

# Meeting Global Challenges with the Power of Technology

Protecting the Rich Nature of the Earth and Ensuring a Bright Future for Everyone

The Fujifilm Group has been striving to create a range of new businesses based on the Group's diverse technical capabilities.

The new products and services developed through our leading-edge proprietary technologies are bringing innovations to a range of fields and helping improve society and the lives of people across the world.

We will contribute to solving the problems faced by society one by one, while continuing to create new value.

The Fujifilm Group will make use of its technologies to protect the rich nature of the Earth and ensure a bright future for everyone.

## The Fujifilm Group's technologies are contributing to the solution of social problems

The Fujifilm Group owns highly versatile fundamental technologies, including those related to organic and inorganic materials, analysis, thin-film formation and processing, image and software, optics, and mechatronics, developed in areas such as photosensitized materials and xerography. In addition, we possess core technologies that contribute to distinctive performance and cost. Based on these technologies, we are developing new businesses for the solution of social problems.

### Fundamental technologies

Inorganic materials	Film formation and processing	Organic materials
Optics	Analysis	Drug discovery
Imaging	Software	Mechanics and electronics
Multilayer coating	Dispersion	Film forming

#### Part 1

Contributing to the Development of the Medical Field by Meeting Local Challenges in Each Country ..... p. 10

[Healthcare and medical systems]



#### Challenges to be met:

- Improve the medical environment in emerging economies
- Expand the possibilities of medical treatment in new fields
- Establish emergency medical care support systems

#### Part 2

Resolving Unmet Medical Needs by Taking Multiple Approaches ..... p. 14

[Healthcare and pharmaceutical products]



#### Challenges to be met:

- Create new drugs that are highly effective with few side effects
- Provide new drugs to protect children from infectious diseases

#### Part 3

Taking on the Challenge of Reducing CO<sub>2</sub> Emissions by 30% through Environmental Innovations ..... p. 16

[Documentation]



#### Challenges to be met:

- Reduce environmental impact across the entire office
- Develop materials with low environmental impact
- Introduce zero-waste resource recycling systems to overseas countries

#### Part 4

Supporting the Effective Use of Solar Energy with Film Technologies ..... p. 20

[Highly functional materials]



#### Challenges to be met:

- Expand the possibilities of CSP system (concentrating solar power system)
- Develop new products to expand the use of solar cells
- Easily conserve energy and electricity by blocking sunlight



# Contributing to the Development of the Medical Field by Meeting Local Challenges in Each Country



Each country and region has their own social difficulties, and expected contributions are different from each other. This is true also in the medical field. For example, companies can help a lot of people improve their health by introducing advanced medicine to emerging economies. On the other hand, in accordance with changes in the times and lifestyles, some new diseases are spreading across the world. Fujifilm has been meeting the needs of those engaged in the medical area across the globe by developing a range of technologies and products in the imaging and other fields.

- 1 2 3 FCR PRIMA: Developed for use at smaller medical facilities in local cities in India
- 4 i-Stroke: Displays the follow-up data of a patient in chronological order, including images, doctors' comments, examination and treatment data

## Case 1 Aiming to spread the use of digital X-ray systems in India

The FCR PRIMA small-sized digital X-ray system

### Social challenges and backgrounds

The digitalization of X-ray systems has been fostered mainly in developed countries, and demand for the replacement of CR<sup>\*1</sup> systems with DR<sup>\*\*2</sup> ones has been increasing, especially among large hospitals in Japan, the United States, and Europe. Emerging economies, however, such as India, China, Latin America, the Middle East, and Eastern Europe, have yet to digitalize their X-ray systems. Some wealthy hospitals in these countries have already been shifting to DR

systems directly from analog systems, but most of smaller hospitals, including clinics, are still in the process of replacing their analog systems with CR systems. For the digitalization of X-ray systems in these countries, it is essential for high-quality products to be developed and provided at affordable prices.

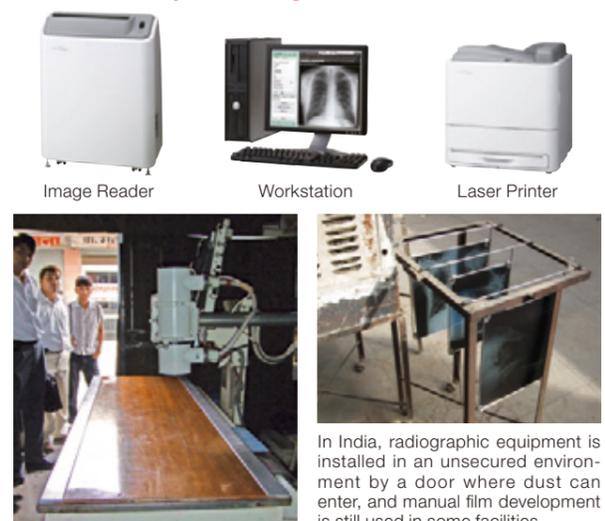
<sup>\*1</sup> CR: Digital X-ray Imaging System using imaging plate (IP)  
<sup>\*\*2</sup> DR: Digital X-ray Imaging System using flat panel detector

Fujifilm began selling X-ray films for medical use just after the establishment of the company. In 1983 the company released the world's first digital X-ray system, Fuji Computed Radiography (FCR), to stabilize the quality of images through digitalization. The system also made it possible for users to transmit images via networks, thereby contributing to the improvement of the medical environment.

At present, Fujifilm is developing and releasing digital products that meet the needs of emerging economies, aiming to further expand its business in the global market. The company developed the FCR PRIMA small-sized digital X-ray system to meet the needs of the Indian market, which had been identified through local marketing activities.

In recent years, large hospitals in Japan, the United States, and Europe have begun to replace their CR systems with DR ones, while smaller hospitals and emerging economies have yet to digitalize their X-ray systems. Due to decreases in the price of digital devices and expectations for stable image quality compared with that of conventional analog films, demand for digital machines has been dramatically increasing. In response, Fujifilm

### FCR PRIMA System Configuration



In India, radiographic equipment is installed in an unsecured environment by a door where dust can enter, and manual film development is still used in some facilities

sent marketing members to more than 100 clinics and hospitals across the world to identify real local needs and discovered that the Indian market had large potential needs for digital X-ray systems. In India, X-ray systems were usually used for diagnosis at imaging centers. There are centers in which films were developed manually and the quality of the resulting images was not good. Some of these facilities began introducing CR systems and customers (patients) who wanted images with higher quality switched to these facilities. As a result, other facilities had no choice but to digitalize their X-ray systems to retain their customers. Therefore, it seemed possible for Fujifilm to expand the market of digital X-ray systems in the country if it could release a product that provided high-quality images at a reasonable price.

In order to resolve the biggest challenge of providing a digital X-ray system at a low price, Fujifilm set an ambitious cost reduction target at the start of the product development stage and launched a project involving employees engaged in product planning, development, manufacture, operations, transportation, and sales. As a result of repeated discussions among members, it was finally decided to be produced by the affiliated company in China. The design staff made a cost reduction plan, including the location of the production base and transportation means, and implemented a range of related measures. Subsequently, in the production base, communication with our Chinese partner has been enhanced to build mutual relations of trust. Also Fujifilm focused on making a high-quality system based on its advanced technologies for diagnostic imaging and by incorporating specifications to prevent the entry of foreign matters inside of the precision equipment to ensure the product could function well even under severe conditions.

As a trial, Fujifilm first released the new system in India, which would be the main market for the digital X-ray system, earlier than in other countries. The company is now striving to spread the use of the system across India by launching sales promotion measures for the local market and also conducting sales activities in local towns where small imaging centers are located.

The FCR PRIMA, which was developed for emerging countries like India, has also been accepted by clinics in developed countries. Moreover, the system began to be adopted by veterinarians and chiropractors who cannot make large investments in X-ray systems, which would not be frequently used at their facilities. The product has thus been making contributions to the improvement of the medical environment across the world.

### Case 1 VOICE



Releasing the second and third versions of the FCR PRIMA to contribute to improving the medical diagnosis level across India

**Nobuo Matsunobe**  
 Marketing Advisor Medical Division  
 FUJIFILM India Private Limited (At the time of the interview)

We had been introducing products already sold in Japan and other developed countries to the Indian market and were able to promote local sales in reference to the sales results in other countries. However, we released the FCR PRIMA first in India and were not sure how to proceed, although both local staff and dealers were highly motivated to sell the product. We made preparations for a press conference to announce the release of the product, listening to local people and holding detailed discussions. As a result, all of us increased our appreciation of this product, which led to successful sales promotion. I think that the release of the FCR PRIMA helped foster the introduction of digital devices to India and improve the level of medical diagnoses in the country. We will release the second and third versions of the FCR PRIMA to continue making contributions to improving diagnosis levels across the entire country.



Press conference to announce the release of the product and implemented a sales strategy in cooperation with local staff and dealers in India



### Stakeholder message



**Dr. B Lal Gupta**  
 Dr. B Lal Clinical Laboratory  
 (First doctor to adopt the FCR PRIMA in India)

### Expanding the use of digital X-ray systems across cities in India

I operate five clinics in the state of Rajasthan. At first I was hesitant to introduce a digital X-ray system to my facilities. Although I highly evaluated the system based on the results of using it at other facilities, I was not sure whether it was worth making the investment to introduce the system to my facilities, which were not big and not located in a large city. The FCR PRIMA, however, proved very worthwhile.

It will of course help improve the diagnosis

level by introducing a digital X-ray system and in India, which is much larger than Japan, there are a lot of patients who will benefit from it. I expect Fujifilm to continue making efforts for the improvement of the medical diagnosis level in local towns and cities through the sale of the FCR PRIMA. I believe Fujifilm will meet this expectation, for which I will cooperate with the company as much as possible.

## Case 2 Developing an endoscope to help overcome difficulties in small-intestinal examination and treatment

Double-balloon endoscope system

### Social challenges and backgrounds

The small intestine is said to be the most difficult organ to access with an endoscope. Although it is relatively easy to access the esophagus, stomach, and duodenum by an endoscope from the mouth or nose to examine and treat the organ, it is difficult for an endoscope to pass through the small intestine, which has a winding structure. Even when an endoscope is inserted into the body through the rectum, it may hurt the small intestine by the inappropriate insertion. Although the number of people suffering from small intestine cancer is not large, there were patients who were suffering from bleeding from the small intestine or ulcers and they had to undergo painful abdominal surgery for the treatment. Small intestine diseases include Crohn's disease,\* which tends to be suffered by young people in their teens and twen-

ties. The number of people suffering from this disease has also been increasing in Japan, and because there are no fundamental treatment methods for it, patients with the disease are in need of a method of coping with it without undergoing abdominal surgery.

\*Crohn's disease: A type of inflammatory bowel disease that often affects the small intestine and causes diarrhea, bloody stools, and weight loss. The disease is caused by abnormal immune reactions to external antibodies (food ingredients, foreign matter, disease agents) and is thought to be connected with environmental factors and dietary habits. It is said that those who take a lot of animal proteins and fats tend to suffer the disease. In the past, North America and Europe had high incidences of the disease, but recently the number of patients has been increasing in Japan due to the westernization of people's dietary habits.

Fujifilm (Fujinon at that time) has been providing a range of products since the development of the world's first digital endoscope in 1984, including a transnasal endoscope that reduces patient discomfort, including the sensation of gagging, tools for surgery, and imaging software. In 2003, the company released a double-balloon endoscope for observation and treatment of the small intestine, which was said to be the most difficult organ to access by an endoscope.

In Japan, about 70% of endoscopes are used for observation of the stomach and esophagus, and the remaining 30% for observation of the large intestine. The small intestine is as long as six to seven meters and is like a soft, folded, flexible tube. It is difficult to insert a conventional endoscope into the organ because the tube can be stretched by the endoscope or because the endoscope could not pass through the organ because of sharp curves. Observation of the small intestine by an endoscope thus took much time and was often very painful for the patient, meaning that many patients with small intestine disorders had to undergo abdominal surgery. The market of endoscopes designed for the small intestine was therefore a very niche market. Fujifilm (Fujinon at that time), however, met the request for the joint development of an endoscope for the small intestine from Professor Hironori Yamamoto of Jichi Medical University, regarding it as a

mission of an endoscope manufacturer and hoping to make a new contribution in the endoscopic field.

The double-balloon endoscope designed by Professor Yamamoto can pass smoothly through the small intestine by means of balloons temporarily fixed at the curves. This endoscope made it possible for patients suffering small intestine ulcers or bleeding from the organ to receive high-frequency currents treatment or clipping treatment instead of having abdominal surgery. When the double-balloon endoscope was released, some in the medical society said, "Unbelievable!" The effectiveness of the product for the examination and treatment of the small intestine has been highly praised.

The small intestine absorbs nutrients and is said to be the most important among the digestive tubes. This double balloon endoscope developed in Japan also attracted much attention from abroad, and now the product is used across the world, including about 300 facilities in Japan, about 500 in Europe, 200 in the United States, and 80 in China.



The two balloons make it easier to pass the endoscope through the small intestine

### Case 2 VOICE



**I would like to develop a thinner double-balloon endoscope for children**

**Masayuki Oyatsu**  
Operations Manager, Endoscopy Systems Div.  
Medical Systems Business Div.  
FUJIFILM Corporation

Crohn's disease affects the small intestine, and children who suffer this disease have to get along with it throughout their lives. Our sales staff are requesting us to develop a thinner endoscope that can be used more safely for children, and we are making efforts to meet this request by using the most advanced technologies, seeking to fulfill our duty as the manufacturer of the double-balloon endoscope.

### Case 3 VOICE



**We feel that we might be able to save someone's life through our job**

**Kiyochika Isoyama**  
Operations Manager, IT Solution Div.  
Medical Systems Business Div.  
FUJIFILM Corporation

In talking with medical doctors, I can feel that we might be able to save the lives of more patients or decrease the number of patients who suffer the aftereffects of diseases. We need to spread the use of our technologies and products in order to make further contributions to society through them. The medical business of Fujifilm has been focusing on the radiation field but we now want to expand the scope of the business to make more contributions to society.

## Case 3

## Supporting emergency medical care for cerebral strokes to prevent deaths and aftereffects

The i-Stroke remote image diagnosis and treatment support system

### Social challenges and backgrounds

Among critically-ill patients urgently transported to medical facilities in Japan, about 30% are suffering from cerebral strokes, which are said to be the third largest cause of death in the country. For cerebral strokes, it is essential for patients to receive prompt and appropriate treatment at the hospitals to which they have been sent. In particular for cerebral infarctions, which account for about 60% of the strokes,

it is critical for patients to receive appropriate treatment within several hours after the start of symptoms, including the administration of thrombolytic agents and endovascular treatment to remove blood clots, which will greatly help reduce the aftereffects of the disease. It is, however, difficult for doctors specializing in the disease to be at medical facilities for 24 hours a day and it is required to establish an emergency medical system to resolve this problem for society.

The i-Stroke remote image diagnosis and treatment support system helps hospitals make diagnoses and give treatment to patients of cerebral strokes urgently sent to them by transmitting patients' clinical examination data—including images—to the smartphones of experts in the disease who are outside the hospitals. Fujifilm developed this system jointly with the Jikei University School of Medicine as part of the university's project to save as many lives as possible, and released the system on the market in June 2011. Since then, it has been widely used at emergency medical care facilities, being appreciated as highly effective for the initial treatment of cerebral strokes.

Fujifilm participated in the joint development project, inspired by the opinion of a doctor at the Jikei University School of Medicine, who said, "Mobile systems can help save our patients." The university asked Fujifilm to participate in the project, highly valuing the company's expertise in diagnostic imaging systems, although it did not have a deep knowledge of cerebral strokes. To meet the expectations of the university, the company developed the i-Stroke system incorporating opinions of a range of people engaged in clinical medicine and capitalizing on its wealth of know-how regarding image processing. The i-Stroke system is equipped with various functions useful for emergency medicine, such as the function to display 3D images in a stress-free manner

and other treatment support tools, including criteria for making judgments about the symptoms suffered by patients.

At present, the i-Stroke system is used by seven medical facilities in Japan. In June 2012, some new functions were added to support more general emergency medical treatment. Fujifilm will further expand these functions to make the system even more useful in the emergency medical treatment of diseases including cerebral strokes. The initial treatment of cerebral strokes is deemed important also outside Japan, and the company is now examining the possibilities of releasing the product overseas, first in the United States.



Doctors can check the clinical examination data of patients, including images, on their smartphones at anytime and anywhere

### Stakeholder message



**Dr. Hironori Yamamoto**  
Professor and Director of the Endoscopy Center  
Jichi Medical University

### Meeting expectations for the attainment of the essential goal of medical treatment—to protect people's health

As for the development of the double-balloon endoscope, it was difficult for me to find a manufacturer who would cooperate with me in the development activity, because the market for endoscopes for the small intestine was very small. At that time, I thought that although the market was small, there were in fact a lot of patients who were in need of endoscopic diagnosis and treatment and manufacturers should not make decisions based on past results and conventional ideas. If patients suffering from small intestine diseases became able to receive diagnosis and treatment, it would give them great benefits, and also the development of new therapies based around endoscopes might expand the size of the market. In fact the double-balloon endoscope has made it

possible for doctors to do what they were unable to do in the past and it has attracted much attention from the industry. For me, it was really rewarding to see patients of small intestine diseases, who were not appropriately diagnosed in the past, being pleased to receive endoscopic diagnosis and treatment. The goal of medical treatment is to protect people's health, and all those engaged in the medical field, including doctors, manufacturers, and governmental agencies must share the mission of improving the quality of medical treatment to this end. I want manufacturers and governmental agencies engaged in the medical field to develop medical devices and to reform the medical administration, keeping in mind their essential mission instead of merely pursuing economic efficiency.

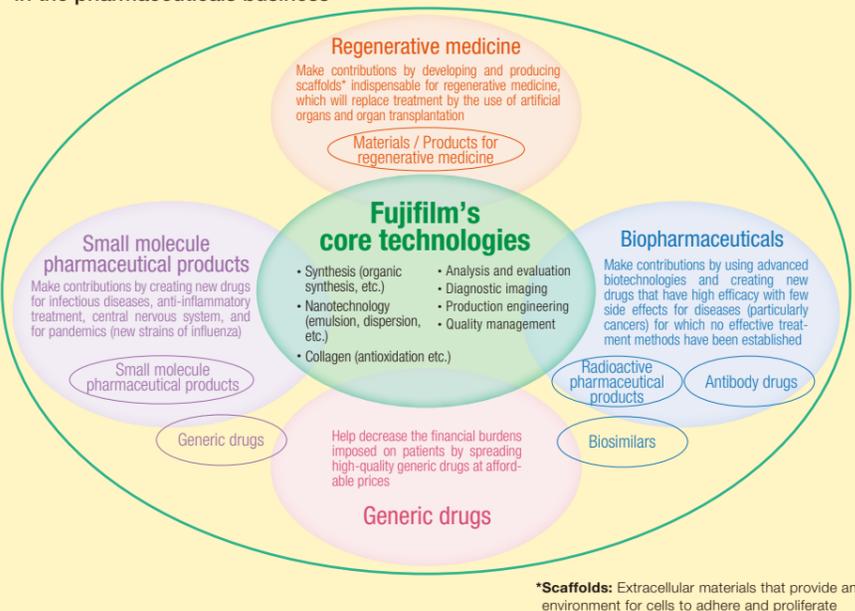
Fujifilm (Fujinon at that time) was the only manufacturer who responded to my request for the joint development. The members of the company engaged in the development in a very sincere manner. I feel this company is very reliable and trustworthy. Japan is leading the world in the field of endoscopes and I hope that Fujifilm will develop even safer and more user-friendly products and release them from Japan to the world as a leading manufacturer of endoscopes.

Promotion and training are necessary for new medical equipment. Dr. Yamamoto continues to present more than 50 lectures a year across the world on the double-balloon endoscope.



# Resolving Unmet Medical Needs by Taking Multiple Approaches

## The Fujifilm Group's social contributions in the pharmaceuticals business



In the aging Japanese society, the need for biopharmaceuticals has been increasing in accordance with an increase in the number of patients of cancers, rheumatism and dementia which are caused by aging. On the other hand, there are still a large number of children suffering from pneumonia and middle-ear infections despite improvements to the living environment in Japan, and the development of more effective treatment drugs is being demanded. In response, the Fujifilm Group is further assuming the healthcare business, focusing on small molecule pharmaceutical products, biopharmaceuticals, and materials/products for regenerative medicine. The company is utilizing the core technologies that it has accumulated in the photographic film business to develop new drugs to resolve these unmet medical needs.

and need to be manufactured to a high precision, including technologies for organic synthesis, emulsion, antioxidation, analysis, and evaluation. Also, for biopharmaceuticals, the manufacture of which includes many complex processes, such as the cultivation of microorganisms, we can utilize these advanced technologies together with process monitoring technology and technology to manage materials quality, thereby substantially increasing the productivity and reliability of the manufacturing.

In today's society, the focus is increasingly on aging control ("anti-aging") rather than on the treatment of diseases. In the future, medical treatment must be provided in consideration of the health conditions of individuals. Even patients suffering from

the same disease need to be treated in different ways in consideration of their individual health conditions, in order to ensure the effectiveness of the treatment and reduce side effects. Medical treatment will be increasingly provided in consideration of the risks and effects for each patient in a more personalized manner (so-called tailor-made medicine). The medical world is greatly changing and the technologies and know-how of Fujifilm, which is based in an industry other than the medical society, will be much in demand for progressive medical treatment.

\* **Biosimilars:** Biologically similar biopharmaceuticals that are developed by other manufacturers after the patent period of the original biopharmaceutical has expired.

## Case 2 Committed to the prevention of infectious diseases among children as a mission of a manufacturer of brand-name drugs

OZEX® fine granules for children (15%)

Because there are few antimicrobial agents\*1 that can be used for the clinical treatment of children, the same types of antimicrobial agents tend to be used repeatedly, and this often causes the emergence of drug-resistant strains of bacteria.\*2 In addition, repeated infections in group nursing facilities tend to spread resistant strains among children and infections with such strains often require hospitalization—even for the treatment of middle-ear inflammation. Despite the calls for new types of antimicrobial agents for children from the medical staffs and societies, the development of such drugs did not progress because the market is small and the development of pediatric drugs requires significant labor and costs. However, Toyama Chemical embarked on the development of a new drug, regarding it as its mission as a manufacturer of brand name drugs.

OZEX® fine granules for children (15%), which is effective for the treatment of pneumonia and middle-ear infection, is a reformulation of OZEX® tablets—sold since 1990; but to make the antimicrobial agent suitable for pediatric use, there were many difficulties to overcome. As is often said, children are not small adults: the organs are not fully functional at birth and it takes about nine months for the kidney, and two years for the liver, to function like those of an adult. It is therefore difficult to adjust the dose for children. Also, children often refuse to take any kind of medicine once they find it distasteful, and so special consideration must be paid to the taste.

New quinolones, a family of antimicrobial agents to which OZEX® belongs, are known to have toxic effects on the joints of young dogs raising concerns about the same kind of disorders in human beings. OZEX®, however, showed relatively few toxic consequences for the joints in young dogs and no joint disorders have been reported to date through post-marketing safety monitoring of OZEX® fine granules for children (15%), as well as through follow-up surveys on patients who took the drug for non-approved indication prior to its official approval. It is now two years since the drug was released in the market, but Toyama Chemical is still continuing the investigations and collecting relevant information.

OZEX® fine granules for children (15%), released in January 2010, has been highly evaluated by clinical doctors. However, its long-term use will undoubtedly cause the emergence of drug-resistant strains of bacteria. As a responsible manufacturer of brand name drugs, Toyama Chemical has been promoting the understanding of effective use of antimicrobials to reduce the

generation of drug-resistant strains by various effective means, such as a "cyclic therapy."\*3

Toyama Chemical is continuing to develop new antimicrobial agents for children, believing this is also one of its missions as a manufacturer of brand name drugs.

\*1 **Antimicrobial agents:** Pharmaceuticals used in the treatment of bacterial infectious diseases

\*2 **Drug-resistant strains of bacteria:** Strains of bacteria that are highly resistant to pharmaceuticals, meaning that the drugs are not very effective or ineffective on these strains

\*3 **Cyclic therapy:** Preventing the generation of drug-resistant strains by using at least three different types of pharmaceuticals in alternation per three to seven days



OZEX® fine granules for children (15%) effective for the treatment of pneumonia and middle-ear infection

## Social challenges and backgrounds

Only a limited number of companies can continuously develop new drugs in the world. Nonetheless, for cardiovascular diseases and lifestyle-related diseases, a range of new drugs has already been created in consideration of the large number of patients. There are, however, still strong needs for new drugs for diseases that cannot be treated fundamentally, such as cancers and Alzheimer's disease and for the smaller medical markets, such as the pediatric healthcare market.

The pharmaceutical industry has entered an age of great change and the development of biopharmaceuticals, which have relatively few side effects, has been fostered in a shift from small molecule pharmaceutical products. The development and manufacture of biopharmaceuticals, however, requires advanced technologies, and companies in the pharmaceutical industry need to combine various technologies in collaboration with each other to foster the creation of biopharmaceuticals.

## Case 1 Entering the biopharmaceutical field with the advanced technologies accumulated in the photographic film business

Fujifilm has been fostering the pharmaceutical business as a core of its new businesses based on the idea of "prevention, diagnosis, and treatment." In particular, for biopharmaceuticals, we made MSD Biologics (UK) Limited and Diosynth RTP Inc. of the United States our consolidated subsidiaries in 2011 to develop the business in multiple ways from a unique standpoint. Also, in 2012 we established Fujifilm Kyowa Kirin Biologics as a company to manage biosimilars.\*

Biopharmaceuticals, which make use of the natural biological functions of organs, are effective with few side effects for diseases that cannot be fully treated with conventional small

molecule pharmaceutical products, but because they are made using biological organisms, complex production technologies need to be adopted. We have accumulated advanced technologies in the field of photographic films, which are delicate products

### History of the Fujifilm Group's pharmaceutical business

Oct. 2006	Made Daiichi Radioisotope Laboratories (present FUJIFILM RI Pharma) a 100% subsidiary [R&D, manufacture, sale and export/import of radioactive pharmaceutical products, other pharmaceuticals, and radiolabeled compounds]
Mar. 2008	Made Toyama Chemical a consolidated subsidiary [R&D, manufacture and sale of small molecule pharmaceutical products]
Dec. 2008	Made Perseus Proteomics a subsidiary [Development of antibody drugs, etc.]
Nov. 2009	Established FUJIFILM Pharma [R&D, manufacture, sale and export/import of pharmaceuticals and R&D, sale of generic drugs]
June 2010	Established the Pharmaceutical Products Division to supervise the pharmaceutical business as a whole Integrated the pharmaceutical and life science research laboratories into the Pharmaceutical and Healthcare Research Laboratories
Aug. 2010	Formed a capital alliance with Japan Tissue Engineering [R&D, manufacture and sale of products for regenerative medicine and products to support R&D]
Mar. 2011	Made MSD Biologics (UK) Limited (Present FUJIFILM Diosynth Biotechnologies UK Limited) and Diosynth RTP Inc. (present FUJIFILM Diosynth Biotechnologies U.S.A., Inc.) consolidated subsidiaries [Development and manufacture of biopharmaceuticals on commission]
July 2011	Formed a business partnership with Dr. Reddy's Laboratories Ltd. [Development and manufacture of generic drugs]
Mar. 2012	Established Fujifilm Kyowa Kirin Biologics [Development, manufacture and sale of biosimilars]



**Yuzo Toda**  
Director Senior Vice President,  
FUJIFILM Corporation  
Director, FUJIFILM Holdings Corporation

## Case 2 VOICE



Protecting children is protecting the future of society

**Yoshitaka Katakuse**  
Advisory Deputy General Manager  
Development Project Group  
Clinical Planning Department  
Toyama Chemical Co., Ltd.

I have long been engaged in the development of pharmaceuticals. When I was in charge of developing drugs for children 14 years ago, a pediatric doctor taught me the importance of always keeping in mind the protection of the lives and health of children. We were able to develop OZEX® fine granules for children (15%) thanks to the advice and support from those working at the forefront of clinical treatment. I think pharmaceutical companies cannot effectively develop and further explore the appropriate use of new drugs without the help of the medical field, academia, and related governmental agencies.

# Taking on the Challenge of Reducing CO<sub>2</sub> Emissions by 30% through Environmental Innovations



Fuji Xerox is accelerating its activities to achieve a very high target of reducing its annual CO<sub>2</sub> emissions in Japan and overseas by 30% relative to fiscal 2005 by 2020. In addition to activities to reduce the environmental impacts of its multifunction devices and printers throughout their life cycles, the company is taking on the challenge of carrying out environmental innovations by changing the office environment or the working styles of all employees.

1 2 3 The technology to reuse parts of recovered multifunction devices supports Fuji Xerox's Integrated Recycling System. (Photos taken at Fuji Xerox Eco-Manufacturing (Suzhou).)

## Social challenges and backgrounds

In order to create a sustainable society, a range of problems needs to be solved, including global warming and the depletion of resources. As for global warming, the international community has set a long-term target of reducing the world's total greenhouse gas emissions by at least 50% by 2050.\* Creating a recycling-based society used to be regarded as a waste issue, but now a wider range of measures are expected such as the efficient reuse of limited resources and the

shift to the use of renewable resources. As a manufacturer who supplies products to customers, it is becoming increasingly important to implement measures to reduce the environmental impacts throughout the life cycles of its products, from the development of materials to design, manufacture, use by customers, recovery, and recycling.

\*G8 Hokkaido Toyako Summit Leaders Declaration (July 2008)

## Policy Pursuing greater contributions to reducing the environmental impacts of society

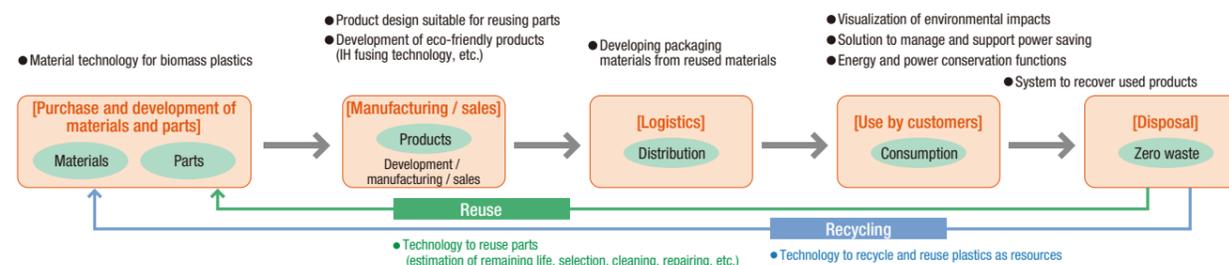
Fuji Xerox conducts activities to reduce the environmental impacts of its multifunction devices and printers throughout their life cycles; from the purchase of materials, manufacturing, sales, distribution, use by customers, the recovery of end-of-life products, to disposal. Out of the products' entire life cycle, relatively large environmental impacts are made when materials are purchased as well as when electricity is consumed as customers use the products. Based on this recognition, the company has been fostering the 3Rs (reduce, reuse, recycle) activities and the improvement of the energy conservation performance of its products.

As for the purchase of materials, Fuji Xerox is promoting the reuse of parts from recovered end-of-life products, and the development of materials so that plastic materials can be replaced with more eco-friendly ones. In particular, substantial reform of the development and manufacturing systems are needed to promote the reuse of parts, which is more difficult than using new parts, Fuji Xerox has invested both technologies and capital to meet this requirement because it is a company that continues

to take innovative challenges as a leader in environmental protection. At present, the company has recycling bases in Japan, Thailand, and China to recover end-of-life products in the Asia-Pacific region. The collected parts are reused to make products with quality as good as new. Based on the belief that end-of-life products are not waste but resources, the company is recovering as many products as possible and reusing their parts to the maximum for more effective use of resources.

With regards to improving the energy conservation during product use at customers' sites, the company has set the target of halving the electricity consumed by all its products in the market in 1995 and achieved this target in 2006, one year later than planned. In order to attain this ambitious target, Fuji Xerox endeavored to improve the energy conservation performance of both color and monochrome devices and is still continuing its efforts. In recognition of this endeavour, the company awarded 11 consecutive years at the Energy Conservation Grand Prize organized by the Japanese Ministry of Economy, Trade and Industry

## Fuji Xerox's LCA-based environmental technologies and services



(from 1999 to 2009).

Fuji Xerox is manufacturing eco-friendly products based on the "RealGreen" concept, which means to be both energy-efficient and user-friendly. Even if a product has great energy conservation performance, customers will not continue using it if they feel stress by using it. The company thinks it important to provide customers with products that are both eco-friendly and comfortable to use, in order to make contributions to reducing environmental impacts through products. The company will continue advancing its technologies to supply more energy-saving products to society, thereby helping further reduce CO<sub>2</sub> emissions.

Fuji Xerox is also determined to help society at large reduce CO<sub>2</sub> emissions by doing more than just reducing the life cycle environmental impacts of its products. Specifically, in addition to reducing the total life cycle CO<sub>2</sub> emissions from its products by

30% relative to the 2005 level by fiscal 2020, the company has set the target of helping customers reduce CO<sub>2</sub> emissions from their offices by a total of seven million tons a year. This target cannot be achieved solely by providing them with energy-efficient products. Supporting customers to make drastic changes to their offices and work styles would also be required. To this end, Fuji Xerox has just begun developing a solution to help customers visualize their use of power and paper in their business operations, thereby supporting them in improving their productivity and reducing their environmental impacts.

Aiming toward the goal set at fiscal 2020, Fuji Xerox will create new work styles and work spaces to help society at large reduce its total CO<sub>2</sub> emissions, in addition to proposing to customers the optimal layout of their office devices for higher productivity.

### [Improving environmental friendliness when products are used by customers] ApeosPort-IV, DocuCentre-IV

The nine models of full-color digital multifunctional devices ApeosPort-IV and DocuCentre-IV series, which were launched in December 2011, are advanced "RealGreen" products that provide a range of comfortable and eco-friendly functions.

#### ● Smart WelcomEyes: Motion sensor detects the access of a user and makes the machine ready for use

To meet requests from users who think, "I want the machine to start up immediately when I want to use it," and "I don't want the machine to consume energy while not in use," the unique motion sensor Smart WelcomEyes detects a user approaching the product and automatically starts up from the sleep mode.

#### ● Smart Energy Management Technology: Supplying electricity only to the component parts in use

The multifunction device is divided into four parts—the scanner, control panel, output unit and controller—and electricity is supplied only to the component parts in use, which leads to a reduction in total power consumption.

#### ● High-speed recovery from the sleep mode: Making the device quickly ready for use

The software of the output unit has been improved to shorten the time required for recovery to below 3.9 seconds.\* Users can make the necessary settings on the control panel even during the recovery time, and can start copying and scanning without experiencing any stress in waiting.

\*With ApeosPort-IV C3375/C2275

Due to the systematic provision of aforementioned technologies, users can experience almost "zero waiting time" even for the recovery from the sleep mode.



The unique motion sensor "Smart WelcomEyes"

### [Reducing the energy conservation of products] ApeosWare Log Management 1.2

ApeosWare Log Management 1.2, which was released in December 2011, is a software for the management and operation of multifunctional devices and printers. It also helps users visualize their environmental impact and increase the efficiency of their environmental measures.

#### ● Encouraging each employee to reduce their environmental impact

This application visualizes the CO<sub>2</sub> emitted by individual users, revealing each person's eco-friendliness. On the control panel of the multifunctional device, the CO<sub>2</sub> emission reduction and paper use reduction rankings are displayed together with the individuals' levels of contributions to the environment (on a one-to-five scale). This encourages employees to reduce their environmental impact.

#### ● Supporting managers in implementing environmental measures

The software also helps managers monitor the use of electricity/paper and CO<sub>2</sub> emissions by the multifunctional devices and printers in their departments. It also collects and analyzes information about the past use of individual machines and automatically makes the machines shift to the energy-saving mode when they are not in use for a certain length of time, depending upon the use frequency of the machine. The length of time is set to be longer during frequently used hours and shorter for less frequently used hours.



Visualizes various information to encourage users to reduce their CO<sub>2</sub> emissions

## Case 1 Making plastics using eco-friendly materials available anywhere in the world

[Procurement and development of materials and parts] Inedible wooden biomass plastic

In order to decrease dependence on oil, the introduction of biomass plastics—plastics made from plants and other renewable materials—has been promoted. For multifunction devices, plastic parts account for about 30 to 40 percent of the total weight, therefore Fuji Xerox has been proactively developing biomass plastics to reduce the life cycle environmental impacts of our products. Although the company is not a manufacturer of materials, we decided to develop the plastic on our own because no high-quality materials that could meet our criteria for flame resistance and strength were available in the market.

In 2007, Fuji Xerox adopted corn-based biomass plastic as the material for the inner cover of our products, and the ApeosPort-IV, released in December 2011, became the first product that incorporates parts made of inedible biomass plastic.\*

The inedible biomass plastic developed by Fuji Xerox was the first inedible material that obtained the BiomassPla logo.

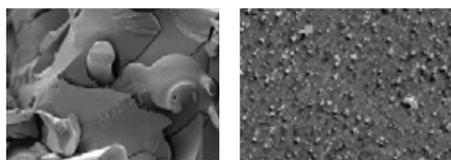
Fuji Xerox developed it through attributing importance to using materials easily available across the world, thinking it important to locally manufacture, consume, and recycle products to reduce life cycle environmental impacts. Specifically, the company chose cellulose contained in wood as the base material for the plastic. Wood is available across the world, and especially in Japan, the use of cellulose will help make more effective use

of forest thinnings. Moreover, the replacement of polylactic acid conventionally used as a material for biomass plastics with cellulose will reduce the amount of energy used in manufacturing.

Cellulose, however, is flammable and difficult to mold. To overcome these problems, Fuji Xerox developed a unique alloy compatibilization technology to mix a small amount of ABS (petroleum-based plastic) into cellulose and compound them physically and chemically, thereby giving sufficient strength and flame resistance. The company is planning to apply the cellulose-based plastic to our products' outer parts, which require higher flame resistance.

To help reduce the environmental impacts of society at large, it is important to promote the use of biomass plastics in a wider range of parts and products in addition to using the plastics in Fuji Xerox's multifunction devices and printers. Fuji Xerox will further improve the performance and cost effectiveness of our own developed biomass plastics by increasing synergies with Fujifilm's material development technologies, thereby contributing to the spread of more eco-friendly plastics in society.

**\*Inedible biomass plastics:** Bio-based plastics that do not compete against food supplies.



Left: Before introducing the compatibilization technology  
The petroleum-based plastic is sticking out like the tip of a rope. Other parts are composed of cellulose.

Right: After introducing the compatibilization technology  
The grainy features are composed of the petroleum-based plastics and other areas are composed of cellulose. The picture shows the optimum dispersion.



Parts made using the inedible wooden biomass plastic and use of the parts in the product

### Case 1 VOICE



**Fuji Xerox could be remembered as a manufacture of biomass plastics**

**Kenji Yao**  
Team manager,  
Marking & Materials Technology Group  
Marking & Materials Research and Technology Dept.  
Fuji Xerox

The team was initially established for the Design for Environment (DfE) project but subsequently began specializing in developing plastic materials. I started research into biodegradable plastics after being shocked by the sight of waste piled up on *Yumenoshima* (a disposal site in Tokyo). We developed the inedible biomass plastic for use in parts for multifunction devices, but I believe it can contribute to creating more eco-friendly society by broadening the scope of its application.



**Preventing the spread of fires caused by burning plastics**

**Masayuki Okoshi Ph.D.**  
Marking & Materials Technology Group  
Marking & Materials Research and Technology Dept.  
Fuji Xerox

In Japan, traffic accidents account for the largest percentage of fatal accidents, followed by fires. As many as 2,000 people lose their lives due to fires on an annual basis. Heated plastics will melt and burn, causing the spread of a fire. I have long been engaged in the development of technologies to increase the flame resistance of plastics. Through such development activities, I would like to increase the flame resistance not only of office equipment but also of household goods (such as sofas and beds), thereby helping prevent the spread of fires caused by plastics.

## Case 2 Achieving zero landfill across the Asia-Pacific region

[Disposal] Fuji Xerox Eco-Manufacturing (Suzhou)

As one of our core environmental activities, Fuji Xerox has been implementing the Integrated Recycling System, which focuses on the recovery of end-of-life products as well as the reuse and recycling of parts. Among the 3Rs (reduce, reuse, recycle), the company gives higher priority to reducing the use of resources and reusing the parts of recovered products than to material recycling. In 1995, Fuji Xerox was the first company in the industry to introduce products containing recycled parts to the Japanese market. In August 2000, it became the first in Japan to achieve zero landfill\* from recovered used products.

Additionally, Fuji Xerox has been conducting these activities proactively also outside Japan. The company introduced the Integrated Recycling System throughout Asia Pacific establishing the recycling center in Thailand in December 2004, which recycles used products and consumables recovered from nine countries and regions, and accomplished the zero landfill in 2009. Also, in January 2008, Fuji Xerox Eco-Manufacturing (Suzhou) started operation of the Integrated Recycling System in China. It disassembles used products collected from all over China (excluding Hong Kong, Macao and Taiwan) and sorts them into 70 categories including steel, aluminum, lens, glass, and copper. The sorted parts are then cleaned and examined for material recycling. Over the period from the operation launch to April 2012, the company generated about 2,200 tons of recycled resources. Parts that cannot be recycled as materials are used as heat sources, and in fiscal 2010, it accomplished zero landfill goal.

Thus, Fuji Xerox has achieved the zero landfill goal across the Asia-Pacific region. In the future, the depletion of natural resources will become an even more serious problem and all resources must be treated as invaluable materials. The company will make more effective use of resources and foster cost reduction by increasing the recovery rate of end-of-life products in China and other Asian-Pacific regions.

\*Fuji Xerox defines zero landfill as recycling rate of more than 99.5%.

### Case 2 VOICE



**It is more difficult to reuse and recycle than to manufacture new products.**

**Chen Yi Yuan**  
Manager, Recycling Division,  
Manufacturing Department  
Fuji Xerox Eco-Manufacturing (Suzhou)

While achieving remarkable economic growth, China is facing the challenge of reducing its environmental impacts by protecting and making more effective use of resources. I am proud of being engaged in the Fuji Xerox Integrated Recycling System. Through this job, I have found it is more difficult to recycle products than to make new products, which has raised my environmental awareness and commitment to making a contribution to society. I am now participating in local social contribution activities, including providing environmental education at neighboring schools. I would like to continue fulfilling my role in environmental improvement in China.



Fuji Xerox Eco-Manufacturing (Suzhou) achieved the zero landfill goal in China by making maximum use of resources.

### Stakeholder message



**Mr. Fan Xing Hua**  
President,  
Taicang HuaDing Plastics Co., Ltd.

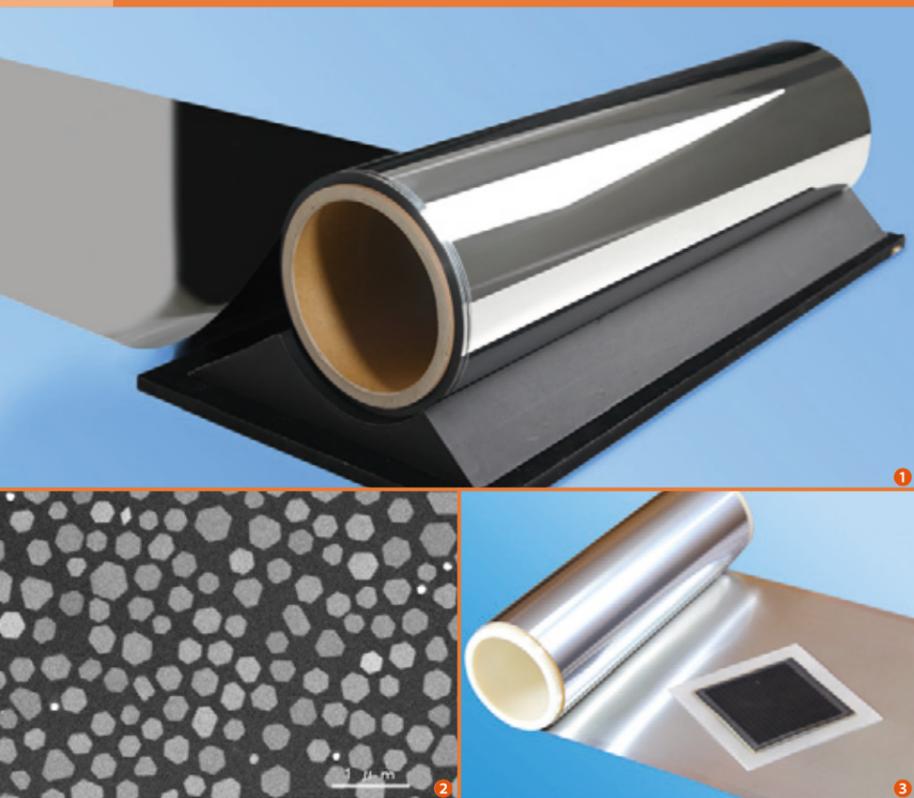
### Aiming to increase the environmental awareness of Chinese society at large

Environmental problems are attracting much attention across the world and both individuals and companies are required to protect the environment as their responsibilities. Resources on the Earth are limited and human beings need to make sustainable use of them. To do this, I think it is essential to recycle end-of-life products. China is not environmentally developed and people are not so aware of the importance of environmental protection. If, however, all Chinese citizens begin conducting recycling activities, it will make a huge contribution to the sustainable development of the world.

Our company has been continuously conduct-

ing environmental activities, including recycling, to fulfill our corporate social responsibility as a partner company of Fuji Xerox. Fuji Xerox has shown the environmental protection and resource recycling principles to be followed by Chinese companies in the future, and I hope the company will continue to take leadership in promoting resource recycling activities in China. By working with Fuji Xerox and as a model company in China, we would like to contribute to increasing the environmental awareness of the entire Chinese society and to the sustainability of the Earth.

# Supporting the Effective Use of Solar Energy with Film Technologies



To curb global warming, power generation using natural energy such as solar cell and CSP system (concentrating solar power system) has been attracting ever more attention. On the other hand, demand for electricity increases in summer due to the same solar energy. Under these circumstances, Fujifilm aims to produce materials that effectively use or block solar energy and control it, based on the research results and manufacturing technologies that the company has long accumulated in the field of films. In this way, we hope to contribute to the creation of a comfortable and sustainable society.

- 1 Film-type mirror used for CSP system: Long film mirrors can be manufactured in vast sizes thanks to the adoption of the roll-to-roll process
- 2 Near-infrared light reflecting film: Silver hexagonal nano disk grains on the film surface
- 3 Flexible CIGS solar cell substrate: The rectangular object is a prototype of the solar cell sub-module

## Social challenges and backgrounds

The Great East Japan Earthquake has made us all recognize that we need to build a more disaster-resistant society and ensure the stable supply of energy as an important social issue. The introduction of renewable energy has long been fostered to help in preventing global warming and improve the energy self-sufficiency rate, and since the occurrence of the mega-earthquake, this movement has further accelerated. According to Japan's basic energy plan, the percentage that renewable energy accounts for within primary energy supplies

will increase to 10% by 2020.\* To achieve this target, however, we need to overcome a range of difficulties, including stabilizing energy supplies and reducing costs, for which technological innovations are urgently required. Also, we need to regard the energy problem as a global problem and make contributions to the international community by helping it resolve the problem through the use of the excellent technologies that we have in Japan.

\*Basic Energy Plan by the Ministry of Economy, Trade and Industry (June 2010)

## Case 1 Flexible and high-reflectance mirror for CSP system, which is now attracting much attention

### Film-type mirror for CSP system

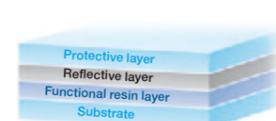
In CSP system, sunlight is collected, with its heat used to drive the steam turbine. This method is suitable for locations with large spaces and plenty of sunshine available, such as deserts. In this power generation method, solar heat can be stored for power generation during the nighttime, and also drinking water can be produced from distilled seawater. Because of these merits, this power generation method has been attracting much attention recently.

In order to reflect and collect solar heat efficiently, high-precision reflecting mirrors are necessary. For example, at a large-scale concentrating solar power plant, many mirrors—each exceeding one square meter in size—are used. For CSP system in places like deserts, the mirrors also need to be highly durable, light, and easily transportable and installable. At present, mainly mirrors manufactured using glass as a base are used for CSP system—but glass is heavy and can be easily broken. The new film-type mirrors being developed by Fujifilm have the same re-

flectance as a glass mirror but are between 1/20 and 1/30 the weight of the glass type.

Fujifilm has developed this film-type mirror by using its silver-related base technologies, which the company has long accumulated through the manufacture of photographic films. Silver has the highest reflectance among all metals and is optimal for use in mirrors. Also, Fujifilm possesses recovery technologies and facilities for silver salt, so the film-type mirror is recyclable. By applying the film-forming technology to create a thin silver film evenly on the plastic film surface and using the production line for films,

### Composition of the film-type mirror



The mirror is composed of four layers: a transparent protective layer (surface layer); a reflective layer (silver-coated layer); a functional resin layer (base layer); and a substrate (PET resin sheet) to provide high reflectance and durability.

the company has succeeded in developing the film-type mirror as an important material for the development and spread of CSP systems. The company is now following the necessary steps toward commercialization of the product, including manufacturing the product at a pilot plant in cooperation with engineering

manufacturers. Although Japan has few resources, it can help the world stabilize energy supplies and make more effective use of resources by exporting the excellent technologies being developed in the country.

## Case 2 The new flexible substrate to expand the possibilities of solar cells

### Flexible CIGS solar cell substrate with insulating layer

Solar cells convert sunlight to electrical energy by using semiconductors. In addition to solar cells made by using crystal silicon semiconductors, currently the mainstream products, there are also various other solar cells available in the market. In particular, CIGS solar cells\* are attracting much attention because its conversion layers are as thin as several microns, and its high conversion efficiency. These cells, however, need to be manufactured at temperatures of 500°C or higher and so flexible substrates with insulator are needed to resist against this high temperature.

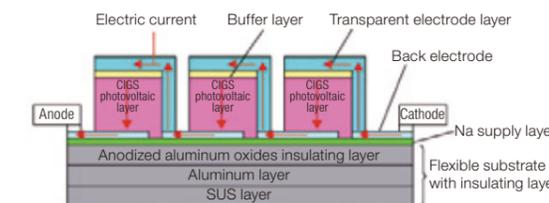
Fujifilm decided to develop flexible substrates with insulating layer for CIGS solar cells because there were no such substrates that could achieve high conversion efficiency. Applying the technology that have long accumulated in the field of printing materials, the company developed a substrate with insulating layer that has enough heat resistance for use in the manufacture of CIGS solar cells at temperatures exceeding 500°C.

Fujifilm will make further contributions to the spread of solar cells by commercializing and stably supplying light weighted,

bendable, and low-cost substrates that will help increase the conversion efficiency of solar cells.

\* CIGS solar cells: Thin-film solar cells made from copper, indium, gallium, and selenium (CIGS) semiconductors

### CIGS solar cell sub-module using flexible substrate (with insulating layer)



The newly developed substrate enables the serial connection of multiple solar cells on a single substrate, leading to a 15% photovoltaic conversion efficiency. Moreover, relative to glass substrate, the unit weight has been reduced to at least a half. (Collaborative work with the National Institute of Advanced Industrial Science and Technology (AIST))

## Case 1 VOICE



### Makoto Yamada

Senior Research manager  
Frontier Core-Technology  
Laboratories  
Research & Development  
Management  
Headquarters  
FUJIFILM Corporation

### Developing technologies to pass down a "debtless" society to future generations

Fujifilm is experienced at developing the highly functional materials needed by society by combining a range of different technologies. In this case we have applied various technologies in combination to make high-reflectance layers and provide new value by supporting power generation with lower environmental impact, including a coating technology, technology to bond layers together to increase their durability, and the technology for stable mass production. We will continue to develop new technologies to help decrease dependence on fossil energy and pass down a "debtless" society to future generations.



### Mitsuyuki Tsurumi

Research Manager  
Frontier Core-Technology  
Laboratories  
Research & Development  
Management  
Headquarters  
FUJIFILM Corporation

### Developing highly functional materials to make contributions to society

Through the development of photosensitive materials, Fujifilm has gained expertise in chemical reaction and particle formation mechanisms. By controlling these mechanisms, we have been improving the functionality of materials—this is the *modus operandi* of Fujifilm. We have developed the film-type mirror in collaboration with departments engaged in analysis and synthesis and have increased the performance of the product by conducting research into the underlying mechanism and functions. We will continue to conduct this process to develop more functional materials and make an even greater contribution to society.

## Case 2 VOICE



### Katsutoshi Yamane

Senior Research manager  
Frontier Core-Technology  
Laboratories  
Research & Development  
Management  
Headquarters  
FUJIFILM Corporation

### Diversifying our products based on our expertise in film technology

I think it is wonderful that manufacturers can contribute to society through their products. Fujifilm has been diversifying its products based in the field of photographic films. However, we always maintain the basics of manufacturing, attributing great importance to making highly reliable products. We are providing customers with high-quality products in a stable manner so that we can continue to deserve their trust. It would be marvelous if we could also inspire our customers through our products.

### Case 3

## Silver nanotechnology: blocking solar heat but letting the visible light through

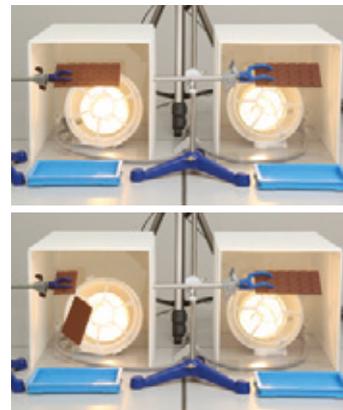
### Near-infrared light reflecting film

In an experiment conducted on August 29, 2011, on which outside temperatures rose to 30.8°C, the temperature inside the window decreased by 6.5°C at maximum as a result of attaching the heat shield film using the newly developed near-infrared light reflecting film, onto the west-facing window (see “Results of temperature measurement” below). Sunlight is composed of visible rays (46%), ultraviolet rays (6%), and infrared rays (48%). The main feature of this reflective film is that it can block not only ultraviolet rays but also infrared rays, which account for about half of sunlight, with high efficiency. The film, however, allows most of the visible light rays to permeate, providing high transparency. It is therefore suitable for use on the windows of trains, buses, and other vehicles, from which passengers can enjoy watching the passing scenery, as well as on the windows of houses and offices.

The base technology used in the development of the near-infrared light reflecting film is silver nanotechnology. Photographic films are made using silver halide, which is a silver compound, and Fujifilm has long accumulated silver-related base technologies in the field of photographic films. By making use of advanced optical simulation technology, the company discovered that hexagonal nano disk grains reflect infrared rays, and by applying various base technologies, succeeded in commercializing the product in only three years. Moreover, the use of silver, which is a precious metal, was minimized, and by using our existing manufacturing facilities, an environmental conscious product has been created.

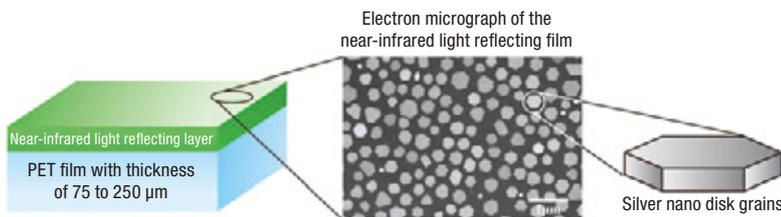
This heat shield film with the near-infrared light reflecting film, which was developed jointly with LINTEC Corporation, was released by the company nationwide in May 2012. The film can block 32% of solar heat with a shade factor of 0.68. It suppresses temperature rises simply by attaching it to a window, providing an easy method of conserving energy and power. We aim to achieve successful results with the product in Japan, which is now facing severe power shortages, and will then expand sales to overseas, thereby making contributions to more effective use of energy across the world.

#### ■ Experiment to confirm the effectiveness of the near-infrared light reflecting film



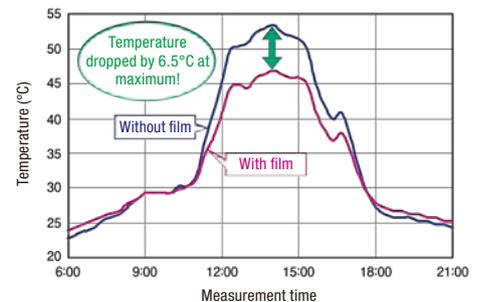
A bar of chocolate was placed in front of the glass onto which the film was attached (right) and not attached (left). Only the bar in front of the glass without the film melted and fell to the ground several minutes after the glass began to be warmed by strong sunlight. [Picture on the bottom left]

#### ■ Layers of the near-infrared light reflecting film



On the film surface, silver hexagonal nano disk grains are evenly placed at a high density. The film allows not only visible rays but also radio waves to permeate and so cell phones and other devices can be comfortably used in the room. The technology to evenly coat tabular grains over a wide area is also one of the unique skills possessed by Fujifilm.

#### ■ Results of temperature measurement (inside of the window)



### Case 3 VOICE



**We have accumulated film technologies for over 160 years**

**Katsuhisa Ohzeki Dr. Eng.**

Research Manager  
Frontier Core-Technology Laboratories  
Research & Development Management Headquarters  
FUJIFILM Corporation

We have now accumulating silver halide photographic film technologies for more than 160 years, although technologies are usually replaced with new ones in about 30 years. The near-infrared light reflecting film was created by making use of Fujifilm's nano disk grain formation technology and coating technology developed in the field of photographic films. I think these long-accumulated technologies have great strengths, and without them we could not have developed this film.



**We are committed to contributing to society through the use of our optical technologies**

**Naoharu Kiyoto**

Frontier Core-Technology Laboratories  
Research & Development Management Headquarters  
FUJIFILM Corporation

I think Fujifilm can make an excellent contribution to society by utilizing its own technologies. We have strong technologies in the field of optical materials, based on which we manufacture and supply high-quality products in a stable manner to society. We will continue developing unique products by conducting research to develop products that will become next-generation mainstream products.