



We will lead to the achievement of our targets by determining the direction of technology management and elaborating strategies from a long-term perspective

ENDO Hideyuki
Managing Executive Officer
CTO
Head of Planning and Development Division.

I have been Head of the Planning and Development Division since 2022 and was freshly appointed to the role of CTO. The appointment of a CTO is a first in our company's history. My role is to elaborate a strategy from a technical perspective and to lead to achievement of the vision and targets set in the long-term business plan "Atelier2050" which defines our targets for 2050, and in the mid-term business plan "Vista2027" which was formulated as a stepping-stone to attain the long-term business plan.

To that end, I have designed a roadmap to steadily build up businesses toward 2027, and to achieve our targets and vision for 2050.

Expanding business domains by linking promising themes to our core technologies

The Planning and Development Division, which I oversee, is involved in the three growing businesses of Information & Communication, Life Science, and Environment & Energy, those we have focused on to achieve the targets of Atelier2050. We are responsible for building high value-added new products and businesses that fit social needs by combining new materials and technologies with our core technologies.

Rather than allocating management resources to all business domains, we are focusing on short-term and mid-term priority themes to promote the early launch of businesses likely to succeed in the future. Among them, we are sometimes taking on the challenge of fields that we have never addressed before, which is considered promising in the future.

It is not an easy task for even talented the researchers to continue research and development in a field unrelated to busi-

ness domains. It is important that we do not let these "enclaves" that we have never addressed remain untouched, and that we link really promising themes and technologies to our core technologies and apply them to our customers' needs and key technologies.

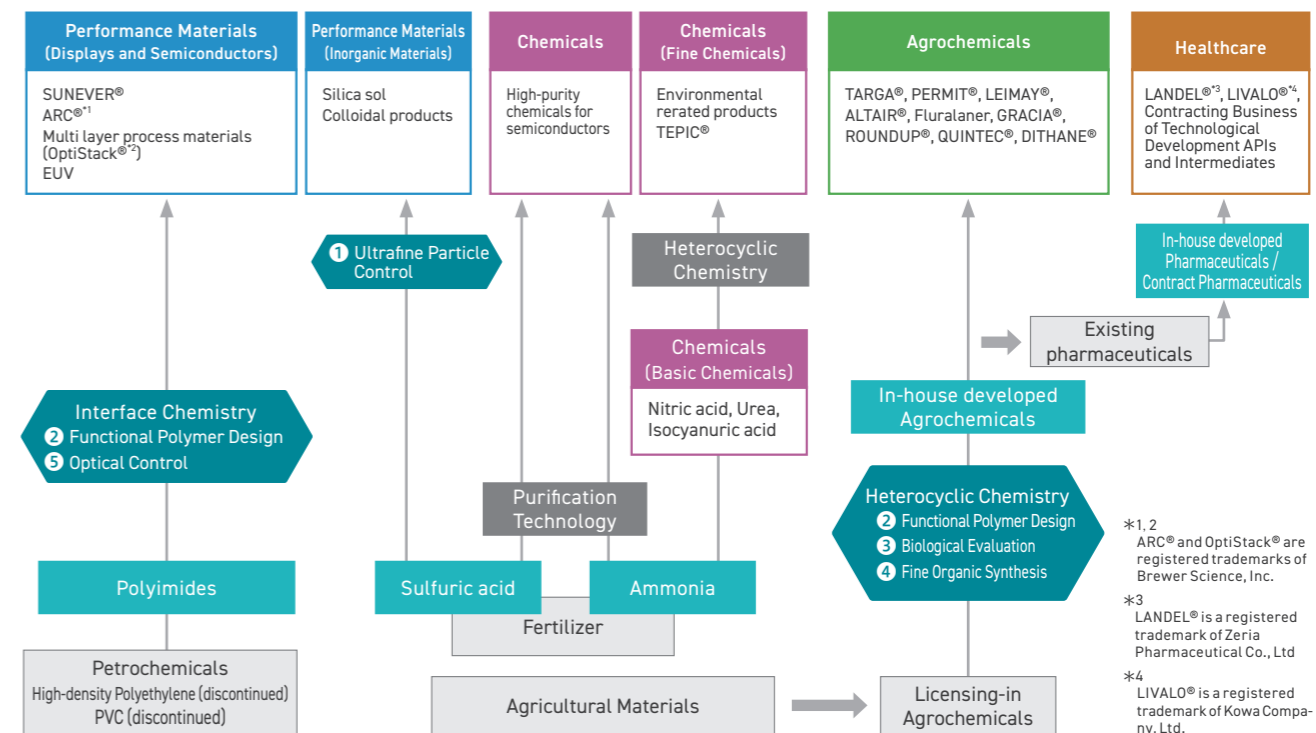
Development investment and capital investment for equipment introduction required from our research laboratories are approved at the management meeting and the Board of Directors after confirmation by the Planning and Development Division and the business divisions. If we are unable to overcome technological issues and reach target criteria and standards, we will decide to interrupt and withdraw through an evaluation meetings on research theme. We then engage in thorough selection and concentration while continuously establishing new themes.

Brushing up technologies and products together with customers

The sources of our R&D capability is that we consistently maintain the highest level R&D expenses among chemical manufacturers to create the seeds of new technologies and nurture them into businesses. We have transformed the business operations from the time of our founding. We have continued to take on the challenge of creating new technologies and businesses by nurturing the five core technologies of "Fine Organic Synthesis", "Functional Polymer Design", "Ultrafine Particle Control", "Biological Evaluation", and "Optical Control", and fusing them across fields.

In order to improve these technologies, we are accompanied our researchers to visit our customers. After I joined Nissan

Research and Development –Our Five Core Technologies–



Chemical in 1990, I was assigned to the Polymer Materials Research Department, the Central Laboratory (currently the Chemical Research Laboratories and the Materials Research Laboratories). Since then, I have been involved in R&D for liquid crystal alignment materials, one of our mainstay businesses, and have been in charge of fundamental research and technical sales. By having the technical discussions with the customer's engineers, we can grow as researchers, and improve our knowledge and insight into problem solving. I accompanied customers as well, grasped their needs and accumulated experience in brushing up the development of products and technologies that the market required from us.

In hiring for researchers, we dedicate the most of interview time to technology and research aspect. Our approach is so unique that we are told by applicants that the process was a technological discussion rather than an interview. I believe that one of the strengths of our R&D is that we are able to hire human resources who have expressed strong thought on research during their interviews.

Developing discerning human resources who can deeply exploit R&D

In Atelier2050, we are challenging to create completely new technologies and products related to three growing businesses, Information & Communication, Life Science, and "Environment & Energy", by adding "Microbial Control" and "Information Science" to our existing core technologies.

Until now, we have contributed to food production through chemical fertilizers and agrochemicals. Our policy of contributing to the resolution of food issues through the Agricultural Chemicals business remains unchanged, but the changes in the

external environment are leading to a worldwide reduction in the use of agrochemicals. We have also started R&D in microbial agrochemicals and established the Biological Group in the Biological Research Laboratories. Microbial control is a very important technology that can also use in the Healthcare business.

In addition, the progress of digital transformation (DX) is remarkable, and "Information Science" is indispensable as a fundamental technology. We will establish technologies that will become the source of value creation for all business domains, by driving new value creation through simulation and data science, and promoting company-wide DX as well as materials informatics (MI) in research departments.

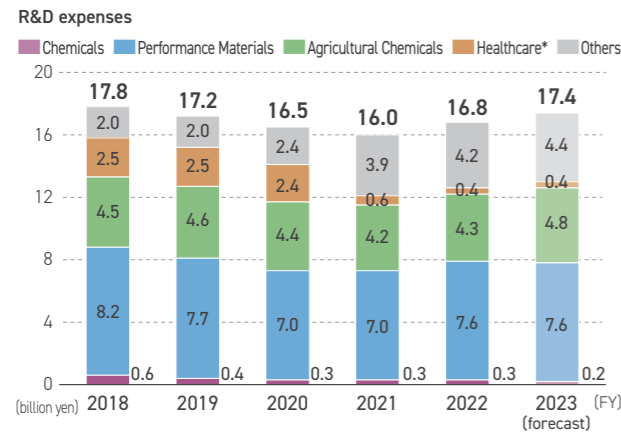
At Nissan Chemical, we call the human resources "connoisseur" who able to deeply exploit R&D by checking for overlooked technologies in our business domains and applying them to technologies demanded by customers and the market. In R&D, all themes do not always become successes with a path toward commercialization. Therefore, it is necessary to develop human resources who can judge whether a technology or a theme can grow into a business in the future. We provide the opportunities for young employees to discuss directly with customers, participate in academic conferences, and receive external technical training in order to acquire the basic knowledge necessary for a researchers. Developing discerning human resources is also one of the roles of CTO.

I am committed to playing my part in management, considering which technologies are necessary to achieve our targets from a long-term perspective, and deciding on our direction that we aim for and our policies on technology.

R&D Expenses

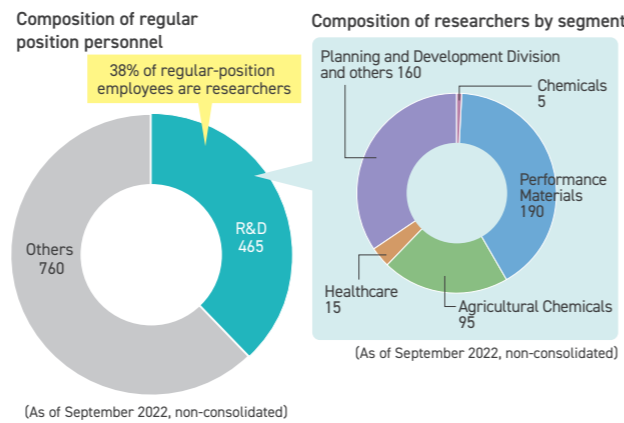
We consider R&D the source of growth, and have intensively invested our management resources in R&D.

Over the last five years, R&D expenses have totaled 84.3 billion yen. The R&D expenses in Performance Materials and Life



*The figures of FY2018-2020 are the former Pharmaceuticals Division.

Science that combined with Agricultural Chemicals and Healthcare account for about 40% each. In addition, about 40% of employees of regular position are allocated as researchers.



Voices of Researchers

Possibility of MI for efficient theme creation

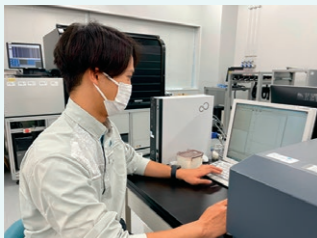


TERATANI Kohei

Materials Research Laboratories
Advanced Materials Research Department

Our team makes full use of materials informatics (MI) to carry forward predictions on the level of roughness of inkjet printing layers in soluble materials for OLED. With collaborations with outside consultants and the Research Management Dept., Planning and Development Div., we aim to build more precise prediction models. If our efforts bear fruit, an experiment that takes one month could be reproduced in a few days. Research optimization which applies computational science, including sophisticated predictions like these, is a priority for us. By introducing analysis that uses programming languages such as Python in daily research, we are promoting the creation of an environment where research result can be obtained efficiently.

My goal is making it possible to handle many themes with a small number of people by maximizing the benefits of MI. As a research and development department with the mission of creating new products, our direction that we aim is clear. We aim to create new themes that becomes next business pillar by using MI to verify many themes more efficiently and to derive innovative discoveries.



Driving value creation by combining Biological Evaluation and Information Science!



FURUHASHI Takamasa

Biological Research Laboratories
Agricultural Chemicals Research & Development Department

Our department has record of utilizing bioinformatics such as plant metabolomics in agricultural chemicals research. With the rapid progress of information science technology in recent years, new doors have been open in applying information science such as image analysis and prediction models using AI to biological evaluation, which is our existing core technology. In imaging for instance, the types and quality of images that can be used for analysis are changing, with aerial photography of farmlands and test fields by drone as one example. In addition, we accumulate data by setting up sensors in test fields all over Japan and monitoring information on weather conditions in real time. We are now engaging in efficacy evaluation based on image data of



crops and weeds, and building of AI models to predict crop growth, and are promoting activities to “build a digital technology foundation” as set in Vista2027. Our goal is to contribute to product development by strengthening the value creation and co-creation process, in the process of making Information Science our new core technology.

Our Group regards research and Development (R&D) and the intellectual property it results in as “the foundation of business” and “the source of growth.”



KAGESHIMA Satoshi

Executive Officer
Head of Intellectual Property Department

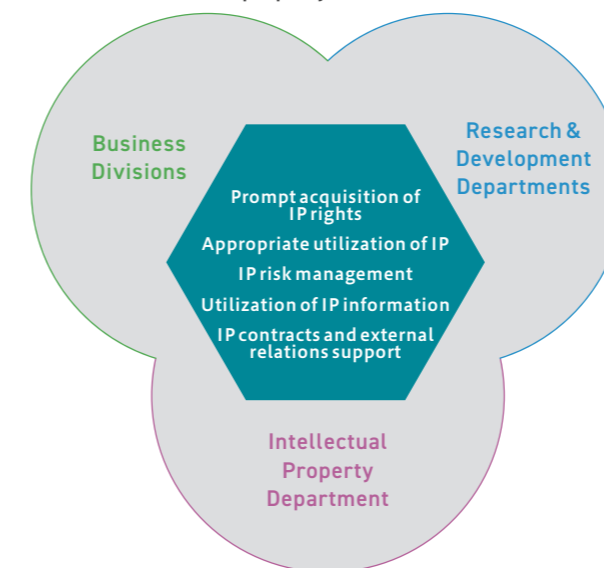
Basic Policy and Features

Nissan Chemical carries out its intellectual property activities based on the “Management Policy of Industrial Property” formulated in 1997, with the three following pillars: “prompt acquisition of intellectual property rights,” “appropriate utilization of intellectual property,” and “intellectual property risk management.” In addition, “utilization of intellectual property information” and “intellectual property contracts and external relations support” have grown into important activities these recent years and the Intellectual Property Department is spearheading initiatives in this realm as a “navigator of R&D benefits.”

The biggest feature of our intellectual property activities is that “R&D departments, business divisions, and Intellectual Property Department unite seamlessly”. This feature has been achieved through our emphasis on R&D, with 70% of new employees and 40% of regular positions being researchers. Outside of the Intellectual Property Department, business divisions and planning departments at the Head Office also include many employees with experience in research, and a large number of personnel familiar with both R&D and intellectual property leads to lively discussions on patents and measures regarding other companies’ rights. Moreover, intellectual property liaisons are established in each division to engage in intellectual property activities in collaboration with the Intellectual Property Department. In addition, “Intellectual property conference” held in the business divisions and planning departments of the Head Office and in all laboratories and plants are another our characteristic activity. These conferences lead to the sharing of internal and outside issues related to intellectual property and promote the cultivation and elevation of a company-wide intellectual property mindset.

In this way, we implement three-pronged intellectual property activities through business divisions, research and development departments and the Intellectual Property Department, and possesses a high level of intellectual property literacy as a whole.

Seamless intellectual property activities



Seamless Intellectual Property Activities

One concrete example is “patent conference” attended by core members of R&D and business. At Nissan Chemical, these patent conferences are opportunities to comprehensively discuss each strategy of intellectual property, research and business, which is reflected in each policy and generates speed and competitiveness.

With respect to photo-alignment materials used in IPS-type LCD panels, we built patent networks ahead of other companies, consequently reached a 99% market share and successively established a monopoly.

In addition, our intellectual property strategy in the agricultural and pharmaceutical field includes the intellectual property that is “global” and “can win in the case of litigations.” We have experienced disputes in many countries and, if necessary, will directly eliminate other companies by litigating.

Aggressive Acquisition of Property Rights

As shown in the number of patents held (P12), we aggressively acquire patent rights. We have compared the number of patents held by our company and by major domestic chemical manufacturers using commercial databases and, as evidenced in the table below, we are ranked first in the ratio of global patents (the number of patents held abroad divided by the number of patents held in Japan) and second in the net sales ratio. We rank fifth out of 30 companies in the R&D expenses ratio but, excluding the agricultural and pharmaceutical field where the number of patents held compared to R&D expenses is fewer and focusing on the materials field, we have approximately twice as many patents as the average of the major domestic chemical manufacturers with respect to the R&D expenses ratio as well.

In this manner, we guarantee the business superiority of Nissan Chemical though this extremely powerful patent networks.

Comparison of the number of patents held using commercial databases*

(As of June 2023)

	Nissan Chemical	Nissan Chemical (materials field)
Ratio of global patents	208 (1)	206
Number of patents held/Net sales	253 (2)	345
Number of patents held/R&D expenses	129 (5)	212

*For all figures, the average of major domestic chemical manufacturers is set at 100. The rank is given by the parenthesized figure.