group products are increasingly discovered, mainly online. We will deal strictly with imitation products and other infringements of our trademarks.

(5) Developing human resources to support global intellectual property activities

With respect to patent education, Toray carries out multifaceted and multilevel education for everyone from general managers and other management to new employees and front line sales representatives on domestic and overseas patent systems and practice for the purpose of improving patent consciousness within the sales and marketing and R&D departments and providing education for enhancing practical skills.

Additionally, to measure the effectiveness of patent education, we carry out annual “Patent Operational Assessment Qualification Test” to objectively evaluate the legal knowledge and practical skills of researchers and engineers with respect to patents. The results of these tests are reflected in personnel evaluations for technical staff.

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 subsidiaries and affiliated companies, we are actively implementing such measures as providing support for strengthening the foreign language capabilities of staff and dispatching staff to overseas subsidiaries and affiliated companies. As of March 31, 2017, Toray Intellectual Property Division (including Toray Intellectual Property Center, Ltd., a subsidiary that handles intellectual property issues) has 33 patent attorneys.

When it comes to our domestic and overseas subsidiaries and affiliated companies, we pour effort into education for a wide range of employees, from management to inventors, and specialized education for members of departments in charge of intellectual property.

We are also working to raise awareness of intellectual property at the corporate level in our subsidiaries and affiliated companies in Japan and overseas through education provided to the management and managers. Moreover, we will assign intellectual property specialists to companies actively engaging in R&D and work to improve education for researchers and engineers.

3 Selection and Concentration in Patent Administration

In accordance with the spirit of the “Total Cost Reduction (TC) Project” within the medium-term management program, “Project AP-G 2019,” we are engaged in various efforts as described below to enhance our patent capabilities while keeping cost-effectiveness in mind.

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 Patenting Projects,” with the objective of establishing patent portfolios for new technologies and related peripheral technologies through applications and patenting;
- (2) “Rank-A Defense Projects,” targeting early clarification of relations of patent rights owned by other companies

- with Toray’s important R&D, and prompt determination of countermeasures to address patents of other companies having a major impact on Toray’s business; and
- (3) “Rank-A Utilization of Rights Projects” structured to cope with infringement of our patents by other companies through proper enforcement of our rights, efforts to curb such infringement by other companies, and to obtain rightful compensation for practice of our patented inventions by other companies.

Rank-A Projects are established in many technologies in major fields which are typified by strategically expanding businesses and intensively developing and expanding businesses.

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

4 Increasing Incentives for Inventions

For employee 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 patents in countries other than Japan 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 Act as well as recent trends in court rulings in areas concerning employee inventions.

In conjunction with the 2015 amendment of the Patent Act, the compensation system has been changed to the reward

system as of fiscal 2016.

Through this kind of flexible system, we are promoting the creation of excellent inventions inspired by enhanced incentives to innovate and invent to 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 subsidiaries and affiliated companies have a similar compensation system.

5 Brand Strategy

Toray strictly controls the various corporate brands which represent our identification and originality, including the "Toray Industries, Inc." corporate name, its corporate symbol*, business trademarks "TORAY," etc., its domain names "toray.co.jp," "toray.com," and so on, as intellectual property that symbolizes Toray Group corporate activities. We make vigorous use of these names in our corporate brand strategy.

Toray Group is advancing a number of brand strategies to enhance employee engagement and customer confidence and strengthen our ability to attract outstanding personnel by enhancing the value of the corporate brand.

The quotation marks in Toray Group's corporate symbol* express our willingness to engage in dialogue with all of our stakeholders through our people, our products and our technology. The quotation marks also speak of our aspiration to excel as a distinctive presence within society. This corporate symbol is registered as a trademark for the primary businesses of the Group in nearly 150 countries around the world in which we have established exclusive use rights. We have also adopted stringent defensive measures to deal with unauthorized use by third parties.

In 2009, Toray Group pledged to move forward in its corporate activities by focusing its entire business strategy on the global environment. Since 2011, the Group has advanced its Green Innovation Business Expansion (GR) Project. In conjunction with this, the Group seeks to make society at large aware of Toray's contributions to environmental preservation and the goal of a low-carbon society through the ecodream™ brand, which is the business brand mark symbolizing Toray Group's GR products and activities.

On April 15, 2013, the ecodear™ brand, which is the all-encompassing brand for biomass-based polymer materials

and products, was established, and the Group announced an intensifying of global deployment. Additionally, on June 22, 2015, the Ecouse™ brand, which is the all-encompassing brand for recycled materials and products was established, and the Group announced that global deployment would begin in FY 2015.

The aim of setting up these business brands is to advance and establish Toray's strong determination to provide solutions to environmental issues through the active development of biomass materials and recycled materials/products in fibers, resins, films and a wide range of other business fields and expansion of such sales.

On October 9, 2012, Toray announced its first technology brand, NANOALLOY™, an innovative microstructure control technology that vastly enhances the characteristics of polymers by making nanometer-order alloys of multiple polymers. Toray has started the full-scale development of commercial products based on this technology (<http://nanoalloy.toray/en/>).

NANOALLOY™ is a ground-breaking technology for which Toray holds basic patents and major manufacturing and uses patents. We are moving ahead with a strategy of enhancing the brand value by making the technology more visible and by working with our partner companies that are using our materials based on this technology.

Toray Group has obtained some 1,400 product brands that are protected by approximately 11,000 trademark rights. We actively pursue our brand strategy to strengthen the underpinnings of each of our business while advancing the appropriate management of our trademarks for these individual product brands.

A collection of Toray's brands and logos is shown below.

*Corporate symbol

TORAY

GR products and activity brands

ecodream

LI products and activity brands

life
innovation

Other main brands

ecodear
Plant-based Product Solutions

ECOUSE

NANOALLOY
TECHNOLOGY

ultrasuede TORAYCON

Lumirror

PICASUS

HIGH-PERFORMANCE CARBON FIBER
TORAYCA

3D-Gene

torayvino

IV Analysis of the Marketability and Competitive Advantages of Technologies

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.



In October 2016, we held the Toray Advanced Materials Symposium 2016 at Tokyo International Forum with the theme of “Expanding Earth’s Future with Advanced Materials.”

Masayo Takahashi, Project Leader at the Laboratory for Retinal Regeneration Research of RIKEN Center for Developmental Biology, Greg Hyslop, CTO of Boeing, Hideo Hosono, Professor at Tokyo Institute of Technology, and Aaron Ciechanover, Professor at Technion – Israel Institute of Technology were invited as special lecturers and gave lectures on the current state and future trends of innovation originating from advanced materials and technology. The symposium was met with much enthusiasm.

We also held the Toray Advanced Materials Exhibition 2016 where we introduced Toray’s advanced materials and technologies that continue to meet the various needs of society with endless possibilities in fields from fashion to medical devices, energy, automobiles and aerospace with the theme of “Changing the World through Materials.”

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 and garment products—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 Core Growth Driving Business. At the same time, R&D is focused on the creation and expansion of high-functional products and advanced fiber and textile materials by pursuing ultimate performance.

As a result, we succeeded in creating the world’s first innovative monofilament manufacturing technology enabling cross-sectional shapes, which had been difficult to achieve up to that point, through our pursuit of the ultimate limits of monofilament manufacturing technology.

We also developed functional pants that provide appropriate support to the lumbar region when worn. The product has a lumbar protective belt made of Toray Nylon and polyurethane elastic fiber LYCRA™ Fiber, and the lower back side of the pants has a portion that hold the belt using the same materials. When worn, the protection belt fits over the

correct position, and does not slide up. It has a simple adjuster and can be easily loosened when not required.

Additionally, we developed MOIST+™, a textile that achieves greater comfort by reducing moisture and controlling static electricity. A special newly developed moisture absorbing and releasing polymer is used in the core, and a nylon polymer is used in the sheath to make a core-sheath conjugate fiber, providing roughly three times the moisture absorbing and releasing performance of regular nylon material.

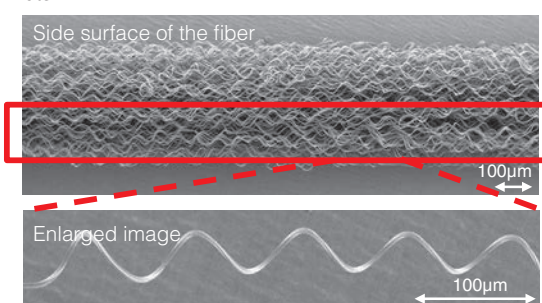
Moreover, we also developed a uts-FIT™ ultra-fine micro-crimped polyester textile offering compact bulkiness and elasticity along with the smoothness and flexibility of ultra-fine fiber. ust-FIT™ uses our proprietary ultra-fine fiber that has a bi-component structure while maintaining an ultra-fine thickness of 0.19T made possible using NANODESIGN™ innovative composite spinning technology which realizes unrestricted and advanced control of the cross-sectional form of the complex fiber.

Furthermore, we also developed TECHNOCLEAN™ EX, offering the natural and soft texture of natural fiber through the use of staple fibers as a new variation of our TECHNOCLEAN™ soil resistant textile that features both soil resistance and world-

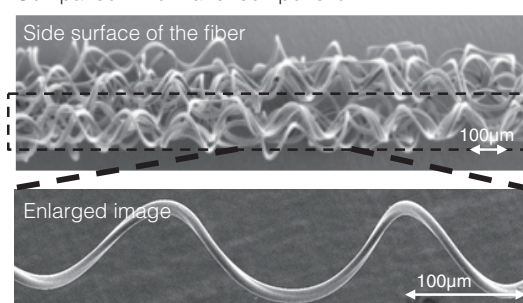
■ NANODESIGN™ innovative composite spinning technology

(Left) uts-FIT™ ultra-fine micro-crimped polyester textile;
(Right) Lateral photograph of a comparative technology (normal bi-component)

uts-FIT™



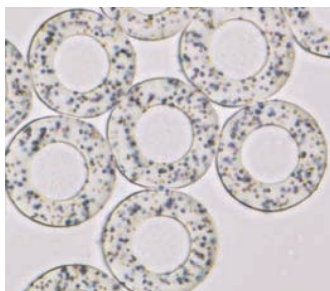
Comparison: Normal bi-component



class ease of cleaning. It was launched in January 2017.

Finally, to strengthen development of materials for hygiene applications, we made the decision to install spunbond fabric development equipment in Japan. We installed the proprietary equipment on the premises of the Toray Shiga Plant, and the plan is to commission it in November 2017.

■ MOIST+™ fiber cross section



■ Lumbar support pants: Nursing care/medical welfare type



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.

An example of recent results is our development of a pliable and tough polymer material with a movable cross-link polymer structure where the molecular bond slides, as part of the R&D program of Kozo Ito, manager of the ImPACT innovative R&D promotion program. By applying NANOALLOY™ technology in addition to molecular design,

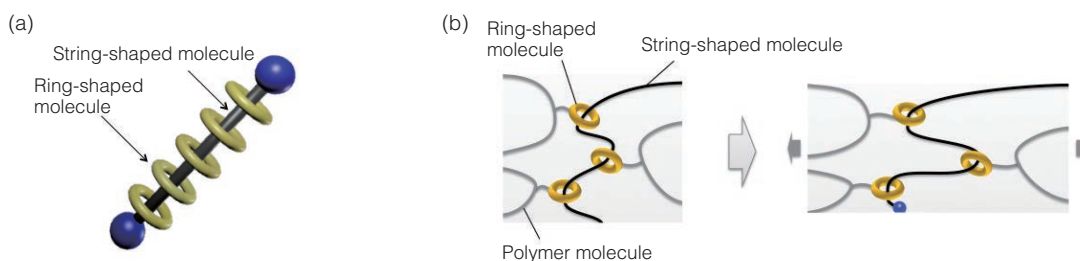
we succeeded in the world's first implementation of a movable cross-link polymer structure in polymer material, achieving roughly six times the breaking elongation and 20 times the bending durability of conventional materials.

Additionally, we acquired large 3D suction blow molding machines from Germany-based Kautex Maschinenbau GmbH to enhance the turbo duct material and mold processing technology used in turbocharged vehicles and launched full-scale operations in October 2016.

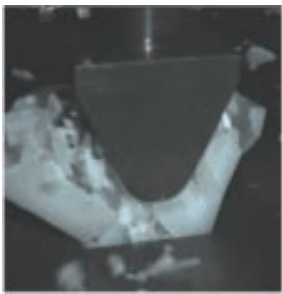
Moreover, the Bangkok Plant of our Thai subsidiary Thai Toray Synthetics (TTS), which is its resin compounding base, installed new PPS resin compounding production facilities and launched full-scale operations in October 2016. Furthermore, at the Resin Technical Center opened within TTS's Bangkok Plant in 2013, an injection molding machine for nylon and PBT resins, an injection molding machine for PPS resin and secondary evaluation equipment necessary for development were newly installed.

We also made the decision to increase our production capacity for TORAYPEF™ polyolefin foam, which is manufactured by Toray Plastics (America), Inc.

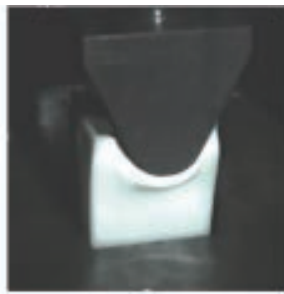
- (a) Diagram of polyrotaxane molecule. Its structure is such that a string-shaped molecule passes through a ring-shaped molecule. (b) Diagram of movable cross-link polymer structure crosslinking polyrotaxane. By stretching it, the ring-shaped molecule slides along the string-shaped molecule.



■ Impact test using box-shaped molded product. A weight was dropped from a height of two meters. The polyamide broke without changing shape, while the developed material changed shapes and absorbed the energy.



Polyamide



Developed material

3 Films

In films, Toray was the first in Japan to commercialize biaxially oriented polyester and polypropylene films and has been leading the world in the field of high-performance and high-function films. 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 recording material applications for computer memory backups.

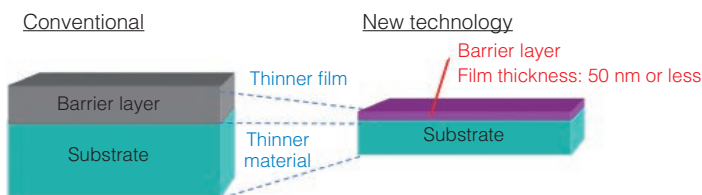
Recent results include our development of a high-barrier film with improved flexibility while maintaining the same level of vapor barrier as our current product based on our proprietary barrier film forming technology. By developing a flexible material and promoting refinement of barrier film, it was possible to substantially reduce the thickness of the

barrier film while maintaining the same level of moisture vapor transmission (10^{-4} [g/m²·day]) as current products.

We also developed a high-performance PPS film with the highest level of dielectric constant (1.9) in the world among high durability/fire-resistant film while maintaining the superior properties of PPS polymers, including heat-resistance, fire-resistance and chemical-resistance. Developing new mixing technology and high heat-resistant particle surface modification technology, we succeeded in greatly reducing coagulation when adding particles.

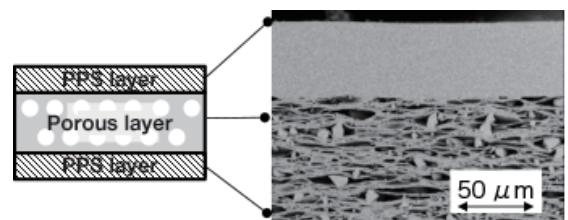
Toray Engineering Co., Ltd. provides products and services for film manufacturing and processing equipment and developed a thin-layer processing roll to roll compatible laser patterning device as a patterning device that processes thin layers for the printed electronics field. We also developed a new small single-wafer processing heat imprint device for R&D/small lot production and launched sales in April 2016. Furthermore, we installed double-width roll to roll barrier film forming equipment at the Toray Shiga Plant and began providing customer test support.

■ Technical concept and characteristics of barrier film



	Conventional barrier film		New technology
Barrier layer thickness	Current film thickness	50 nm	50 nm or less
Barrier 10^{-4} g/m ² /day	○	×	○
Bending resistance \leq R1mm	△	○	○
Thin film (curl)	×	○	○

■ High-performance PPS film



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) and OLED materials.

As a result, we received the 63rd (2016) Okochi Memorial Production Prize from the Okochi Memorial Foundation. Winning this award was a testament to advances made in the photosensitive polyimide technology we have cultivated over the years and how we developed positive photosensitive polyimide material that greatly improved the light emitting reliability of OLED displays and the productivity of the panels and established the production technology.

We also developed a very low refractive coating with excellent anti-reflection properties. Using polysiloxane, a transparent polymer with high heat resistance, application of molecular design technology and improvement of nanocomposite technology allowed us to achieve a very low refractivity of 1.33 with advanced flowability control.

Additionally, with the application of "Toray waterless plates" and newly developed hydrophilic polymers, we developed

a waterless UV printing system that uses water-soluble ink, the ultimate eco-friendly printing method that uses no volatile organic solvents. The ink contains no volatile organic solvents and is water soluble, so it can be washed off with water-based detergent, making it possible to reduce the discharge and use of volatile organic solvents generated in the printing process.

Furthermore, we developed a graphene conductive assistant for lithium ion batteries capable of stable dispersion while maintaining a very thin form using our proprietary surface treatment technology. Applying our proprietary surface treatment that improves solvent compatibility to the graphene surface makes stable dispersion within the solvent possible.

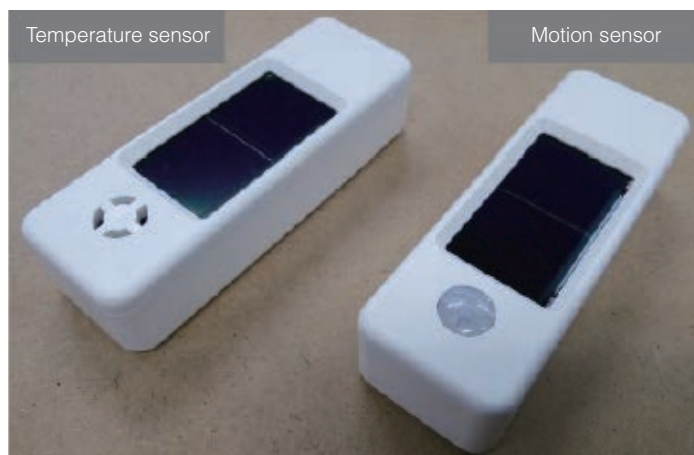
We also achieved electron mobility of 81 cm²/Vs in semiconductor-type single-walled carbon nanotubes (CNTs), twice the previous highest mobility in the world for coated-type semiconductors. We were the first in the world to demonstrate the possibility of low-cost manufacturing with coating technology.

Finally, we also developed an organic thin-layer solar cell module for wireless sensors, forming a process enabling application including synthesis technology for high quality power generating materials and use of non-chlorine-containing film-forming solvents based on organic thin-layer solar cells that have already achieved world-class conversion efficiency of more than 10% for sunlight and more than 20% for indoor light as a single-layer element.

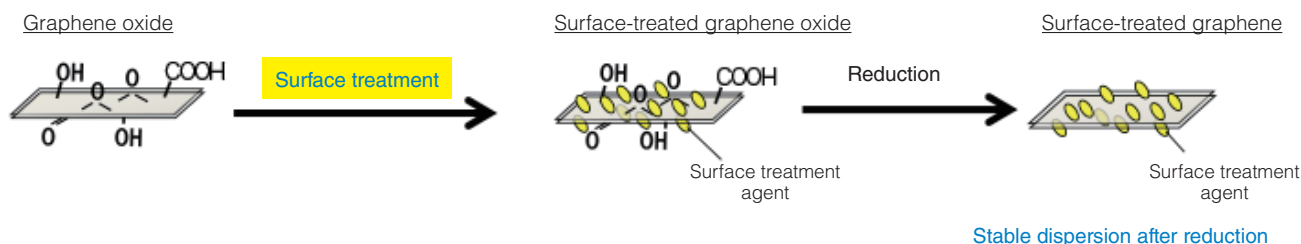
Okochi Memorial Production Prize Ceremony



Wireless sensor prototypes with organic thin-layer solar cell modules



Graphene conductive assistant for lithium ion batteries capable of stable dispersion



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 (carbon fiber resin-impregnated sheets) 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.

As a result, we received the 65th CSJ Award for Technical Development (2016) from the Chemical Society of Japan for the “development of high-performance carbon fiber reinforced plastic (CFRP) with the use of epoxy resin NANOALLOY™ technology applying reaction-induced phase separation.” This involves development of epoxy resin and prepreg with dramatically improved mechanical and impact resistance properties of carbon fiber reinforced plastic. We developed CFRP with both impact resistance and bending strength, which had been difficult to achieve up to that point, and its commercialization as NANOALLOY™ technology applied prepreg primarily for sports use was rated highly.

Additionally, our prepreg using TORAYCA™ T800S high-strength, intermediate modulus carbon fibers was certified for

use as the primary structural material for Europe-base Airbus' A380 wide-body jet airliner, and we have begun supplying it to the company's plant in Germany. TORAYCA™ carbon fibers have also been selected for use in the fan case of US-based Pratt & Whitney's PW1100G-JM engine.

We also developed TORAYCA™ prepreg, offering world-class performance with 30% improved tensile strength and impact resistance as next-generation material for aerospace applications. Through design of the molecular structure comprising matrix resin and control of the reaction during hardening, we achieved a high level of both elasticity and toughness.

We also signed a long-term supply agreement lasting 10 years beginning in 2016 with France-based Safran for composite materials (e.g. carbon fibers) used in aircraft engines.

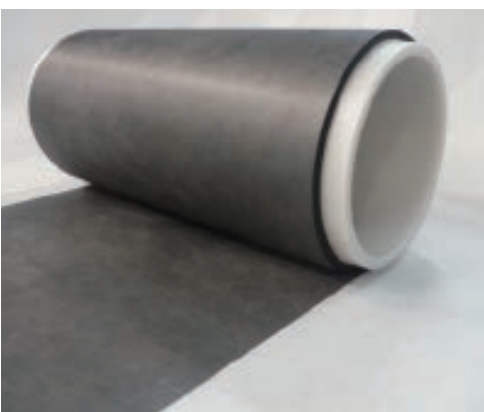
Our carbon paper is used in the fuel cell stack electrode substrates and our high-strength carbon fibers in the high pressure hydrogen storage tank of Honda Motor's Clarity Fuel Cell vehicle.

We also decided to install new large-scale production facility for carbon paper used in fuel cell stack electrode substrates at the Toray Ehime Plant.

■ 65th CSJ Award winners for Technical Development



■ Toray carbon fiber materials used in Clarity Fuel Cell (Left: Carbon paper; Right: TORAYCA™ high-strength carbon fiber)



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.

In recent news, we obtained approval for the manufacture and sale of REMITCH™ OD Tablets 2.5 μg (OD=orally disintegrating) as a new dosage form on March 30, 2016.

* "REMITCH™" is a registered trademark of Torii Pharmaceutical Co., Ltd.

We also obtained approval for the manufacture and sale of RAPROS™ oral prostacyclin (PGI₂) derivative drug as a medicine for chronic kidney disease in cats on January 13, 2017. RAPROS™ is a drug with beraprost sodium as its active ingredient.

Additionally, we were allowed to commence Phase I clinical trial of our proprietary "TRK-950" as a drug for treating solid cancer by the US FDA, and phase I clinical trials are currently in progress. "TRK-950" is a monoclonal antibody drug that binds to cancer cells and attacks them.

Moreover, Toray and Maruho Co., Ltd. have concluded a licensing agreement for exclusive rights to develop, manufacture and sell the ROR γT inhibitor created by Toray globally.

In the medical devices field, we have been working on research and technological development of antithrombotic material for many years. We discovered that the higher the mobility of the water molecules (absorbed water) interacting with the hydrophilic macromolecules, the better the effect of controlling depositing of blood components, and we are developing hemodialysis membranes with excellent antithrombogenicity.

In recent news, we added two models, P-U CELSITE PORT™ EV and P-U CELSITE PORT™ EV Discrete Type, to our P-U CELSITE PORT™ series of catheter access ports and

launched full-scale sales in March 2017. Catheter access ports are medical equipment comprised of subcutaneous implantable port, catheter, puncture needle and other accessories.

Additionally, Toray Medical Co., Ltd. newly developed the TC-R Multi-Patient Dialysis Machine, which received approval for manufacture and sale from the Ministry of Health, Labour and Welfare on November 16, 2015, and launched sales in June 2016.

■ TC-R Multi-Patient Dialysis Machine



■ P-U Cell Site Port™ EV catheter access port



7 Environment/Water Treatment

To solve the water shortages and the 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.

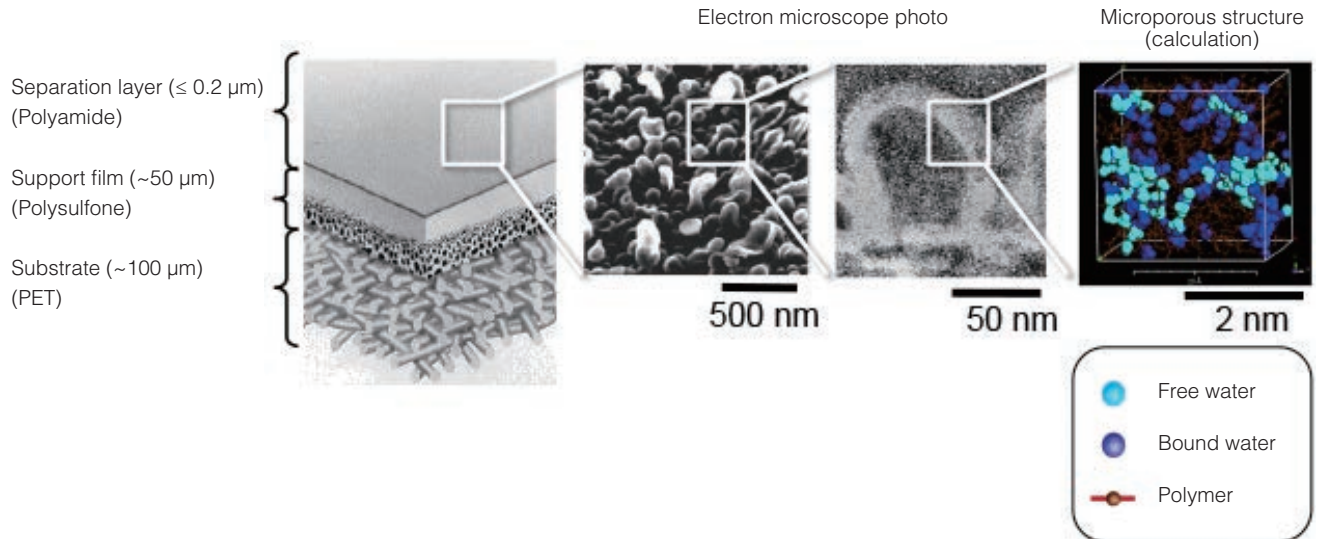
As a result, in joint research with Professor Osamu Yamamuro and Assistant Professor Maiko Kofu of the Institute for Solid State Physics of the University of Tokyo, Toray and the Toray Research Center Inc. showed that water in the pores of reverse osmosis membranes is separated into bound water, which interacts with the pores and stays in place, and free water, which is highly mobile, and that free water is diffused more than 10 times faster than bound water. We were also the first in the world to show that polymer molecules in reverse

osmosis membranes not only form the pores but also interact with water and exhibit active mobility.

Additionally, for the 30th anniversary of our TORAYVINO™ household water purifiers, we released a limited edition TORAYVINO™ CASSETTY™ 308T color model in June and TORAYVINO™ CASSETTY™ 308MX with an advanced removal cartridge (removes JIS13 substances) in October.

We were also successful at demonstrating an increase in the scale of the membrane-integrated fermentation process fusing water treatment membrane technology with biotechnology. This process was designed for ethanol manufacturing technology that uses a bacterial cell recycling type continuous fermentation process based on the biomass material (bagasse and molasses) generated at sugar manufacturing factories. This enables efficient production of ethanol from sugarcane at about 10 times the production rate of the conventional process. It also improves the yield 10-20%, which also allows increased production of ethanol.

Microstructure of reverse osmosis membranes



Limited color type TORAYVINO™ CASSETTY™ 308T model



V R&D, Intellectual Property Organization/R&D Partnerships

1 R&D and Intellectual Property Organization

As of 1985, Toray has built an R&D organization centering on its Technology Center. The role of the Center is to draft company-wide strategies and key projects for R&D.

We are also reinforcing global R&D 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) R&D Innovation Center for the Future

Toray has made the decision to establish the R&D Innovation Center for the Future at our Shiga Plant, which is where the Company was founded, as a new base of research. As the headquarters of our global research, it will research the functions and structures necessary for the society of the future and promote/enhance futuristic research and technological development in the aim of achieving *kotozukuri*,

leveraging the strength of our materials. By establishing the functions of an innovation hub, we will promote strategic open innovation through exchanges, cooperation and collaboration with academics and major partners in various fields and will advance fusion of cutting-edge technologies with our proprietary materials and technologies at the core.

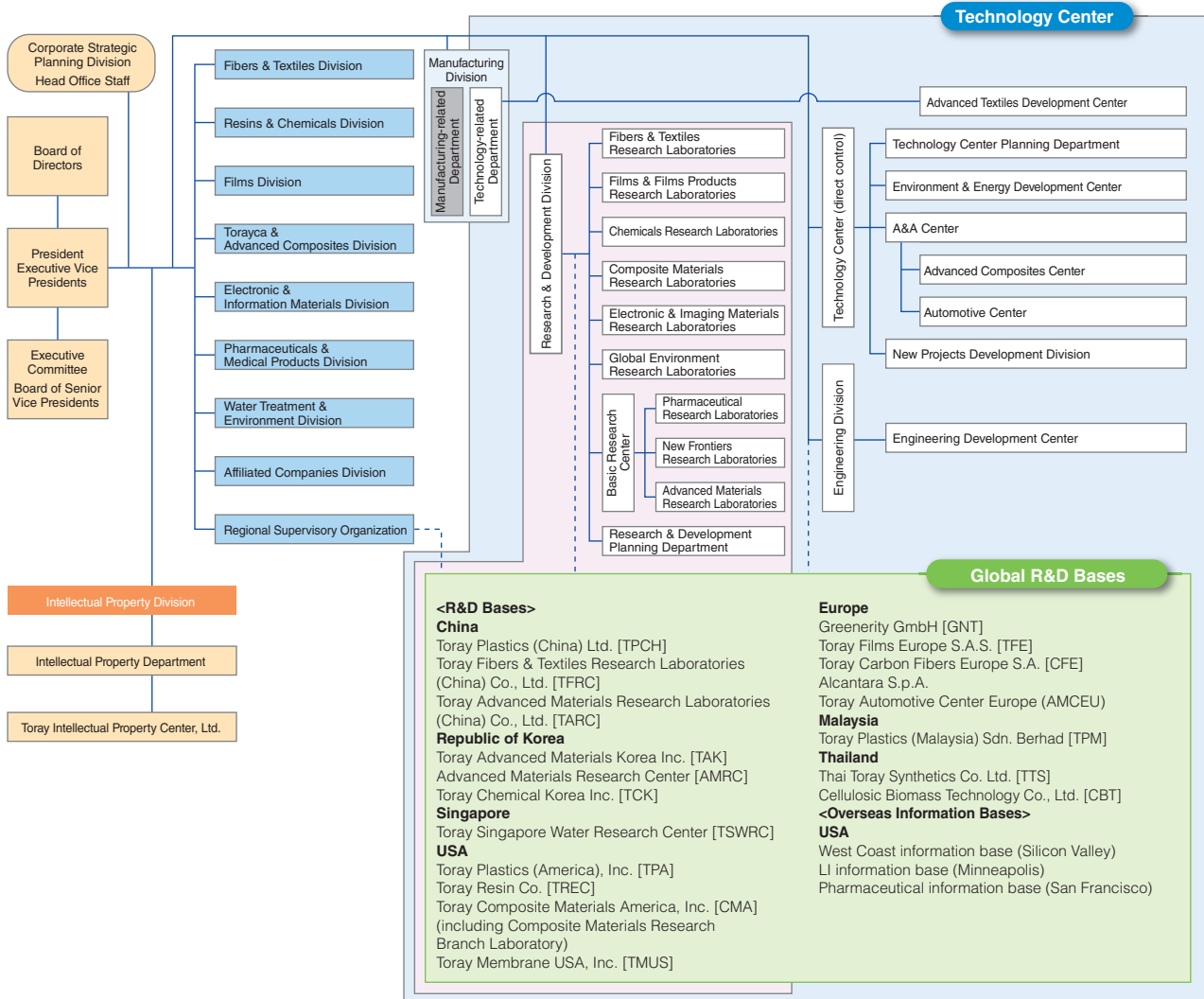
(2) Strengthening of carbon fiber business company

Toray Carbon Fibers America, Inc., which is engaged in the manufacture and sale of regular tow carbon fibers in the United States, and Toray Composites (America), Inc., which is engaged in the manufacture and sale of its processed product prepreg materials, were merged in April 2017 to develop an integrated carbon fiber and prepreg business operating structure. Up until then, the two companies had been operating as up-stream and mid-stream business companies for carbon fiber. With the integration, Toray expects further business expansion by bolstering the sales and technological development capabilities and building a flexible production structure to offer solutions in response to market needs. The decision has also been made to enhance the large tow carbon fiber production facilities at US subsidiary Zoltek Companies, Inc. (Zoltek), which is engaged in the manufacture and sale of large tow carbon fibers. The plan is to increase the annual production capacity at Zoltek’s Mexico Plant by 10,000 tons, and production is set to begin at the end of 2017.

■ Artistic representation of R&D Innovation Center for the Future



■ Organization (As of October 2017)



2 R&D 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 Group offers solutions to its customers.

As a topic from FY 2016, in Fibers & Textiles, we developed new materials jointly with ASICS Corporation. Highly elastic materials and high rigidity materials were used in the 2016 concept model of short-distance race outfits, spiked shoes and marathon shoes for the world's top athletes. Another product of the joint research conducted by the ASICS Institute of Sport Science and the Toray Advanced Textiles Development Center was "Chameleoid Mesh", a material with various functions, including the appearance of different colors depending on the viewing angle.

In July 2016, COCOFY PLUS™ elastic medical socks offering both comfort and style were released as a result of collaboration between Toray Medical Co., Ltd. and TOKO, INC. COCOFY PLUS™ features beige-dyed LYCRA™ T-906H elastic polyurethane fibers developed by Toray Opelontex Co., Ltd. and provides a comfortable fit when stretched. They are also

made with TOREX™ QUUP™ highly absorbent and moisture releasing nylon manufactured in Japan by Toray to ensure comfort while wearing them.

We also launched the hitoe™ worker protection service that utilizes wearable biosensors. The purpose of this service is to allow companies and organizations to efficiently manage the physical condition of employees and ensure their safety. The safety management system utilizes IoT, combining the functional material hitoe™ developed by Toray and Nippon Telegraph and Telephone Corporation (NTT) to enable continuous measurement of bio-information and the cloud system provided by NTT Communications Corporation (NTT Com).

In the field of resins, sales of "FlowDesigner™ for 3D TIMON™**" were launched in January 2017. An optional module for the 3D TIMON™ series developed by Toray Engineering and Advanced Knowledge Laboratory Inc., this mold design support software gives life to short-cycle molding.

* FlowDesigner™ is a registered trademark of Advanced Knowledge Laboratory Inc.

In the field of carbon fiber composite materials, Mitsui & Co., Ltd., Hexagon Lincoln Inc. and Toray signed a joint development

agreement on April 25, 2016 to study the feasibility of establishing a joint venture to engage in the manufacture and sale of onboard carbon fiber reinforced high pressure hydrogen tanks in Japan.

Additionally, Xiborg Co., Ltd., Sony Computer Science Laboratories, Inc., Toray and Toray Carbon Magic Co., Ltd. jointly developed a new flat spring for competitive prosthetic legs used by top athletes and commercialized the “Xiborg Genesis” competitive prosthetic leg.

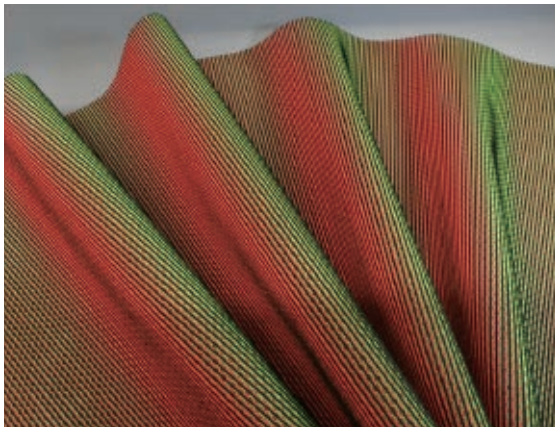
In Life Science, NTT and Toray submitted notification to the Pharmaceuticals and Medical Devices Agency concerning single-use ECG electrode hitoe™ Medical Electrode (Medical Device Notification No. 13B1X00015000031), its exclusive ECG cable and the hitoe™ Medical Lead Wire (Medical Device Notification No. 13B1X00015000032) as general medical devices, and registration was completed.

Additionally, Fujita Health University, Toray, NTT and NTT DoCoMo, Inc. conducted joint experiments to verify the effectiveness of the rehabilitation patient monitoring system utilizing hitoe™ beginning on February 7, 2017.

In the Environment field, Yamanashi Prefecture, Toray, Tokyo Electric Power Company Holdings, Inc. and TAKAOKA TOKO CO., LTD. signed an agreement to collaborate on developing the technology for a power to gas (P2G) system and promoting empirical research to achieve a CO₂ free hydrogen energy society.

Toray also made the decision to establish a joint venture in Thailand with Mitsui Sugar Co., Ltd. to demonstrate the cellulosic sugar-manufacturing system technology for manufacturing cellulosic sugar, the raw material for producing various biochemicals, using excess bagasse generated at sugar factories as the raw material.

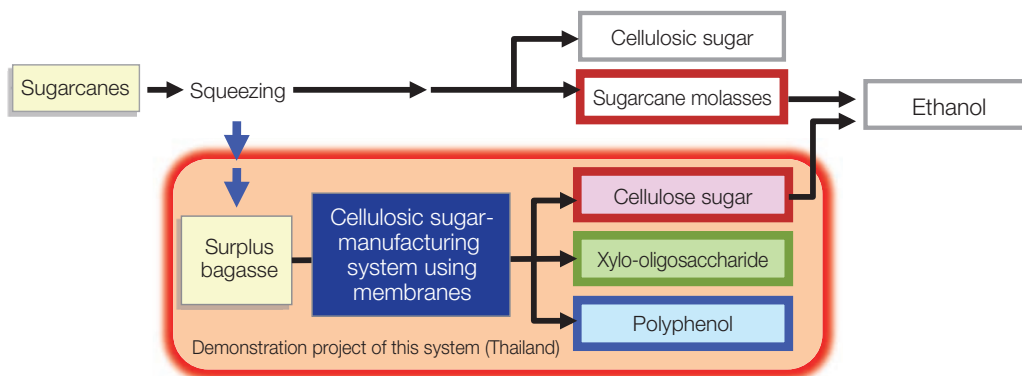
■ “Chameleoid Mesh” textile



■ “Xiborg Genesis”



■ Overview of the demonstration project of the cellulosic sugar-manufacturing system using membranes



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 Intellectual Property Division (including Toray Intellectual Property Center, Ltd., a subsidiary that handles intellectual property issues), as well as members of the research, R&D and business (sales) departments in each business field. In this way, we adopt an integrated approach to the management of intellectual properties, R&D 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 our brand management system as the organization overseeing important trademarks and brands in our business fields. In most cases, the general manager in each of Toray's business divisions is appointed the brand manager. He/she and members of the Intellectual Property Department and other operational staff departments participate in managing brand strategies of the division.

The Technology Brand Committee serves as the organization charged with reviewing and setting policy for the promotion and management of technology brands of which NANOALLOY™ is a representative example.

2 Management of Trade Secrets and Prevention of Technology Leakage

Toray is working to manage trade secrets and prevent technology leaks based on our Confidential Information Management Regulations for systematic information management and for the prevention of information leakage in response to calls for further strengthening of information management, including 1) prevention of unfair competition; 2) protection of personal information; 3) security trade administration; and 4) protection of classified information.

Moreover, in recent years large-scale information leaks have become a problem in the management of digital data, and based on our Electronic Information Security Standards, we are working on thorough information management at the work site, including

regular internal audits. We regularly review our Confidential Information Management Regulations and Electronic Information Security Standards according to the changing risks of information leaks and revise them as necessary.

At the Risk Management Committee, which manages company-wide risk, information management is positioned as one of Toray's priority risks, and from an integrated perspective considering document control, electronic data control, personnel management and facility/equipment management, we are working on thorough management of trade secrets and technical information and prevention of information leaks.

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. Promoting open innovation that globally involves

industry, government and academia, Toray Group 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 48 Japanese and overseas subsidiaries and affiliated companies at the end of March 2017)

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

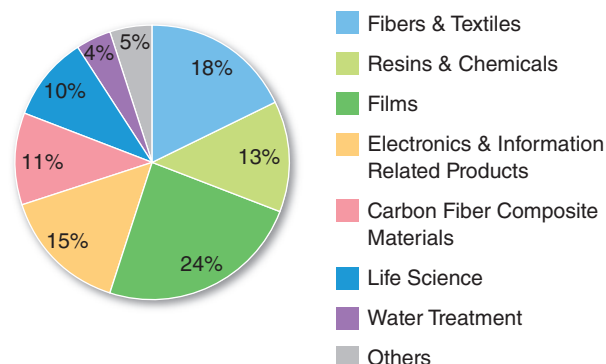
In recent years, we have engineered a pronounced shift in emphasis from quantity to quality, which translates into greater emphasis on improving the quality of patents. This has resulted in a more stringent focus on cost awareness and operational efficiency in determining whether or not to file patent 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 2017, the number of valid and enforceable patents in Japan was 5,861, of which 2,124 (36.2%) were in current use within the Group; 2,852 (48.7%) were scheduled to be used in the future; and 884 (15.1%) 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 2017

Fibers & Textiles	1,040
Resins & Chemicals	774
Films	1,431
Electronics & Information Related Products	882
Carbon Fiber Composite Materials	621
Life Science	560
Water Treatment	255
Others	298
Total	5,861



2 Valid and Enforceable Patents in Countries Other than Japan

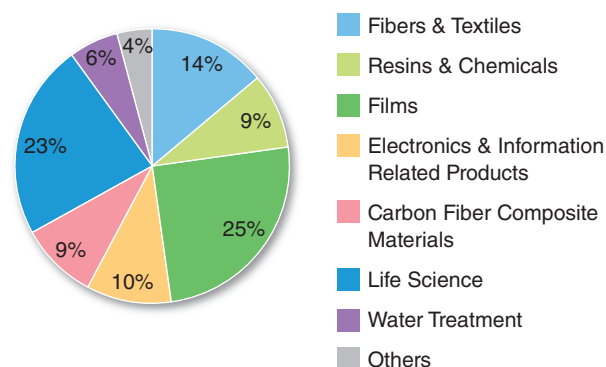
(Total for Toray Industries, Inc. and 48 Japanese and overseas subsidiaries and affiliated companies at the end of March 2017)

At the end of March 2017, the number of our valid and enforceable patents in countries other than Japan was 8,611, with the following chart breaking down these patents by specific R&D segment. The large proportion of patents in

countries other than Japan for Life Science compared with that of Japanese patents owned in this area reflects Toray's goal of expanding its operations globally in this segment.

Number of Valid and Enforceable Patents in Countries Other than Japan at the End of March 2017

Fibers & Textiles	1,184
Resins & Chemicals	753
Films	2,128
Electronics & Information Related Products	908
Carbon Fiber Composite Materials	817
Life Science	1,962
Water Treatment	547
Others	312
Total	8,611



3 Japanese Patent Applications

(Total for Toray Industries, Inc. and 48 Japanese and overseas subsidiaries and affiliated companies in FY 2016)

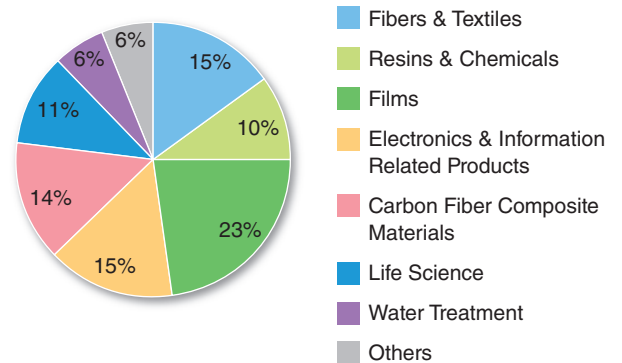
The number of applications in Japan in FY 2016 was 1,643, with the following chart breaking down these applications by R&D segment.

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

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

■ Number of Japanese Patent Applications in FY 2016

Fibers & Textiles	239
Resins & Chemicals	169
Films	386
Electronics & Information Related Products	251
Carbon Fiber Composite Materials	227
Life Science	181
Water Treatment	92
Others	98
Total	1,643



4 Patent Applications in Countries Other than Japan

(Total for Toray Industries, Inc. and 48 Japanese and overseas subsidiaries and affiliated companies in FY 2016)

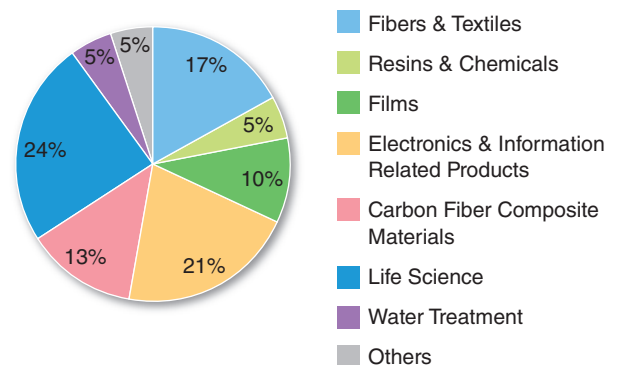
The number of applications in countries other than Japan was 3,996, with the following chart breaking down these applications by R&D segment.

Particularly noteworthy, the relatively large proportion

of patent applications in Electronics & Information Related Products and Life Science compared with domestic patent applications is an indication that we aim to expand our global business in these fields.

■ Number of Patent Applications in Countries Other than Japan in FY 2016

Fibers & Textiles	667
Resins & Chemicals	214
Films	380
Electronics & Information Related Products	839
Carbon Fiber Composite Materials	530
Life Science	969
Water Treatment	196
Others	201
Total	3,996



5 External Commendations

■ Commendations Received in FY 2016

Local Commendations for Invention

Commendation	Region	Subject of Commendation	R&D Segment
Minister of Education, Culture, Sports, Science and Technology Prize	Chubu	Stretch artificial leather	Fibers & Textiles
The Encouragement Prize for Invention	Chubu	Flowability improving technology for PBT resin	Resins & Chemicals
Minister of Education, Culture, Sports, Science and Technology Prize	Shikoku	Carbon fiber reinforced polypropylene injection molding material	Carbon Fiber Composite Materials
The Encouragement Prize for Invention	Shikoku	Composite semipermeable membrane and method for producing the same	Water Treatment
Shiga Prefecture Governor's Prize	Kinki	High-quality silky material	Fibers & Textiles
The Encouragement Prize for Invention	Kinki	Lining woven for knee where fraying is prevented	Fibers & Textiles

Other External Commendations

Commendation	Awarding Institution	Subject of Commendation	R&D Segment
2016 The CSJ Award for Technical Development	Chemical Society of Japan	Development of high-performance CFRP with the use of epoxy resin NANOALLOY™ technology applying reaction-induced phase separation	Carbon Fiber Composite Materials
63 rd The Okochi Memorial Production Prize	Okochi Memorial Foundation	Development of positive-tone photosensitive polyimide for insulating layer in organic electroluminescence display	Electronics & Information Related Products
The Advanced Technology Award Fuji Sankei Business i Prize	FujiSankei Business i	All-in-One Type Chip-ELISA system "RAY-FAST"	Life Science

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 others in each technology. Our policy likewise requires mandatory confirmation of others’ 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.

As of March 31, 2017, there are no intellectual property related lawsuits pending in the courts deemed capable of having a serious impact on the business interests of Toray Group. There also were no intellectual property related judgments in fiscal 2016 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.

Product names marked with TM are trademarks.

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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