TOYO GOSEI

Naturally innovative company, Toyo Gosei

Our Innovative R&D becomes Global Technonolgy

Company History

September, 1954

For the purpose of manufacturing and refining medicinal chemicals such as anaesthetic drugs (ethylene trichloride and barium chlorate), established Nihon Acetylene Chemical Engineering Co., Ltd. (Capital : one million yen) with a factory at 3-13 Edogawa, Edogawa-ku.

1956

Moved headquarters to Komatsugawa, Edogawa-ku, Tokyo.

May, 1961

Changed corporate name to Toyo Gosei Co., Ltd.

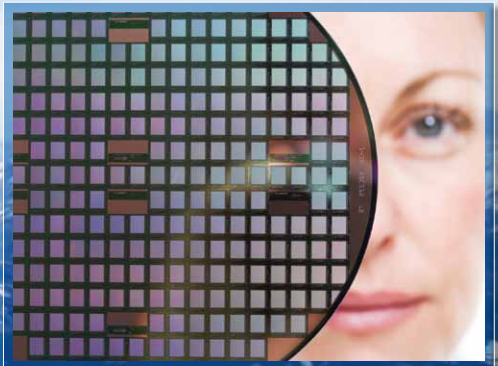
January, 1963

Completed construction of a new factory in Ichikawa City, moved factory operations, and started manufacturing acetate ester.

Developing Only-one Technology* in the World

Our company has obtained patents all over the world for the innovative technologies stemmed from our creative R&D.

*Water-soluble photosensitive resin BIOSURFINE®-AWP



No.1 in the World*

Our company leads the world in the field of photoresist materials.

*From *2011 Resist and Lithography-related Market Overview* published by Fuji Soken

Direct to the Global Market

Our overseas sales accounts for 36% of the total sales, and it has been gained by exporting our products directly to 26 countries in Asia, North America, Europe and etc.

February, 1971

Opened Tokyo Sales Office in Chuo-ku, Tokyo.

August, 1971

Relocated headquarters to Ichikawa City, Chiba.

October, 1971

Constructed Takahama Chemical Tank Terminal in Ichikawa City (400kℓ tank × 6 and 650kℓ tank × 5) , and started liquid chemical warehousing operations.

May, 1972

Received a certification as a bonded warehouse on the Takahama Chemical Tank Terminal from Ministry of Finance (MOF)

October, 1975

Got a license to be of an intermediate treatment trader of industrial waste from Chiba Prefecture.

Shift to the Future with overcoming difficulties

December, 1978

Got a license of warehousing business (Licence Number #341)

July, 1981

Completed Photosensitive Material manufacturing facilities at Ichikawa Plant, started manufacturing Photosensitive Materials.

September, 1982

Set up Photosensitive Material Research Center in Funabashi, Chiba, Japan.

August, 1983

Completed the sixth stage construction at the Takahama Chemical Tank Terminal (total capacity for liquid chemical storage 47,500kℓ)

October, 1985

Installed three LPG tanks at Takahama Chemical Tank Terminal (Tank capacity 1,800kℓ ×3), begin LPG consigned storage business.

September, 1988

Established Chiba Toyo Gosei Co., Ltd. a fully owned subsidiary in Katori District, Chiba, for the purpose of manufacturing Photosensitive Materials (Capital: 200,000,000 yen)

Our Core Technologies → Our Creative R&D → Our Vision for the Future

Our innovative technologies for breakthrough

Developing from medicinal chemicals to distillation purification technologies

Founded in 1954, Toyo Gosei Kogyo began manufacturing operations in the field of medicinal chemistry. Studying as many research papers in chemical journals and magazines in the United States as possible, "we managed to construct a distillation column, which dissolves liquid chemicals to isolate components utilizing the boiling point to distillate, and purifies imported raw materials of synthetic fibers. This innovative technology brought us great commercial success. Soon after that, the major domestic petrochemical companies began their own production of synthetic fibers and resins without relying on imported materials. The time for the next technological innovation had come.

Expertise in Chemical Reaction Technology

Using domestically mass produced petrochemicals as raw materials and giving them chemical changes, our company proceeded to the technological development to produce raw materials for paint, agriculture, and synthetic resin additives. By visiting laboratories in many universities, we learned chemical reaction techniques proactively, which is the core for our flavor & fragrance material business today. In other words, we made effort to develop the technologies for mass production from the very beginning experiment stage at the laboratories.

Research and Development of Photosensitive Materials for going beyond the next generation

The two oil crisis in the 1970s not only let the major petrochemical manufactures join the derivatives fields, but also accelerated to yield other innovative technologies. Japanese industries rapidly shifted towards production of electronic devices, which performance is hugely dependent on semiconductors, and for which production the solution of photosensitive resin is essential. It was necessary for us to tackle the research and the development of photosensitive materials owing that the density of semiconductors becomes quadruple every three or four years according to the Moore's Law. While the semiconductor industry were producing and selling semiconductor products, and developing the production technologies just focusing on the next generation, we conducted research and development aiming to meet the needs of the industries two generations ahead, i.e., seven or eight years away.

Ceaseless Technological Innovation

Our research and development is ceaseless because it encourages us to tackle difficulties and to generate innovative technologies. We are proceeding technology innovation for the future e.g., biotechnology and nanotechnology with our creative and unique R&D stemmed from technologies and experiences accumulated over a half century. Our positive approaches and actions will never end.

November, 1989

Completed Photosensitive Material manufacturing plant, in Chiba Toyo Gosei Co., Ltd. (present Chiba Plant)

May, 1993

Received ISO 9002 certificate for Photosensitive Materials manufacturing section of Ichikawa Plant.

May, 1994

Received ISO 9001 for Ichikawa Plant.

October, 1995

Received ISO 9002 for chemical products manufacturing section of Ichikawa Plant.

April, 1996

Received ISO 9001 for Takahama Chemical Tank Terminal.

April, 1996

Incorporated Chiba Toyo Gosei Co., Ltd and Tosei Sangyo Co., Ltd. Received ISO 9002 certificate for both Chiba Plant and Takahama Chemical Tank Terminal.

November, 1996

Completed new research center in Inba District, Chiba and relocated the Photosensitive Materials Research Center.

Our Foresight & the Realization

September, 1998
Established TG Finetech Inc, a fully owned foreign affiliate in Ohio, USA. (Capital 400,000 US dollars)

March, 2000
Registered to the Japan Securities Dealers Association (currently Tokyo Stock Exchange JASDAQ market) as a OTC company.

January, 2001
Completed the third Photosensitive Materials facility in Chiba Plant.

July, 2002
Received ISO 14001 for Ichikawa Plant.

October, 2002
Constructed new food ingredients manufacturing facility.

April, 2003
Introduced a divisional system.

June, 2004
Published environmental report.

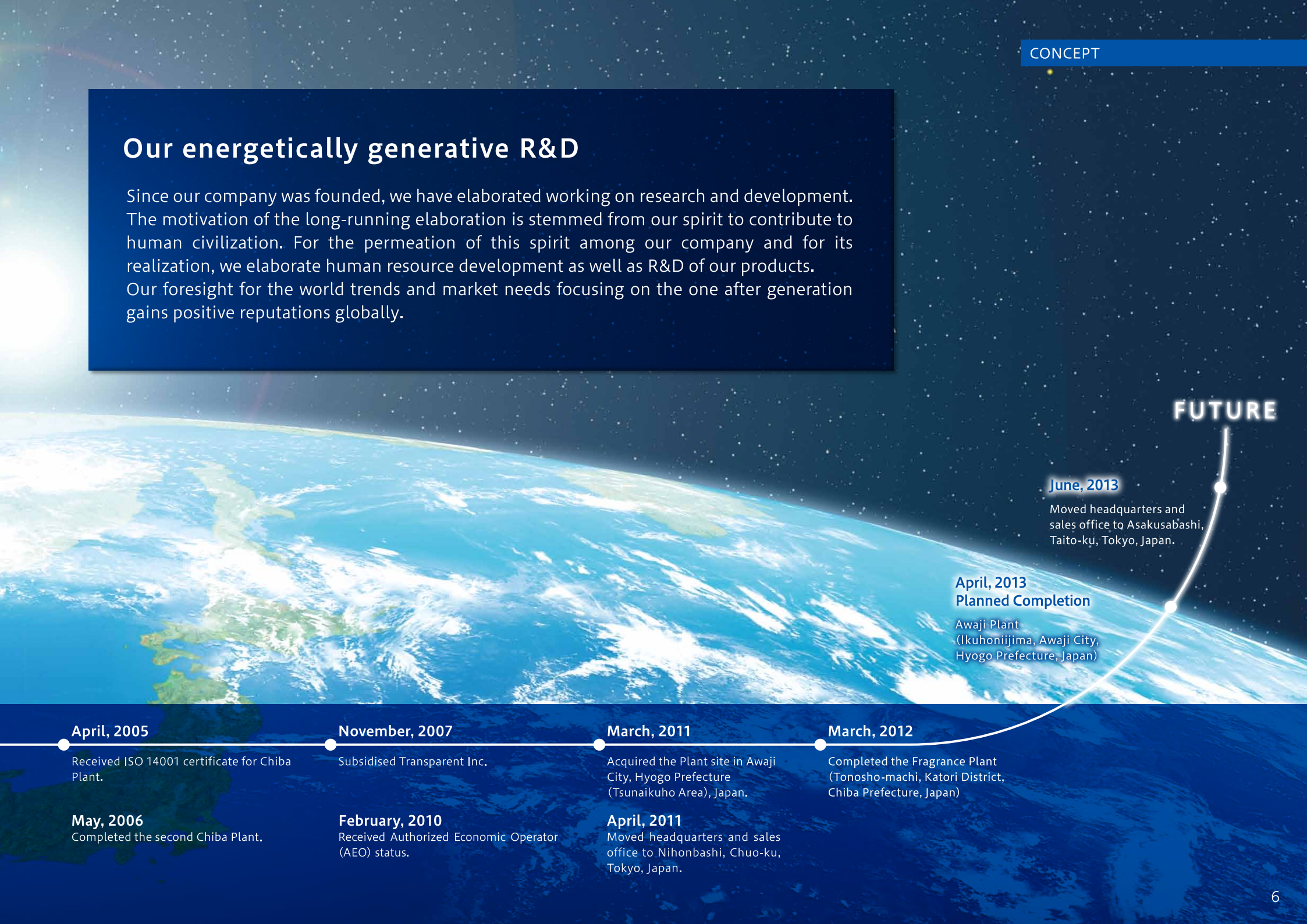
September, 2004
50th anniversary of Toyo Gosei Co., Ltd.

December, 2004
Completed the manufacturing facility for ionic liquid.

April, 2005
Established a logistics base in Rotterdam, Netherlands.

Our energetically generative R&D

Since our company was founded, we have elaborated working on research and development. The motivation of the long-running elaboration is stemmed from our spirit to contribute to human civilization. For the permeation of this spirit among our company and for its realization, we elaborate human resource development as well as R&D of our products.
Our foresight for the world trends and market needs focusing on the one after generation gains positive reputations globally.



FUTURE

June, 2013
Moved headquarters and sales office to Asakusabashi, Taito-ku, Tokyo, Japan.

April, 2013
Planned Completion
Awaji Plant
(Ikuhonijima, Awaji City, Hyogo Prefecture, Japan)

March, 2012
Completed the Fragrance Plant (Tonosho-machi, Katori District, Chiba Prefecture, Japan)

March, 2011
Acquired the Plant site in Awaji City, Hyogo Prefecture (Tsunaikuho Area), Japan.

April, 2011
Moved headquarters and sales office to Nihonbashi, Chuo-ku, Tokyo, Japan.

November, 2007
Subsidised Transparent Inc.

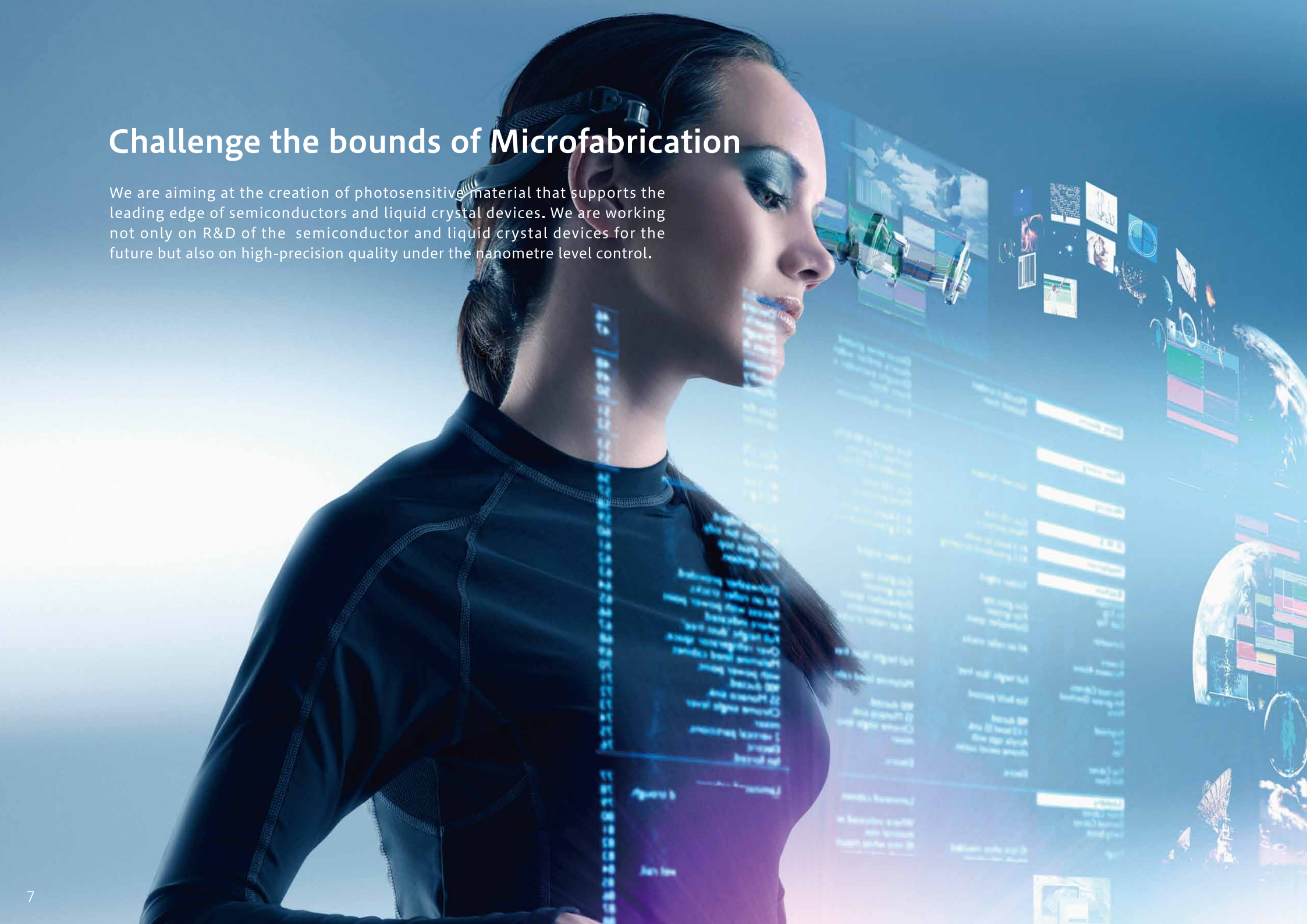
February, 2010
Received Authorized Economic Operator (AEO) status.

April, 2005
Received ISO 14001 certificate for Chiba Plant.

May, 2006
Completed the second Chiba Plant.

Challenge the bounds of Microfabrication

We are aiming at the creation of photosensitive material that supports the leading edge of semiconductors and liquid crystal devices. We are working not only on R&D of the semiconductor and liquid crystal devices for the future but also on high-precision quality under the nanometre level control.



Contamination of our photosensitive materials: from “ppb” to “ppt”

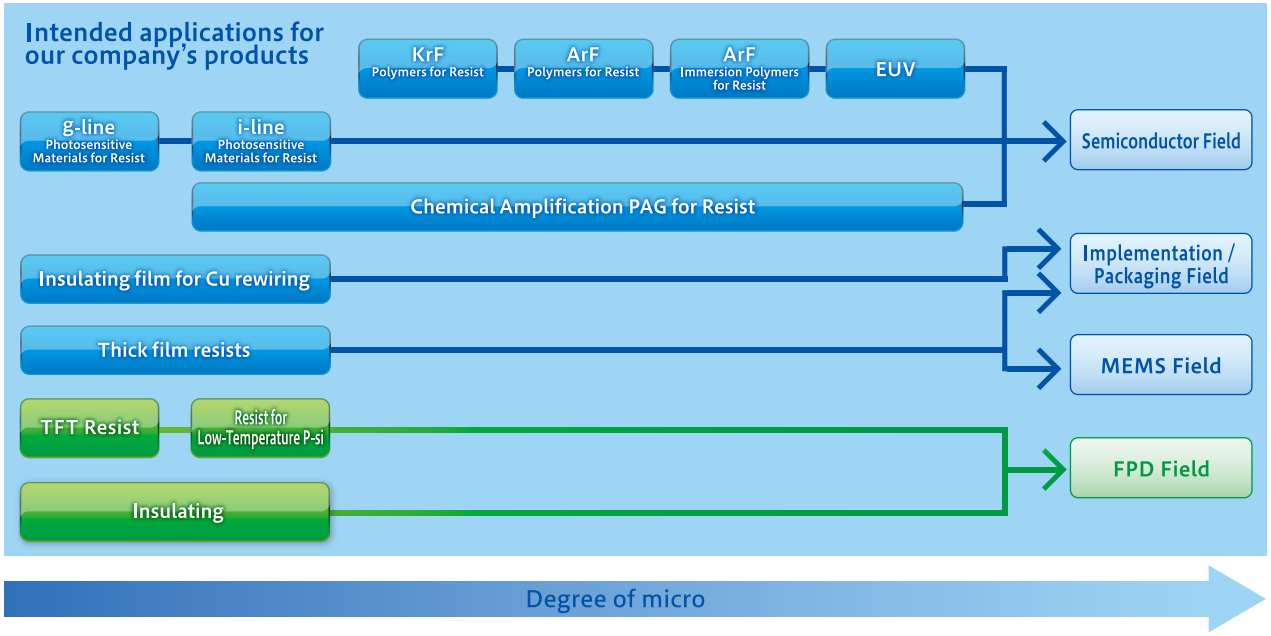
We began basic research into the photosensitive compounds used in forming semiconductor circuits in the mid-1970s when we suffered from the oil crisis twice. By 1981, we had succeeded in commercializing ‘positive photosensitive materials (PAC)’ and ‘negative photosensitive materials’. Since 1997, we also have been providing ‘photo acid generators (PAG) for chemically-enhanced resist’ and ‘polymers for KrF resists’ responding to the trend of the miniaturization of semiconductor devices at that time. Semiconductor integration density is increasing every year, and nano-scale fabrication under 100 nanometers dimensions is rapidly becoming a mainstream. Responding to this trend, we built the third plant for photosensitive materials in 2001, and began producing ‘polymers for ArF resists’.
We look towards the next “ppt” level of contamination, while we continue to mass-produce high-performance, high-quality photosensitive materials with ppb* impurity level.

*1ppb = 0.0000001% (parts per billion) / 1ppt = 0.0000000001% (parts per trillion).

Support from Development to Commercialization

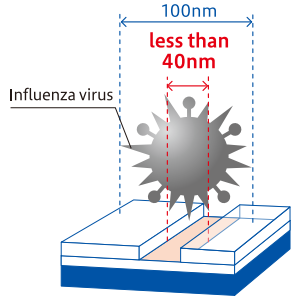
The market is becoming more demanding: from the quality of the products to the speed and the cost. We consider that all the process of production -from the first stages of development of raw materials to the final stage of commercialization- would determine the value offered to our customers. By maintaining the value, we will be a company that grows with our customers.

» High-performance & high-quality photosensitive materials for ever higher fabrication densities



Semiconductors are made using lines that are narrower than viruses.

Semiconductor fabrication production is supported by very fine technique. Thanks to the technology, it is possible to form under 40 nm width lines currently, which is far thinner than the 100 nm diameter of the influenza virus.



Green Chemicals: Combining & Refining High-Purity Chemicals without Environmental Destruction

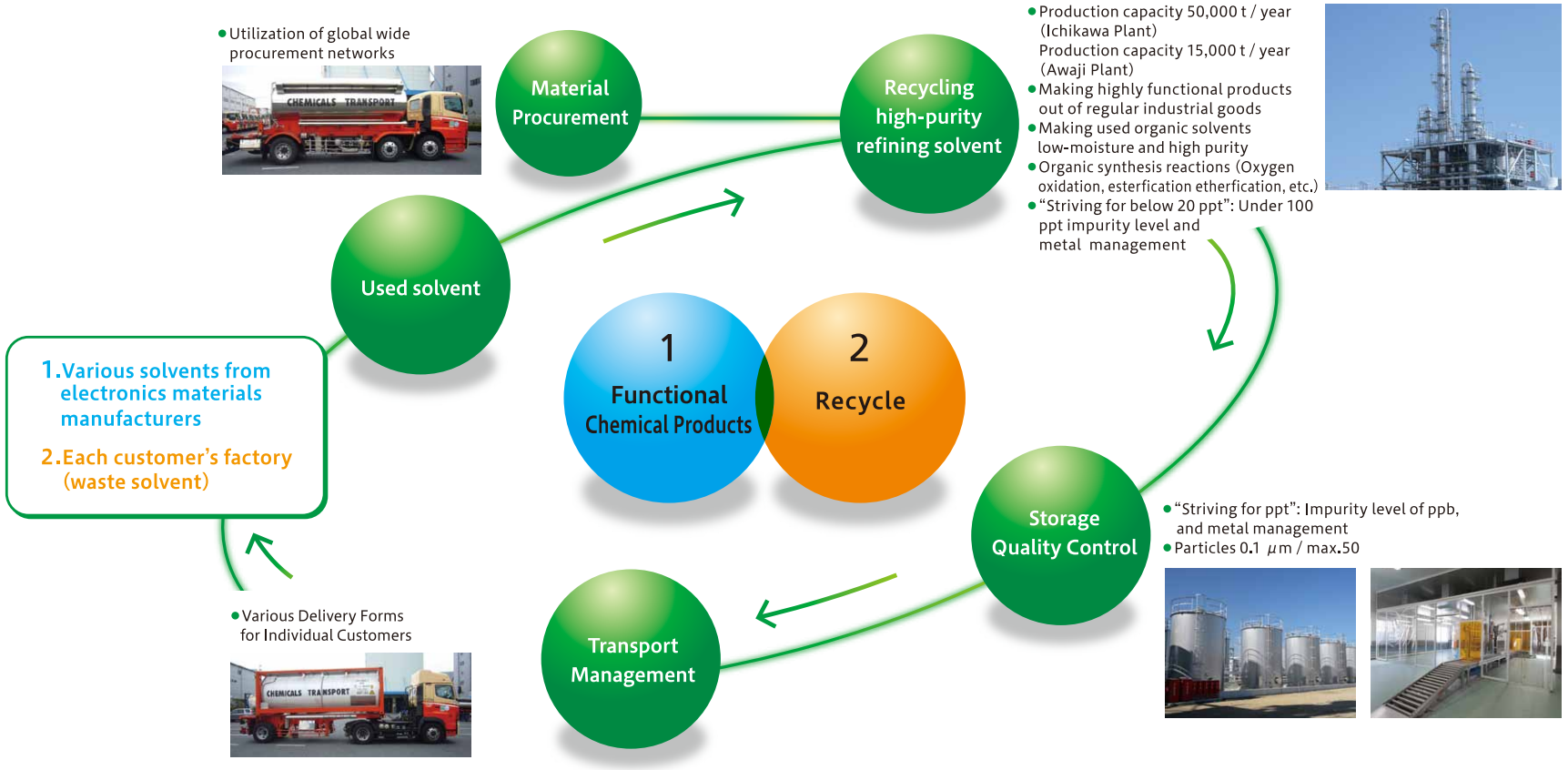
The Green Chemicals Division is engaged in synthesis and refinement of the high purity solvents, especially used for electronics materials in ppb level, and is recycling the solvents.

Manufacture and Sale of Functional Chemicals

By maintaining well-organised management systems and well-equipped analytical facilities for our products, our Green Chemicals Division responds to the increasing demands of our customers. High functional chemicals we offer can get rid of the slightest impurities that affect the quality, and are packed in the clean room cutting off any contaminants.

Effective Use of Resources and Preservation of the Global Environment

Taking advantage of distilling and refining technology fostered for over half a century, we have a business developed around the recycling of organic solvents. We contribute to the effective use of limited resources and to protecting the global environment using advanced recycling technology.



Electrolytes as Future Rechargeable Energy Device

We provide electrolytes used for rechargeable energy devices, e.g., lithium-ion batteries and electric double-layer capacitors. These eco-friendly batteries are highly demanded now.

Energy Device Technology towards Future Generations

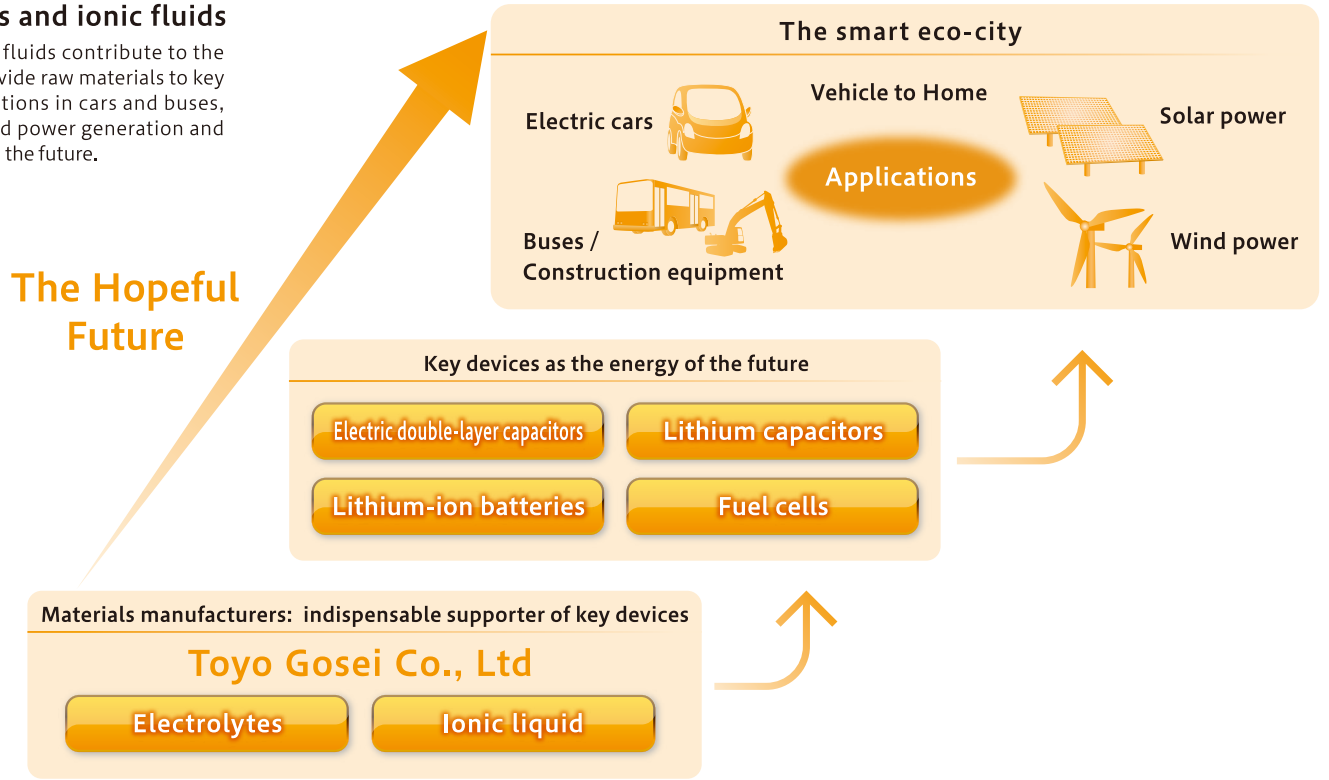
Electric double-layer capacitors as potential energy systems of the future are expected to be used for wind power generators, vehicles, and also dye-sensitized solar cells. Our Energy Division supplies the electrolytes and ionic fluids used in these products; with 25 years of experience as a photosensitive materials manufacturer, we can offer stable mass-production of electrolytes of very high purity and high quality.

Customer Support: from R&D to Mass-Production

Our long-running technologies for electrolyte synthesis in high purity levels, solvent purification, control of electrolyte density, and impurity control at the ppm scale are all for our customers. We provide samples of electrolytes and ionic fluids through the whole development processes of our production. With our own mass-production facilities, we can provide electrolytes at the rate of several tens of tons per month and ionic fluids at the rate of several tons per month. We can respond to various customers' demands with all of our long-running technologies.

Applications of electrolytes and ionic fluids

Our high purity electrolytes and ionic fluids contribute to the constitutions of Smart Eco-City. We provide raw materials to key device manufacturers for their applications in cars and buses, construction equipment, solar and wind power generation and more, helping to realize Smart Eco-City in the future.



Providing Aroma Chemicals of High Quality and Stability to the Global Flavour and Fragrance Industry

Flavour and Fragrance Material Division provides high quality and stable aroma chemicals to the world using over a half-century experience in synthesis, distilling, and refining technologies.

All Aromas: Fragrance & Flavor

With our over 50 years' distilling-purifying and synthesizing technologies, we produce high quality and stable flavour aroma chemicals from highly purified chemical compounds used for the daily-use products such as shampoo and body soap, and for the flavors of food products. We have achieved KOSHER and HACCP as well as ISO certification, implementing thorough quality management.

High Quality Delivery Systems

In order to respond to worldwide customer needs, we set up a speedy delivery system, by establishing a logistics warehouse in Rotterdam, Holland to serve our European customers.

Enriched Life by Aromas

Our lives are filled with a variety of aromas, such as refreshing fruit scents, sweet floral scents, scents of each season, and that of sweet memories. Aromas can bring a richness, variety, and depth to our everyday lives, which cannot be realised by any advanced technologies. We wish our aroma contributes to the enrichment of people's everyday life.

High Performance Chemical Logistics Terminal

We have been contributing to our customers' logistics with our more than a half-century experience of chemical manufacturer.
Our convenient location and facilities with built-in safety measures provide high added value to the Tokyo-area chemical logistics terminal.

Sea-Land Interface (Capable of) Handling 200 Ships per Month, 200 Trucks per Day

The Takahama Chemical Tank Terminal (in Ichikawa City, Chiba) handles hazardous materials for our customers, with ISO 9001 certified quality assurance system. The terminal is situated at a strategic point at the centre of the Tokyo Bay coastline, and is only two minutes from the metropolitan expressway network. There are a total of 65 chemical storage tanks of a variety of capacities, material properties, and functions (56 tanks capable of class 1 petroleum storage) for a total storage capacity of 55,400 kiloliters. Three berths can accommodate 200 ships per month, and the truck filling facility (25 lanes, all accepting full-sized tankers) can handle 200 trucks per day.

Receiving, Storage, and Shipping Safe and Efficient Handling of Hazardous Materials

Our one-tank･one-line system (-from ship to tank storage and to truck dispatch-) prevents any contaminations.
The facility can transfer petroleum from class 1 and also blend the chemical products. Our permanent staffs at on-site laboratory can respond to quality assurance and emergency analysis (affiliated with the Japan Marine Surveyors and Sworn Measurers' Association). The temperature control system allows for the precise temperature management required for handling highly hazardous and highly reactive materials.

Facility Outline

- Site Area: 43,000 ㎡
- Total Storage Capacity: 55,400 kℓ
- Number of Tanks: 65 tanks
- Tank Breakdown: 2,000 kℓ × 5 tanks
  1,000 kℓ × 31 tanks (including 8 SUS)
  650 kℓ × 12 tanks (including 2 SUS)
  400 kℓ × 17 tanks (including 9 SUS)
- Hazardous Materials Automated Storage:
  Capacity 10,000 drums
- Lorry Filling Stations: 25 span
- Drum Filling Stations: 5 automatic filling machines
- Truck Scales: Up to 40 t, 15 m long × 2
- Boilers: 1.5 t/hr × 2
- Refrigerators: 39.9 t × 2
- Liquid Nitrogen Storage Capacity:
  18,000 ℓ Evaporation Potential: 1,500 ㎥/hr
- Analysis Lab: Can handle any type of analysis
  (Associated with Shin Nihon Kentei Kyokai)

R&D is our Core

Founded on R&D, we always pursue further technologies. By interacting with leading-edge researchers from around the world, we continue R&D for the high and innovative technologies of photosensitive materials, which can be applied for other fields including energy, nanotechnology and biotechnology.

Three research groups, over fifty researchers in our R&D organization

Each laboratory elaborates R&D on organic and polymer synthesis techniques, and very high levels of purity along with our customers' demands and market trends on one hand, and on new chemical compounds, new functionalities and applications, and more efficient techniques for synthesis on the other hand. The three research groups consist of: Photosensitive material research group (R&D on photosensitive materials used in producing semiconductors); Energy research group (R&D on ionic fluids and electrolytes); and Next-generation technology research group (R&D on nanotechnology and biotechnology)

Three actions at Photosensitive Material Research Group to compete in the global market

1. Partnerships with academia to adopt the latest technologies

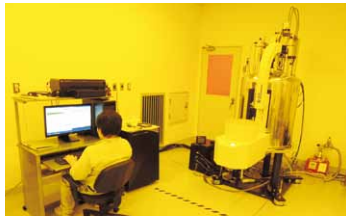
All of the R&D groups are working on the latest technologies in collaboration with specialists in the respective fields (e.g., the University of Tokyo and Waseda University, National Institute of Advanced Industrial Science and Technology).

2. Guest Lecturers from Major Universities

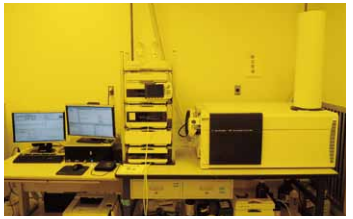
We have an Organic Compound Study Group headed by Dr. Kenji Mori, and a Polymer Chemistry Study Group headed by Dr. Yōtarō Morijima. Organic compound technology is one of the core competences of our company. We also call in Dr. Mori as a consultant on organic synthesis for the entire company. Since many of our products take the from of polymers, knowledge of polymer chemistry is also extremely vital. The central role of polymers in our products makes polymer chemistry a crucial area of interest.

3. International Academic Conferences

Since the very beginning of R&D on photosensitive materials, we have let our young researchers participate in international conferences about lithography of semiconductor in the States to enhance their knowledge for the products as well as the network of contacts.



NMR with 400 MHz high-sensitivity probe



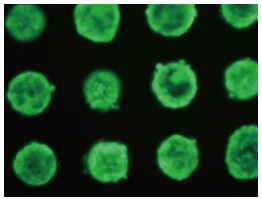
QTOF-LC / MS equipment

Curing Cancer

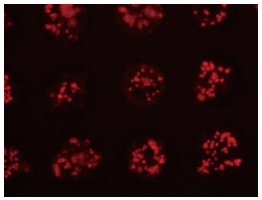
Toyo Gosei develops and markets three dimensional cell cultivation systems to keep cancer cells alive in vitro.

Understanding Cancer ex vivo

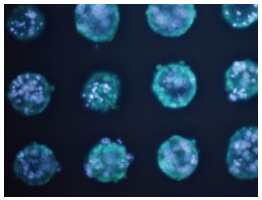
In developed countries, cancer is becoming the no. 1 cause of death, making combating it a major social concern. Cancer traits can vary by individual, so Toyo Gosei is developing systems that enable cultivation of a variety of cell types. Beyond R&D on drugs, Toyo Gosei seeks to apply this work to drug sensitivity testing and other applications to clinical practice. Our hope is to help improve QOL for cancer patients.



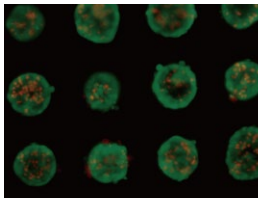
Cancer cell lines spheroid (DLD-1) fluorography (living cells)



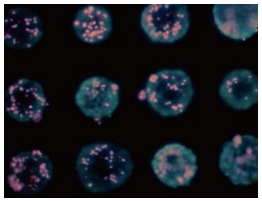
Cancer cell lines spheroid (DLD-1) fluorography (dead cell lines)



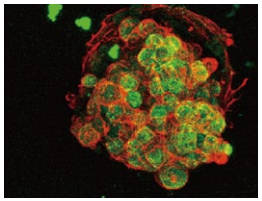
Cancer cell lines spheroid (DLD-1) fluorography (nuclei)



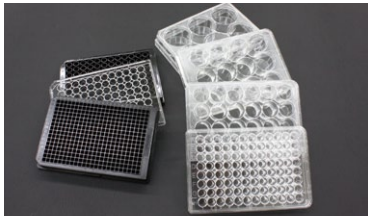
Cancer cell lines spheroid (DLD-1) fluorography
(living cells and dead cell lines merge)



Cancer cell lines spheroid (DLD-1) fluorography
(nuclei and dead cell lines merge)



Hepatocyte spheroid fluorography



Cell-able® plates

Experiment in progress

Applications of Photosensitive Materials to Biotechnology

Cell-able is an application of water-soluble photosensitive material technology stemmed from our long-running R&D. Currently, over fifty pharmaceufical companies and university research facilities worldwide are using it as an evaluation platform in cancer research, for stem cell cultivation, and for measuring the toxicity and metabolism of prospective medical product compounds. Utilizing the easiness of patterning, safety of the organic material, and the non-adhesion against protein, we develop the system for the three-dimensional cultivation of cells.

Cell-able® experiments

Safety Initiatives

Approval of AEO (Authorized Economic Operator) System

The AEO system was introduced in response to the terrorist attacks that happened in the United States in September of 2001, with freight security and compliance as its goals. It is a joint effort of the public and private sector to prevent terrorism. AEO is a system, approved by customs, for trade-related companies who participate in the supply chain and who have secured both compliance and a mutual security system.

GHS

GHS (Globally Harmonized System of Classification and Labeling of Chemicals) is an international system that was made public in July of 2008 upon recommendation of the UN. For standardized global use, it classifies the hazards of various chemical products, displaying them by labels with icons, and reflects itself on an MSDS (Material Safety Data Sheet). This system contributes to disaster prevention, and to the preservation of human health and environmental preservation relating to use, export, and disposal of chemical substances. Toyo Gosei makes labels that conform to both domestic and international standards, and also creates safety data sheets.

Establishment of Occupational Safety and Health Management System (OSHMS)

At the Ichikawa Plant, the Chiba Plant, and the Takahama Chemical Tank Terminal, we have implemented the Occupational Safety and Health Management System (OSHMS). Proactive workforce-wide activities have since continued to embed the system, resulting in mechanisms to mitigate risk. In addition to risk assessment and Occupational Safety and Health Committee activities, we strive for full implementation of key safety rules and other safety activities at the Chiba Plant. We continue working to enhance both occupational health and safety and OSHMS operations. Declaring the March 11 Tohoku-Pacific Ocean Earthquake 2011 as the first year of disaster prevention, we conduct disaster prevention drills, including re-evaluation of emergency equipment, expecting actual situations. "Finger point and call" measures are always practiced for the prevention of careless mistakes at the Plant.

Disaster Preparation: Early Earthquake Warning Service

The Tohoku-Pacific Ocean Earthquake happened on March 11, 2011 at 2:46pm. Our early earthquake warning service “Digital Catfish” sprang into action at Takahama Chemical Tank Terminal, which is our tank terminal and hazardous material storage facility. It announced the magnitude and time of the earthquake during the quake and also the aftershocks. The “Digital Catfish” also worked during the recovery work of the automatic storage warehouse under the aftershocks, which guaranteed the safety for our recovery procedures. As of April 2015, the system has been adopted at the Ishikawa Plant, the Awaji Plant and the Takahama Chemical Tank Terminal.

Environmental Conservation Efforts / Regional Community Interactions

Energy Conservation Efforts

We are using LED lighting at night as one of our energy conserving measures. While an expensive effort, we are planning to switch to LEDs as part of explosion-proof specifications. We also applied thermal barrier film to office windows to reduce rising room temperature from sunlight. As expected, energy savings are also emerging from setting standard AC temperatures. In addition to these measures, we practice leak tests of the pressurized air, nitrogen pipes and the valves as highly effective energy conservation measures.

VOC (Volatile Organic Compounds) Regulation Countermeasures at Takahama Chemical Tank Terminal

While Takahama Chemical Tank Terminal has already cleared the regulation numbers, various improvements are constantly being made as countermeasures for VOC regulation at a higher level. For example, three vapor return facilities, one line on the ship side (receiving facility) and two on the lorry side (shipping facility) were installed.

Reduction of Odor and VOC Emissions at Ichikawa Plant

Continuous efforts toward construction of odor-reducing mechanisms reached a degree of completion. Odor concentration measurements also cleared the regulation (regulatory concentration of 25 and that of 2000). We continue effective countermeasures to curtail VOC emission amounts.

Improved Safety of Tank Loading

Owing to the installation of a magnetic grounding facility in all tank truck filling lanes, the tanks are visibly ensured grounding on static electricity removers.

Reduction and Recycling of Industrial Wastes

As one of activities to reduce the industrial wastes in our factories, we are recycling them in the distillation and purification process. This has led to recycling of about 76% the solvent used. We have also started reuse or recycling of other industrial wastes such as packaging materials of products and of raw materials.

Voluntary Cleanup Activities

Chiba Plant employees hold voluntary clean-up activities in the vicinity of the factory before summer and winter holidays. In addition to collection empty cans, bottles and other refuse, the employees also clean up fallen leaves and mown grass.

"Dream / Work Perfect Fit Experience"

In 2014, two sixth-grade students from Tojo Elementary School (Town of Tonosho) and their teacher came to our Chiba Plant to learn and experience the workplace. The visit included tours of where we produce ionic fluids and electrolysis. They also had a look around the production floor and analysis room.

Tonosho Community Festival

As voluntary activities at the Chiba Plant and Flavor & Fragrance Material Plant, employees take part in the Tonosho Community Festival. Employees took part for the 10th time in 2014, and continuous participation has made their teamwork stronger, while taking part in the event has allowed the employees to contribute to this fun local festival. Employees hope to continue to participate well into the future.

TOYO GOSEI

http://www.toyogosei.co.jp/

UD FONT

Based on universal design(UD)theories, the fonts and design used are intended to be easy to read for as many people as possible.

VEGETABLE OIL INK

It is printed with environmentally friendly vegetable oil ink, which results in reduced VOC (volatile organic compounds)helps preserve the atmosphere.

Green Power

The factory that printed this company guide takes a portion of its electricity from green energy sources that do not generate CO_2.

Waterless Printing, Naturally.

We use printing techniques that does not require a dampening agent, a product which contains VOC (volatile organic compounds), which helps preserve the atmosphere.