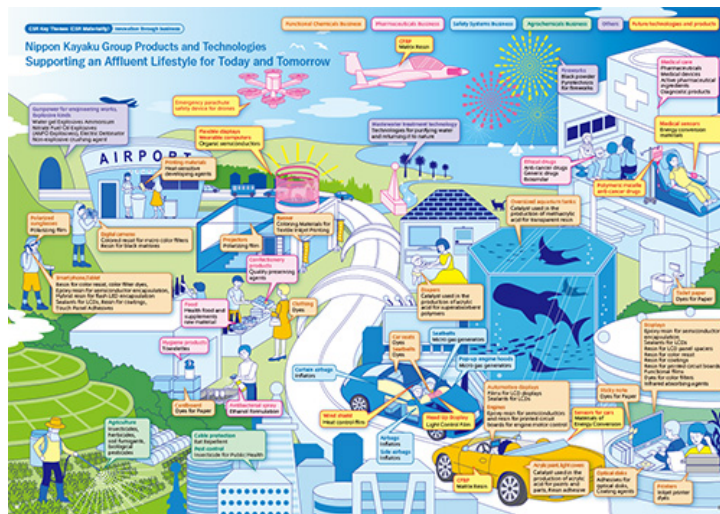




# CSR activity through economic responsibility and business

## Current Nippon Kayaku Group Products and Future Technologies and Products Supporting an Affluent Lifestyle

The Nippon Kayaku Group has adopted a corporate slogan called Global "sukima" ideas and is striving to develop Nippon Kayaku into a company that the world truly needs, by developing high value added products with unique technologies that stand out in niche markets and elsewhere.



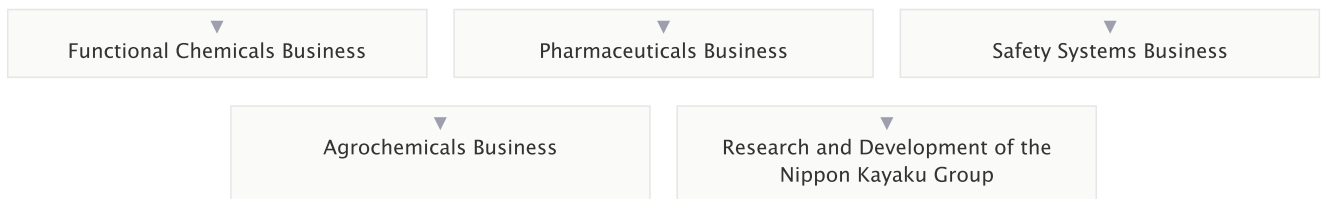
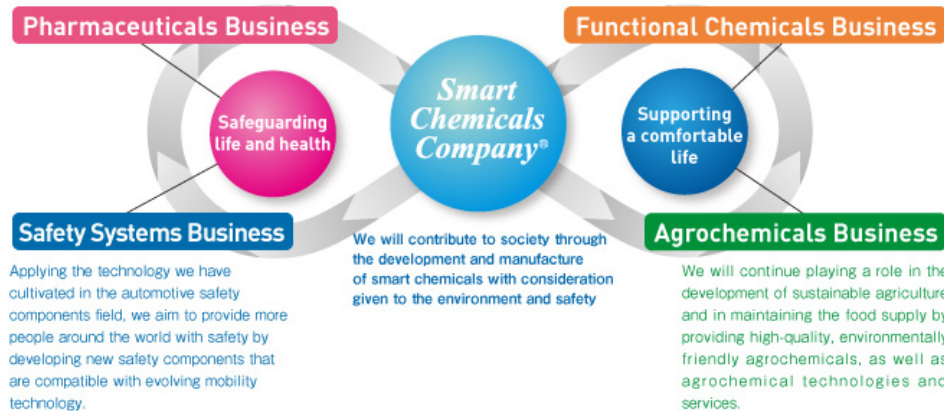
> [View larger image](#)

## The Nippon Kayaku Group's Businesses

This section will take a closer look at the 4 core businesses of the Nippon Kayaku Group as well as products that they developed with unique technologies that contribute to the betterment of society.

We aim to contribute to society through improved medical care by promoting innovations in our proprietary technologies and by providing a stable supply of and information about high-quality pharmaceutical products.

We contribute to the creation of an ultra-smart society and the realization of the SDGs by applying our core resin, colorant, catalyst and optical processing technologies to provide functional chemicals that offer special characteristics for the fields of information and communications, digital printing and energy and resource conservation and sensing.

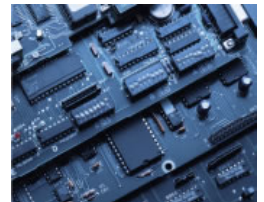


## Functional Chemicals Business

- We will contribute to society by supplying unique functional chemicals for the IT, ICT and resource conservation fields

Many believe that the world is set to become a super-smart society in the future. This is a society where various things are connected to the Internet, making people's lives truly comfortable.

In the field of ICT, the network connecting personal digital devices with home electronics and automobiles is growing, while rapid advancements are also being made in reducing the size and increasing the performance of semiconductor devices and improving the resolution of displays mounted on these digital devices. At the same time, there is growing demand for energy conservation and resource conservation. The Functional Chemicals Business is helping to realize this super smart society by supplying unique products to the fields of IT, ICT, energy conservation and resource conservation using its long-standing technologies in resins, pigments, and catalysts.



[> Functional Chemicals Business](#)

## Pharmaceuticals Business

- We are contributing to society through improved medical care by promoting innovations in our proprietary technologies and by providing a stable supply of and information about high-quality pharmaceutical products.

The Pharmaceuticals Business engages in research and development specializing in anti-cancer drugs and peripheral fields, focusing on polymeric micelle anti-cancer drugs that utilize nanotechnology as well as antibody drug, biosimilars and generic pharmaceuticals in the cancer field.

We aim to contribute to society through improved medical care by promoting innovations in our proprietary technologies and by providing a stable supply of and information about high-quality pharmaceutical products.



[> Pharmaceuticals Business](#)

## Safety Systems Business

### ■ Through explosives technology applications, we help protect lives during auto collisions throughout the world

Although automobile production declined somewhat in China in 2018, on a global basis, the total number of units produced is expected to continue growing. In addition, safety components that protect passengers and pedestrians involved in auto collisions are rapidly spreading beyond the developed countries to the developing countries as well. The Safety Systems Business manufactures and markets uses explosives technology, on which the Company was founded, in its automotive safety components, providing such product that employ explosives technology as inflators and micro gas generators, which are incorporated in such automotive safety components as air bags, seatbelt pretensioners, and hood-opening devices that protect pedestrians. The Safety Systems Business's products are manufactured not only in Japan, but also in the Czech Republic, China, Mexico, and Malaysia, and are used by auto manufacturers almost worldwide. The Safety Systems Business's products are helping to save people's lives in auto accidents everywhere.



[> Safety Systems Business](#) 

## Agrochemicals Business

### ■ We will contribute to society by supplying safe agrochemical preparations technology that are compatible with the environment and indispensable to stable food production

The environment surrounding agriculture is becoming more severe with each passing year, marked by food supply issues caused by the rising world population, issues with food self-sufficiency rate, and increasing crop damage from disease and pests. Such an environment requires that safe and secure agricultural crops be grown consistently and brought to market in a stable manner.



In June 2018, we launched our new insecticide, FINESAVE<sup>®</sup>. It is receiving rave reviews from the market as an insecticide that works on thrips and other pesticide-resistant insects, along with our spiracle-blocking agent, Fumon<sup>®</sup>, which is effective in overall pest control and does not rely only on a chemical pesticide.

[> Agrochemicals Business](#) 

## Research and Development of the Nippon Kayaku Group

The Nippon Kayaku Group engages in proactive R&D activities, knowing that R&D is a driving force behind its business growth. Since marking its 100th anniversary, Nippon Kayaku continues to further deepen its long-standing elemental technologies and core technologies for new technological development. We will contribute to society, safeguard the life and health of the public, and support a comfortable life by executing R&D to consistently deliver the best products.

Also, out of those R&D initiatives aimed at creating new products and businesses, we are strategically allocating companywide management resources to those themes that we believe hold the most promise for future growth, and we are proactively pursuing this as corporate research that integrates external technologies, products, and intellectual property from both inside and outside the company. The Research and Development Group engages in exploratory research for the introduction of new technologies and the upgrading of Nippon Kayaku's elemental technologies, as well as on new R&D themes that will support the company's long-term future growth.

[> Outline of research department](#) 

### ■ Company-wide Research Presentation Conference

The annual Company-wide Research Presentation Conference brings together researchers from the Research and Development Group engaged in R&D at four laboratories in Japan as well as officials from the head office including the President for oral and poster presentations of research outcomes. The event also features oral presentations and awards for patented inventions that greatly contribute to the company's businesses or technological development.

In fiscal 2019, we sponsored poster presentations on our research and development teams' technologies and two oral presentations (on the tribulations and success stories of R&D), and these strengthened the lines of

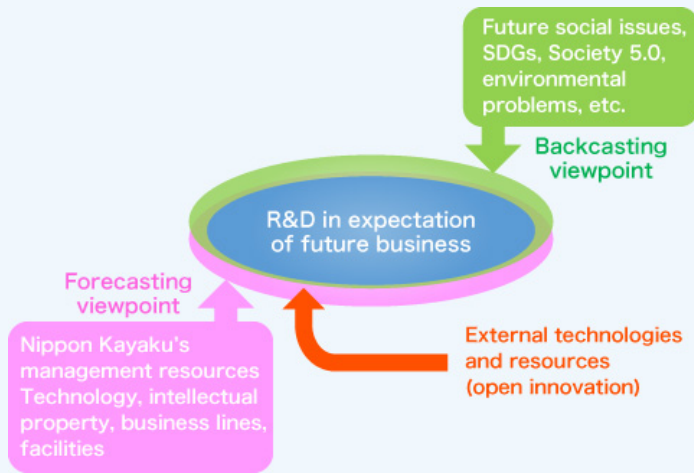


communication between our management team and our researchers and among our researchers. We are promoting the creation of innovations and solutions to the social issues that we will face in the near future by deepening understanding of and further developing and integrating the proprietary technologies and strong R&D capabilities that Nippon Kayaku has nurtured throughout its history.



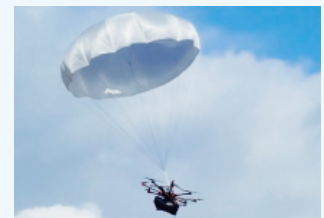
### In Search of Long-term R&D Themes

In fiscal 2019, we launched the Waku-Doki Project, an R&D project that looks for long-term R&D themes. This project identifies the megatrends and near-term social issues facing our portfolio of proprietary technologies so that we can create R&D themes that are characteristic of Nippon Kayaku and that will help solve the social issues that are envisioned in the near future from both backcasting and forecasting points of view.



### Developing Safety Devices for Drones

The Safety Systems Group develops, manufactures, and sells inflators, micro gas generators, and other types of gas generators, which are key components in automobile safety apparatus. Since its founding, Nippon Kayaku has been building up the explosives technologies used in these gas generator businesses. The Safety Systems Research Laboratory is continuously developing new products that utilize explosive technologies, and it has also considered expanding these technologies to other areas.



The parachute has opened



Actual safety device mounted on a drone

#### ■ Launch of new theme creation project

The development of safety devices for drones was a theme proposed over the course of repeated discussions at off-site meetings and brain-storming sessions, where our young researchers take the initiative in launching projects based on new themes. The technological innovations and development of uses for drones over the past several years has been startling, and drones will probably become widely used throughout society in the future. Looking at the growth possibilities for drones, it occurred to us that we could use explosives technology to come up with a safety device for drones. Because a small amount of explosives is very powerful, we



Teamwork is essential because development and testing involve many components

thought that drones' flight performance could be best enhanced if the device on the drone was small and lightweight.

### ■ Technical issues and innovation factors

We used explosives to design a prototype device for opening a parachute. In the event that the drone suddenly starts falling, the safety device will open a parachute to slow the drone's descent, thus alleviating the impact of a crash landing and protecting any people on the ground. Although explosives are powerful, they are also dangerous and must be handled cautiously, so we took great pains in going through many iterations in our strength design. Also, when mounting it on a drone, the device must be small and extremely light so as not to interfere with the drone's flight operations. We therefore eliminated all excess space and parts. We mounted the safety devices on drones and took them to an outdoor test field to conduct flight and landing tests and verify their effectiveness.

### ■ Active use of open innovation

Although Nippon Kayaku possesses a large store of technology regarding explosives and automobile safety components, drones and parachutes were a new frontier for us. We therefore perfected our knowledge of this new frontier with the help of other firms, consultants, and university research labs. In addition, because this is a safety device for landing the drone, we needed a large test field for the actual flight tests. The laboratory borrowed a site at one of Nippon Kayaku's plants, where it ran repeated tests in which the parachute was deployed after the drone was dropped from a giant crane. This served to improve the reliability of the safety device. In launching this business endeavor, we thought that it was important to tell the market about this concept as soon as possible so that we could get feedback on the device. We are therefore proactively exhibiting at trade fairs and seeking out customers who will use our safety device. Drone development is proceeding very rapidly overseas as well, so we are proactively networking with partner firms overseas. In particular, we obtained a competing product in the U.S., and we are trying to differentiate our product by conducting benchmarking tests with the help of a partner firm. We want to use innovative initiatives like these to contribute to society by producing competitive drone safety devices as soon as possible.



Drone flight and landing tests are undergone repeatedly out in the field



A drop test using a giant crane



An outside instructor gives a class on drone mechanisms and system control techniques

### New 5G Products: Production and Sales About to Launch!

We have developed a new product geared to the 5G system of next-generation high-speed telecommunications: the maleamide resin MIR-3000, which is a resin used in high-speed telecommunications. The Nippon Kayaku Group holds the top market share in high-purity epoxy resins used in electronics components, and this product is a maleamide resin that possesses electrical properties for high-speed telecommunications that were not obtainable with prior epoxy resins and that possesses our proprietary biphenyl skeleton that is noted for its good processing formability, unlike previous maleamide resins.

The Functional Chemicals R&D Laboratories started developing products for high-speed telecommunications more than 10 years ago, in line with its predictions for the future. The head office, research laboratories, and plants worked together to handle new production methods, new raw materials, and new equipment, thus bringing about the manufacture and sale of this new maleamide resin product. With this new maleamide resin product, we intend to play a role in realizing an affluent, super-smart society supported by high-speed telecommunications.



## ■ R&D that takes the Nippon Kayaku Group's proprietary technologies to new heights – R&D of light control films

The Research and Development Group will contribute to society, safeguard the life and health of the public, and support a comfortable life by executing R&D investments to consistently deliver the best products.

Automobiles are set to undergo a major transformation with advancements in electric vehicles and autonomous driving technologies. A large number of sensors are now fitted to automobiles to support safe driving. One of these is the head-up display that displays various forms of information on the windshield. Head-up displays use special films that control light in order to display this information clearly. Light control technology is used in a very wide range of fields, including not only head-up displays, but also LCD and organic EL displays, projectors, transparent displays, heat shield windows, and sunglasses, to name a few.

Nippon Kayaku is examining the use of the group's light control technologies such as polarizing films and retardation films to develop highly advanced and specialized light control films as one of its corporate research themes. For example, we are examining together with group companies the possibility of using these films to develop automotive head-up displays using our unique technology that makes images clear in wide viewing angles and to develop eyewear such as sunglasses and goggles with a completely new metallic-like finish despite being made from organic materials.



Head-up displays



Eyewear

## ■ Researching the Needs of Tomorrow: R&D for Organic Semiconductor Materials

The Research and Development Group will contribute to society, safeguard the life and health of the public, and support a comfortable life by executing R&D investments to consistently deliver the best products.

Additionally, the Research and Development Group is implementing R&D strategy with a medium- to long-term perspective to create new products and new business through open innovation inside and outside the company and by combining the intellectual properties and technologies of the Nippon Kayaku Group. The Kita-ku, Tokyo is one of the Nippon Kayaku Group's largest R&D hubs and considered a critical area for R&D and new business creation. We will concentrate resources here including researchers from each business field and facilities to achieve collaboration and integration of technologies and people.

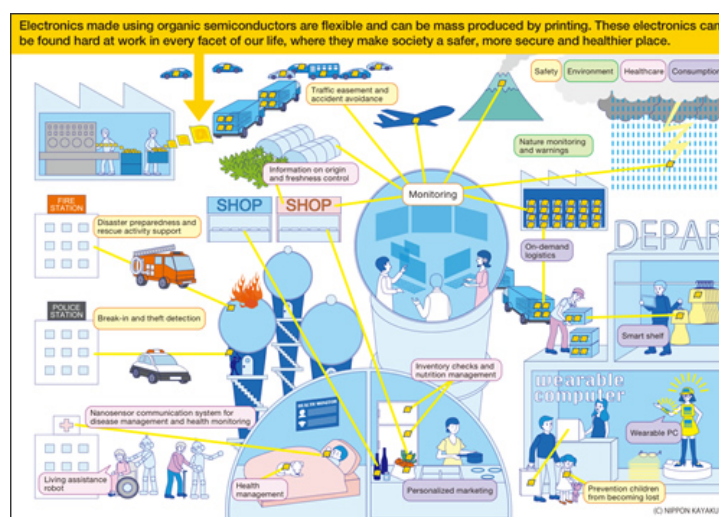


Inorganic semiconductor



Organic semiconductor

[> Learn more about our research laboratories](#)



[> View larger image](#)

## ■ Flow chemistry technology

At present, almost all fine chemical products are made using the batch method. The batch method has a long history, having shouldered the development of the chemical industry to date. In recent years, the focus has

been turning to a new production method called the precision flow method. The precision flow method is safer than the batch method, and it uses less energy and generates less waste.

At Nippon Kayaku, we are conducting research on continuous manufacturing techniques that use the precision flow method. We are also working on ways to inspect the products and applications in new product development. We expect to come up with new types of initiatives for improving the safety of our chemical plants and reducing their burden on the environment. As a fine chemical maker, we are ramping up our social contributions by adopting new technologies and continuing to enhance our manufacturing capabilities, which is an elemental technology.



Precision flow method



Pilot test facilities

## Globalization of Research Activities

Following the policy of Nippon Kayaku's global management, the Research and Development Group is in the process of building a global R&D structure inclusive of overseas Group companies. While promoting greater interaction among researchers working for overseas subsidiaries, the Research and Development Group is carrying out the following activities from the perspective of CSR.

### Hosting International Internship Students

Nippon Kayaku hosts interns from both domestic and overseas universities. Interns engage in various activities at Nippon Kayaku's laboratories with a focus on research and development, while also learning about corporate activities and Japanese culture. At the same time our employees receive a boost in terms of motivation and stimulation by working together with these young interns. Going forward, through these internships, we will continue to globalize our corporate culture and contribute to international exchange as well as the education of overseas students.



### Joint Collaboration with Overseas Research Institutes

Nippon Kayaku actively engages in joint research with research institutes located outside of Japan.

We utilize web conferencing during joint research with overseas group companies to share information in a timely manner and speed up the R&D process. Also, we are among the first to adopt cutting edge technologies and materials, while utilizing industry-academia collaboration programs with overseas universities, to ensure that we can help create a sustainable society.

The collaboration and integration of our long-standing excellent technologies help promote problem solving and the creation of innovation.

## Exchange within the Nippon Kayaku Group

Meeting for the 60th time in 2019 is held annually as a company-wide venue for sharing achievements in terms of operational improvements, improving productivity, human resources development, and new product development.

It has become the largest annual event to participate not only from Nippon Kayaku but also from domestic and foreign group companies.

In the Meeting, each department makes a presentation, and among them we select excellence awards and special awards to recognize excellent themes.

Evaluation of daily activities increases employee motivation for work.

By attending presentations of various workplaces, we can obtain hints for new ideas and task solving.

In addition, at the social gathering after the presentation, we are deepening collaboration laterally by communicating with people beyond occupations, generations, and countries, and expanding our horizons of business.



We will continue holding this meeting so that Nippon Kayaku Group employees can continue to raise their ambitions and take the next step in their careers.

## KAYAKU spirit Dream and Drive("Kaizen")Activities\*The exchange meeting

Meeting for the 8th time in 2019 is a field to talk about "KAYAKU spirit Dream and Drive"("Kaizen") Activities frankly. It is a small-scale meeting mainly plant departments and every participant can speak frankly and actively.



In this exchange meeting for two days, the presentations were carried out on the first day and had open discussions on the second day. During the open discussion, participants talked freely about how to lead D&D activities, evaluation method of the result, and troubles and ingenuities of activities.

The small group size made it easier for participants to talk amongst themselves, resulting in active discussions. So it is popular among participants because it allows active exchange of opinions and information sharing. Through discussions with people in multiple workplaces, we receive stimulus from other workplaces, lead to improvement of problem awareness and promotion of D&D activities at our own workplace.



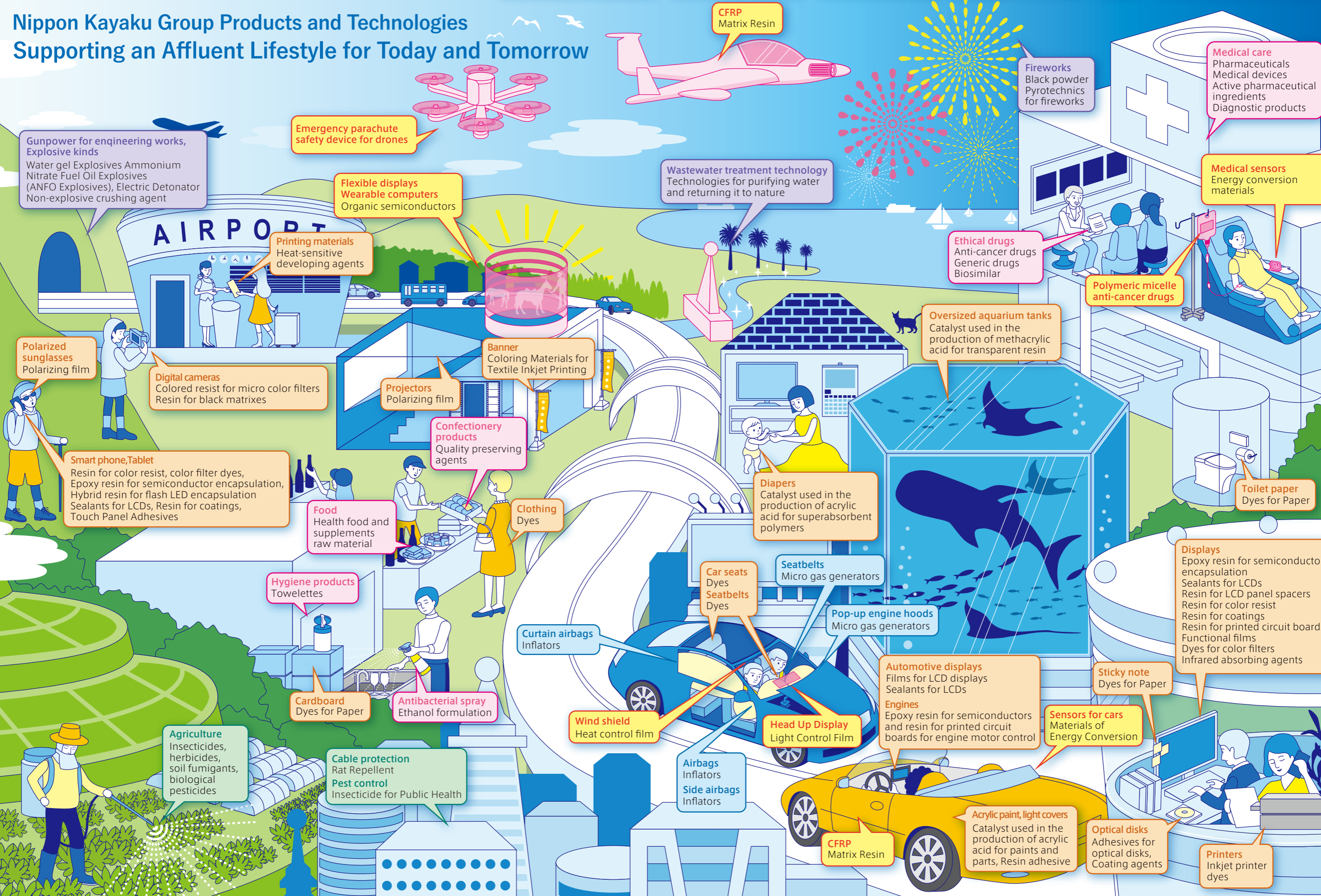
We will continue this exchange meeting and will do it for more active D&D activities in future

※ KAYAKU spirit Dream and Drive("Kaizen")Activities: A form of improvement activities that focus on the ingenuity and innovations of all employees in order to resolve tasks in the workplace independently under the banner of CSR management)



# Nippon Kayaku Group Products and Technologies

## Supporting an Affluent Lifestyle for Today and Tomorrow



**Gunpower for engineering works, Explosive kinds**  
 Water gel Explosives Ammonium Nitrate Fuel Oil Explosives (ANFO Explosives), Electric Detonator Non-explosive crushing agent

**Emergency parachute safety device for drones**

**Flexible displays Wearable computers Organic semiconductors**

**Printing materials Heat-sensitive developing agents**

**Wastewater treatment technology**  
 Technologies for purifying water and returning it to nature

**Fireworks**  
 Black powder Pyrotechnics for fireworks

**Medical care**  
 Pharmaceuticals Medical devices Active pharmaceutical ingredients Diagnostic products

**Medical sensors**  
 Energy conversion materials

**Ethical drugs**  
 Anti-cancer drugs Generic drugs Biosimilar

**Polymeric micelle anti-cancer drugs**

**Oversized aquarium tanks**  
 Catalyst used in the production of methacrylic acid for transparent resin

**Polarized sunglasses**  
 Polarizing film

**Digital cameras**  
 Colored resist for micro color filters Resin for black matrixes

**Banner**  
 Coloring Materials for Textile Inkjet Printing

**Projectors**  
 Polarizing film

**Confectionery products**  
 Quality preserving agents

**Smart phone, Tablet**  
 Resin for color resist, color filter dyes, Epoxy resin for semiconductor encapsulation, Hybrid resin for flash LED encapsulation Sealants for LCDs, Resin for coatings, Touch Panel Adhesives

**Food**  
 Health food and supplements raw material

**Clothing**  
 Dyes

**Diapers**  
 Catalyst used in the production of acrylic acid for superabsorbent polymers

**Toilet paper**  
 Dyes for Paper

**Hygiene products**  
 Towelettes

**Curtain airbags**  
 Inflators

**Car seats**  
 Dyes

**Seatbelts**  
 Micro gas generators

**Pop-up engine hoods**  
 Micro gas generators

**Displays**  
 Epoxy resin for semiconductor encapsulation Sealants for LCDs Resin for LCD panel spacers Resin for color resist Resin for coatings Resin for printed circuit boards Functional films Dyes for color filters Infrared absorbing agents

**Cardboard**  
 Dyes for Paper

**Antibacterial spray**  
 Ethanol formulation

**Wind shield**  
 Heat control film

**Head Up Display**  
 Light Control Film

**Automotive displays**  
 Films for LCD displays Sealants for LCDs

**Engines**  
 Epoxy resin for semiconductors and resin for printed circuit boards for engine motor control

**Sensors for cars**  
 Materials of Energy Conversion

**Sticky note**  
 Dyes for Paper

**Agriculture**  
 Insecticides, herbicides, soil fumigants, biological pesticides

**Cable protection**  
 Rat Repellent

**Pest control**  
 Insecticide for Public Health

**Airbags**  
 Inflators

**Side airbags**  
 Inflators

**CFRP Matrix Resin**

**Acrylic paint, light covers**  
 Catalyst used in the production of acrylic acid for paints and parts, Resin adhesive

**Optical disks**  
 Adhesives for optical disks, Coating agents

**Printers**  
 Inkjet printer dyes

Electronics made using organic semiconductors are flexible and can be mass produced by printing. These electronics can be found hard at work in every facet of our life, where they make society a safer, more secure and healthier place.

