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Denka

# The Denka Way


Winter
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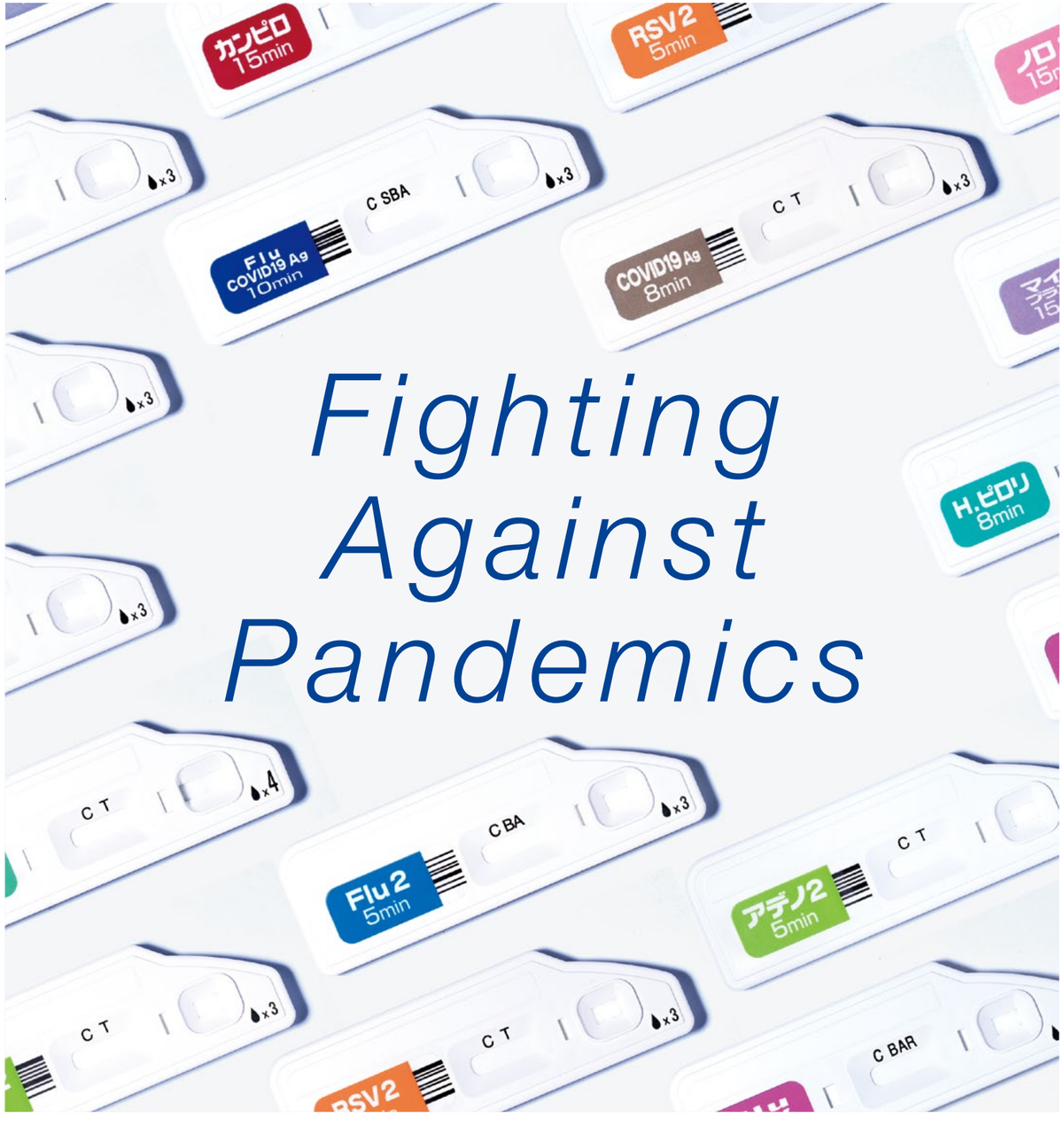



# Fighting Against Pandemics

# Denka's POCT Products That Contribute to the Early Diagnosis of Infectious Diseases

**The COVID-19 pandemic put a spotlight on Denka's rapid antigen test kits for infectious diseases in the field of POCT(Point of Care Testing), a rapid, simple testing method that helps doctors with early diagnosis. As one of the top manufacturers in Japan, we have summarized Denka's efforts in the early diagnosis of infectious diseases.**

**Rapid antigen test kits**

Part. 1

## Why do pandemics occur?

**Pandemics cause many infected persons and patients throughout the country and globally through the explosive spread of infectious disease. We spoke with Professor Tetsuya Matsumoto of the International University of Health and Welfare about the conditions for a pandemic outbreak, contributions that can be made by testing, and his expectations of manufacturers.**

**Dr. Tetsuya Matsumoto**

**Chief Professor,
Department of Infectious Diseases
International University of
Health and Welfare**

Following his graduation from Nagasaki University School of Medicine in 1987, he joined their Second Department of Internal Medicine. After studying at Harvard University in the United States, he served as lecturer at Toho University, chief professor at Tokyo Medical University, and was appointed to his current position in 2018. He previously served as chairman for the Japanese Society of Chemotherapy and concurrently serves as chairman for the Japanese Society for Clinical Microbiology, director for the Japanese Society for Infection Prevention and Control, expert committee member for the Pharmaceuticals and Medical Devices Agency, program supervisor for the Japan Agency for Medical Research and Development, and other positions.

### Conditions for a pandemic outbreak

A number of conditions are necessary for a pandemic to occur. First, the majority of people do not have immunity to the virus due to the emergence of new pathogens, etc., and it is highly contagious, being transmitted via droplets and aerosols. In addition, there is no vaccine, there is no immediate means of countering it, and it is not extremely toxic (if it is too toxic, the host will die and the virus will disappear), etc. Furthermore, I think a pandemic is more likely to last longer if the virus is prone to mutations similar to COVID-19.

Due to the development of transportation, even if it is a new infection that occurred somewhere else in the world, there is a high possibility of it entering Japan, so we need to constantly be prepared for a pandemic.

So, how can we protect ourselves against a pandemic? Realistically speaking, I think that it is difficult to prevent a pandemic from the start. That's because it is difficult to know what kind of pandemic will be caused by which infectious disease in the future. As a result, it's important to prepare after taking into consideration potential risks during non-pandemic times, immediately switch to emergency response once infection begins to spread, and have a system in place to handle it.

Leveraging lessons from the COVID-19 pandemic, the Japanese government is earnestly working on measures against new infectious diseases that may occur in the future. The Strategic Center of Biomedical Advanced Vaccine Research and Development for Preparedness and Response (SCARDA), which was established by the Japan Agency for Medical Research and Development (AMED), is vigorously working on domestically developing vaccines, and a new, unprecedented organization is being created with the launch of the new Cabinet Agency for Infectious Disease Crisis Management.

### Establishment of testing methods is the first key

When new infectious diseases occur, testing, vaccines, treatments, infection control measures, and other methods are ways that humans can fight back. At the beginning of the COVID-19 pandemic, there were no vaccines or treatments, which emphasized the importance of testing. This was because neither treatment nor prevention could be done if there was no diagnosis. In the initial stages, when there were no treatments or vaccines that could be used, the only method that could be carried out to reduce infection was to separate patients whose diagnoses had been confirmed through testing. Therefore, when a new infectious disease occurs, establishing testing methods is an extremely important measure for preventing the spread of infection.

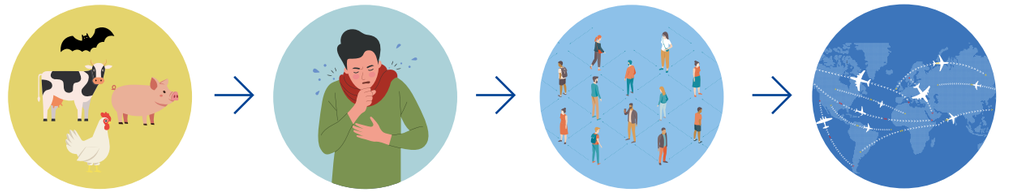
With Japan's technical skills, it would not be difficult to rapidly develop testing methods for new infectious diseases. I believe that by creating a system that allows for early approval without being bound by regulatory frameworks for the wide-spread utilization of these testing methods, we will be able to respond more quickly in emergencies.

### Future expectations of test reagent developers

Due to the hard work of everyone working on the development of new testing methods on a daily basis, various testing products have already been released into the world, which has contributed to the diagnosis of various infectious diseases. However, there are a wide variety of infectious diseases that cause outbreaks, and unfortunately, it still cannot be said that testing products are adequately meeting the society's needs. Thus, in clinical practice, there are many cases where tests are not available, and clinical diagnoses still need to be relied on. For example, there are many opportunities to improve clinical outcomes, such as by diagnosing resistant bacteria, gastrointestinal infections, and sexually transmitted diseases. Moreover, in pediatrics, there are many cases where children are infected with multiple diseases at the same time, so there is a need to develop a product that can quickly test for multiple diseases with one test.

Furthermore, the state of society has been changing, so it is possible that medical access becomes more restricted in the future. As a result, even if there are no medical facilities nearby, such as in places that are underserved medically, early diagnosis and treatment will still be possible no matter the area if people can make diagnoses using their own test kits, or if antiviral treatments, etc. can be prescribed through remote medical treatment. I hope that these hidden social needs will be identified and testing kits that can meet them developed, and that they will be approved for insurance coverage so that they can be used in medical treatment.

### Mechanism for infection spread



**Sources of infection (Pathogen-carrying animals)**

Pathogens that have not yet infected humans exist in nature, such as in wild animals

**Susceptible hosts (No immunity)**

Infects humans through some type of contact with the source of infection

**Human to human infection (Transition to mass infection)**

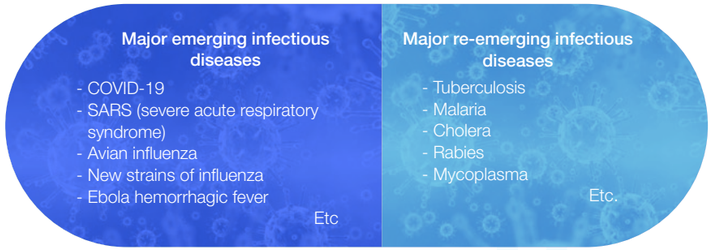
Easily transmitted pathogens spread through droplets, aerosols, or other methods

**Spread of infection through movement of people (Pandemic)**

Infection further spreads to various areas around the world through the movement of people

### Emerging and re-emerging infectious diseases

Emerging infectious diseases are those that have been newly discovered over the past 30 years while re-emerging infectious diseases are older infectious diseases that people thought would be overcome in the near future but seem to be becoming prevalent again.




Rapid testing, reliable results

Part. 2

# Denka's rapid antigen test kit "QuickNavi™"

**How has real-time testing realized through rapid antigen test kits, one of the products in the field of POCT, brought about changes in clinical testing?**

### What is POCT? (Point of Care Testing)

POCT refers to testing that is performed in a medical setting other than a hospital testing facility or outsourced testing center, such as in an outpatient clinic, operating room, or at the bedside of a patient in a hospital ward, in order to obtain test results quickly and enable doctors to make an early diagnosis and provide treatment. As speed is necessary, compact size and simple operation are generally needed. Rapid antigen test kits, such as the QuickNavi series, which is manufactured and sold by Denka, are representative examples of POCT and contribute to rapid diagnosis in the field of infectious diseases.

## Product lineup

Top: Product name Bottom: Virus to be examined

| | | |
|---|---|---|
| 1 | QuickNavi™-Flu+COVID19 Ag | COVID-19 and influenza types A and B |
| 2 | QuickNavi™-COVID19 Ag | COVID-19 |
| 3 | QuickNavi™-Flu2 | Influenza types A and B |
| 4 | QuickNavi™-RSV2 | Respiratory syncytial virus |
| 5 | QuickNavi™-Adeno2 | Adenovirus |
| 6 | QuickNavi™-Mycoplasma | Mycoplasma pneumoniae virus |
| 7 | QuickNavi™-Flu+RSV | Influenza types A and B and respiratory syncytial virus |
| 8 | QuickNavi™-StrepA2 | Group A beta-hemolytic Streptococci (Streptococcal infection) |
| 9 | QuickNavi™-H. pylori | Helicobacter pylori |
| 10 | QuickNavi™-Noro3 | Norovirus |
| 11 | QuickNavi™-Campylo | Campylobacter |

## 4 characteristics of the QuickNavi™ series

### 1 Results in five minutes! Top-class supply capability in Japan

Results given in as little as five minutes due to various technologies cultivated thus far. Furthermore, supply capabilities are one of the highest in Japan.

5 minutes

### 2 Simultaneous testing for multiple infectious diseases using a single specimen!

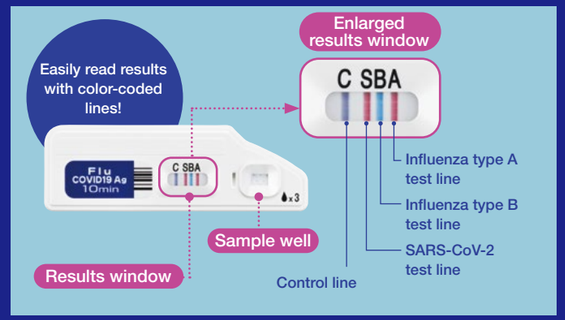
As it is possible to use a single specimen solution and apply it to several tests, mycoplasma, influenza, COVID-19, respiratory syncytial virus, and other infectious diseases can be tested for at the same time. It reduces the risk of infection for healthcare workers and the burden on patients.

Allows for simultaneous testing

### 3 Instant diagnosis due to changes in color! Colored latex immunochromatography method

Using the colored latex immunochromatography method, specific antigens and antibodies are diagnosed rapidly. This technology uses colored latex particles that, when bound to a specific antigen or antibody, bind to the antibody located at the detection line, resulting in a test result that appears as a line and can be easily interpreted with color coding.

Results easily interpreted with different colors




### 4 Enhancement of production capability and automation and labor saving through digitalization!

Denka will enhance rapid antigen test kit production capability at Kagamida Plant at the Gosen Site with the aim of further growing its healthcare business. Denka will also reform and automate operational, manufacturing, and logistics processes through the utilization of digitalization and strengthen labor saving efforts. This facility will begin operations in 2025, and it aims to respond to expanding testing demand and contribute to the enhancement of people's QOL (quality of life) throughout the world.

*Conceptual image of new manufacturing building at Kagamida Plant at the Gosen Site

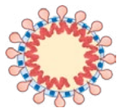
## Technical principles of rapid antigen test kits

### Antigens and antibodies

Denka's rapid antigen test kits all use the principle of immune reaction, which is the antigen-antibody reaction that occurs in the body. "Antigens and antibodies" have been talked about more recently, but what are they?

**Antigen**

Antigen refers to the bacteria and viruses that cause sicknesses, but it does not only refer to pathogens. Any substance that enters the body and triggers an immune reaction, such as pollen for people allergic to pollen, is called an antigen.



**Antibody**

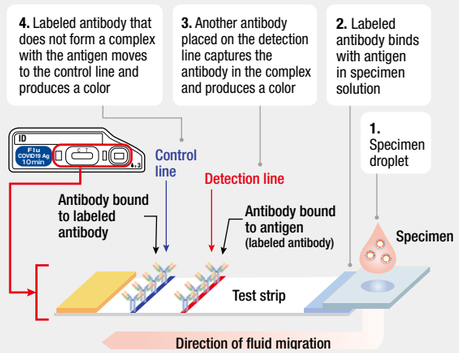
Antibody is a substance in the body that finds and binds to substances (antigens) that enter the body and cause an immune reaction, preventing the invasion and proliferation of pathogens.

### Principle of immunochromatography

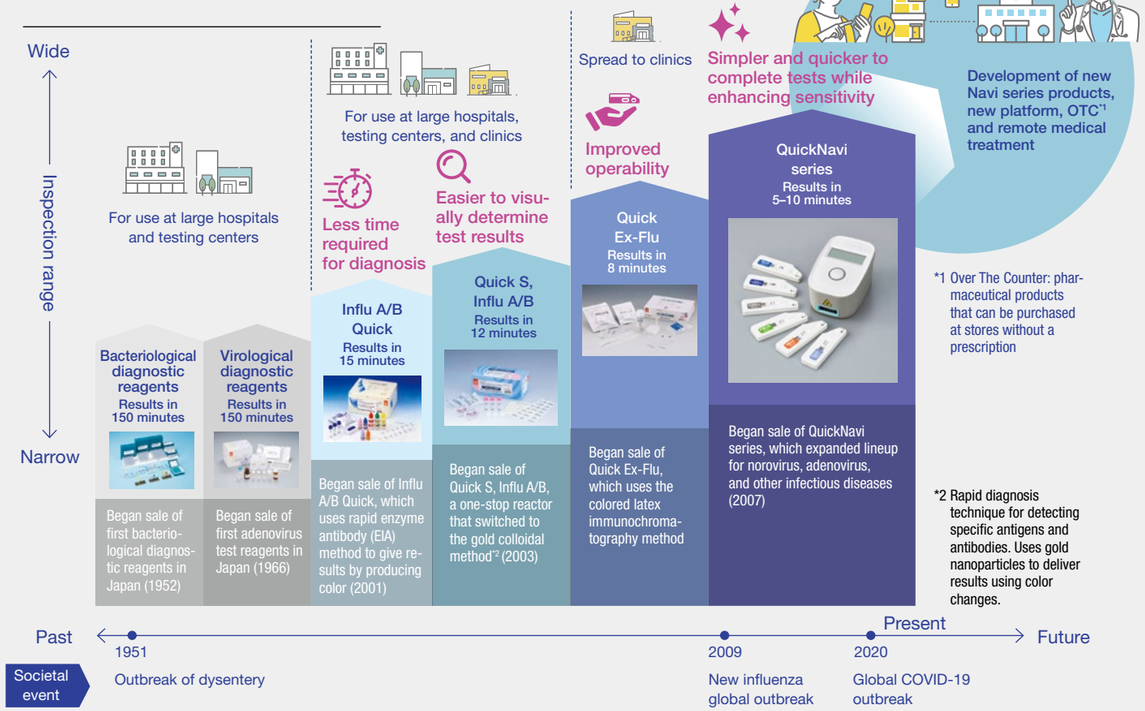
Immunochromatography is a technique that combines immune reactions and chromatography, which is used to purify and separate substances.

Test kits are designed in a way that they can detect one or multiple (for example, simultaneous testing for influenza types A and B) specific antigens, such as COVID-19. A specimen taken from the nose, throat, etc. with a cotton swab is mixed with an extraction solution. The solution contains artificially created antibodies that cause a one-to-one immune reaction with the antigens if the target antigen is present, and the antibodies and antigens bind to each other. These antibodies are called labeled antibodies. When the solution is dropped onto the test device, it moves as it is absorbed into the test strip (known as migration). The captured antibodies, which are placed on the test strip, then capture the antigens, concentrating the labeled antibodies that have been bound to the antigens and producing a color that can be observed, allowing the presence of a specific infectious disease to be detected.

### QuickNavi process




## Development of Denka's POCT business




*1 Over The Counter: pharmaceutical products that can be purchased at stores without a prescription

*2 Rapid diagnosis technique for detecting specific antigens and antibodies. Uses gold nanoparticles to deliver results using color changes.

Part. 3

# To deliver rapid antigen test kits

**In this section, we share the voices of employees who have a shared passion and continue challenging themselves to maximize product value in areas ranging from R&D to sales.**

## R&D

### Miwa Kuwahara

**Group Leader**
**POCT Development Dept.**
**Life Innovation**

**Profile**

After working as a university researcher, she joined the company in 2014 and was put in charge of commercializing QuickNavi™-RSV2 and QuickNavi™-Adeno2, as well as virus culturing, evaluation, design, and development for QuickNavi™-COVID19 Ag. She took her current position in 2022. Her hobby is touring remote islands and visiting hot springs, and her goal destination is Kakeroma Island.

### Continuing to be a top supplier

I am responsible for the design and development of new products and for improving marketed products. When deciding a product's final specifications, reflecting the users' needs is most important, but being able to provide a stable supply of products that constantly perform also gains customers' trust. I am always thinking of product design from a wide perspective, including raw material selection, the manufacturing process, quality control, and product cost.

The strength of Denka's R&D of POCT products is in the technology and knowledge Denka has acquired through more than 20 years of experience. Particularly remarkable was Denka's development of QuickNavi™-COVID19 Ag. Normally, product development requires a considerable amount of time, from acquiring antibodies to rolling out the product, but Denka succeeded in launching QuickNavi™-COVID19 Ag with astonishing speed. All related departments, including manufacturing, quality control, and pharmaceutical affairs departments, urgently responded by coming together, in addition to collaborating among industry, government, and academia. The driving force created from the alignment of all these gears was impressive. With the aim of continuing to be a top supplier of rapid antigen test kits, I want to build a foundation that will support the realization of Denka's ideal future.

## Manufacturing

### Takashi Miyazawa

**Deputy Manager &**
**Engineering Section Manager**
**POCT Manufacturing Dept.**
**Kagamida Plant, Gosen Site**

**Profile**

Joined the company in 2002. He has been involved in the R&D of rapid influenza test kits, as well as the R&D of the QuickNavi™ series, including Quick S, Influ A/B "SEIKEN." He assumed his current position in 2023. His hobby is golf. He is in the Gosen Site's Golf Club and is looking for golf partners.

### I want to be an engineer that thinks of the future based on the current condition of products

In addition to overseeing mainly the streamlining and stabilizing of the production of the QuickNavi™ series and the sharing and transfer of technology to the manufacturing team, I am also attempting to develop essential technologies related to POCT. I want to be an engineer that thinks of the future based on the current condition of products.

In the manufacturing of rapid antigen test kits, Denka has one of the highest production capacities in Japan, and through meticulous production planning, it is flexibly adapting to the changes in demand that come from infectious disease outbreaks. Furthermore, with thorough line clearance, Denka is able to manufacture its entire product lineup on one production line. Denka's ability to stably produce high-quality products with rigorous process management and inspection is also a strength. With the establishment of the POCT Manufacturing Department's Engineering Section, our goal is to improve existing products and develop some improved products within our department. I want to streamline operations from a perspective closer to the production site and create an environment in which employees can reserve sufficient time for gaining skills and knowledge related to health and safety risk assessment and products as well as learning about new production technologies and more.

## Marketing

### Naohito Kobayashi

**Section Manager**
**Domestic POCT Sales Section,**
**POCT Sales Dept.**
**Life Innovation**

**Profile**

Joined Denka SEIKEN in 1999 and oversaw Hokkaido, Chiba, Ibaraki, Tochigi, Tokyo, and Kanagawa as DMR. Currently, as section manager of the Domestic POCT Sales Section, he is mainly in charge of sales companies and wide-area distributors. His hobbies are going to the gym and drinking.

### Turning customer expectations into a driving force for activities

In 2000, the year after I joined Denka SEIKEN, Influ A-Quick, an influenza virus antigen test kit and the company's first rapid antigen test kit, was launched, and I recall being busy responding to inquiries. There were numerous difficulties following that, such as improving and expanding the product lineup, launching Denka's first piece of medical equipment, the QuickNavi Reader™, and QuickNavi™-COVID19 Ag during the COVID-19 pandemic. Nevertheless, what was memorable were the words of gratitude from customers and distributors as well as being told, "I want to use QuickNavi, so I'll wait," while preparing a shipment.

I believe these can be attributed to not only the QuickNavi™ brand being generally well received in terms of performance, operability, and Denka's handling of supply, product follow-up, and complaints but also the attachment to Denka's image, cultivated through vaccines and clinical reagents.

As demand for rapid antigen test kits continues, their stable supply is a pressing issue. Since the Gosen Site's new facility will begin operations in 2025, I will work together with internal stakeholders to provide a stable supply to customers, while also steadily doing what I can to sustainably grow the POCT business.



## The evolution and future of Denka's POCT products

**General Manager, POCT Sales Dept.**
**Life Innovation**

### Masakazu Yagi

**Profile**

Joined Denka SEIKEN in 1987 and oversaw sales in Fukuoka, Nagoya, Tokyo and other areas. After working for the head office's Domestic Reagents Dept., he took his current position in 2023. He has become more of an indoors person since 2020, and his hobbies consist of DIY, taking care of his aquarium, gardening, and more.

In 2000, Denka's POCT business started shifting from an influenza antigen testing method that used EIA (enzyme immunoassay) plates (a testing method that measures the virus antigens in a serum) to one that uses immuno-chromatography. After that, Denka continued making improvements as appropriate, eventually arriving at the current test device shape, in turn leading to the development of the product lineup. Today, the QuickNavi™ series is being used at many clinics and other medical facilities. Additionally, as the automation of manufacturing progresses, Denka also plans on automating product storage in the new facility that will begin operating in 2025. I'm only involved in part of this journey, but I believe that continuing to commercialize products from the customer's perspective, provide services, and, above all else, supply safe and reliable medical products is important to continuing the business.

Cholera, dysentery, influenza, COVID-19—humankind will never be free of disease, so there will continue to be a need for testing in medical treatment. On the other hand, testing methods that once required drawing blood to measure blood glucose levels have now progressed to no longer require it. Even for rapid test kits, there is a possibility their testing method will change, just as it once did from the EIA testing method. Denka must continue to identify and respond to further changes without growing content.

Rapid antigen test kits have been recognized globally by not just medical professionals but also the general public due to the COVID-19 pandemic. The number of COVID-19 infections is trending downward, but future waves are expected due to mutations in the virus. The risk for other disease outbreaks is also rising because of the revitalization of the movement of people and global warming. Denka also foresees market growth from a shift to self-medication as a countermeasure to growing medical costs and increased health awareness. While cultivating the field of infectious disease as the core of Denka, the company will strive to expand the scope of the POCT business with a view toward non-medical fields to contribute to improving the health and lives of people.

# Message



## Taro Inada

**Executive Officer**
**Division Director, Life Innovation**


**Profile**

Joined the company and was assigned to the Research Institute in 1993. Following his time as general manager of the New Business Planning Department and the Global Innovation Department, New Business Development; as representative of Denka-KEW Genomics; and in other positions, he was assigned to his current position in April 2024. His hobby is running.

POCT is a test setting that allows for easy testing of patients, quick results, and doctors to provide early diagnosis and treatment. Within Denka, I believe some people think "POCT" refers to "rapid antigen test kits," but "POCT" actually encompasses all tests performed outside of hospital testing facilities and outsourced testing centers, and it has a wide range of applications.

That being said, rapid antigen test kits are a major example of POCT. COVID-19 brought them into the spotlight. As the leading Japanese manufacturer of rapid antigen test kits, Denka developed products early and contributed to the pandemic response. The driving force behind this was Denka's strength: a high level of comprehensive capabilities. This involves many factors: each of Denka's products' scientific performance, such as sensitivity and specificity; the products' usability that allows for simple, quick, and accurate testing; Denka's diverse product lineup; the instantaneous supply and high quality required of infectious disease tests; the robust sales capabilities cultivated through the diligence of the members at the head office and medical sales offices as well as collaboration with sales companies and distributors; and Denka's meticulous technical support for end users. Denka gained the trust of its customers by meeting the needs of medical facilities and distribution channels at a high standard and maintaining that standard for many years. This trust is an asset and the inspiration for creating Denka's next product and new related businesses.

What Denka learned from the recent pandemic is that humankind is always at risk for infectious diseases, and, in order for Denka to be the most capable of facing this threat, all relative personnel must come together as one, put their comprehensive capabilities into full swing, and prepare. Going forward, the company will continue to fulfill its responsibilities as a leading company: developing technologies and products that more quickly generate more accurate results, enhancing quality and the supply chain, and strengthening manufacturing capabilities by starting operations at the Gosen Site's new facility to provide a stable supply of products.

Additionally, as exemplified by the launch of rapid test kits creating a market, the environment surrounding testing is changing. Denka has excelled in testing technology that effectively applies chemical reactions like the ones occurring inside our bodies by handling viral and bacterial antigens and the antibodies (proteins) that react and bond to them. Recently, innovations in testing technology relying on genetic sequence information, which determines the properties of these substances, have been occurring. Furthermore, POCT, previously called "bedside testing," has now gone beyond the hospital and is discussed in a wider context, such as blood-sugar monitoring for diabetic patients, simple home pregnancy tests, and, more recently, wearable devices like smartwatches. Similar to what happened with COVID-19 tests, the POCT market is expected to expand due to the spread of home testing, home specimen collection, and remote patient monitoring, in which doctors diagnose the examination results, with medical digital transformation facilitating all of these advancements. This may also change the conventional rules of competition and players in the market. Denka sees these changes as new growth opportunities for the POCT business. Denka will focus on expanding into markets that are new to the company, such as overseas markets and markets for testing kits for conditions other than infectious diseases, and will take on the challenge of developing new products and related businesses.

Lastly, the Life Innovation business, which includes these rapid antigen test kits, is a very familiar business area that will improve the quality of life for you, your family, and your friends, and I hope this article has reignited your interest in it. Please share your opinions and guidance so that we can continue to have essential discussions on the business.





Manufacturing influenza vaccine stock solutions

## Protecting Society From Influenza by Providing Safe and Reliable Vaccines to More People

Influenza vaccines are essential for preventing severe cases of influenza. In 2022, a new facility for producing influenza vaccine stock solutions was launched at Denka's Gosen Site Niigata Plant. Saito, who works at this facility, is involved in sterile filtration for the influenza vaccine stock solution.

To produce influenza vaccines, fertilized chicken eggs are inoculated with the virus and cultured, and the propagated virus is harvested. The purpose of sterile filtration is to ensure that no impurities are introduced during the preparation of the stock solution. Saito is committed to creating an environment that prevents the introduction of contaminants by thoroughly implementing aseptic techniques to ensure sterility, meticulously maintaining production equipment, and rigorously maintaining cleanroom cleanliness. He also prioritizes consistent communication with relevant departments and personnel responsible for upstream and downstream processes. "My goal is to ensure the stable production of influenza vaccines by preventing equipment malfunctions and human error. The most rewarding aspect of this job is being able to contribute to people's health through vaccines." Produced in compliance with strict national standards, Denka's vaccines are the result of an unwavering commitment to perfecting the most basic tasks.

### Influenza HA vaccine

Inoculation of the vaccine prevents the propagation of influenza viruses in the body and helps prevent severe cases.

**Specialist**


### Kazuhiko Saito

**Production Section No. 1, Vaccines Dept., Niigata Plant, Gosen Site**

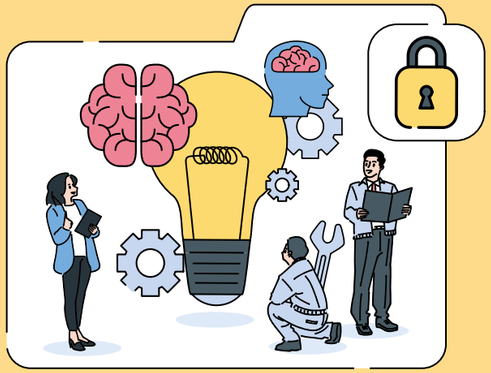

Joined Denka Seiken (currently the Vaccines and Diagnostics Business Headquarters, Life Innovation) in 2005. He has consistently been involved in the production of influenza vaccine stock solutions and is currently responsible for sterile filtration.

# Business Value Creation Through IP Strategy

Ideas, technologies, and inventions created by people, which are recognized as having property value, are referred to as “intellectual property.” These days, intellectual property is drawing attention as an indispensable element in shaping business strategies. In this article, we will introduce Denka’s intellectual property assets and its initiatives for leveraging them effectively.

## Why is intellectual property necessary?

How do intellectual property rights, which protect intellectual property, influence a company’s business activities?



### Case 01 To protect a company’s technology and ideas

Intellectual property rights allow a company to take legal action, such as seeking injunctions or claiming damages, if another company imitates its technologies, ideas, or inventions. By preventing imitation from other companies, these rights help avoid economic and opportunity losses.


### Case 02 To enhance the credibility of technology and products, and increase corporate value

Intellectual property rights also serve to visualize the intangible value of a company’s strengths, such as technologies or brands. Acquiring intellectual property rights enhances the credibility of these strengths.

**Are intellectual property rights becoming more important?**

#### 2021 Corporate Governance Code Revision

In today’s market, where it is no longer possible to differentiate products solely based on performance or price, an increasing number of companies are enhancing their corporate value through intangible assets such as intellectual property. Its importance is reflected by the fact that in the United States, approximately 90% of corporate assets are now intangible. In Japan, the 2021 revision of the Corporate Governance Code introduced provisions related to intellectual property for the first time. This revision is expected to drive greater investment in intellectual property and the development of strategies to leverage it effectively.

### Case 03 To foster collaboration with other companies

Intellectual property rights can be licensed to strengthen partnerships with other companies. Licensing your own technologies to third parties or having other companies share their knowledge and technology can also promote open innovation.

## What are intellectual property rights?

Intellectual property rights protect the ideas and creations produced by individuals as their property. They not only prevent unauthorized use by others, but also establish rules for handling intellectual property to ensure that technological development is not hindered. Intellectual property rights encompass various types of rights, such as those listed below.

### Main Types of Intellectual Property Rights

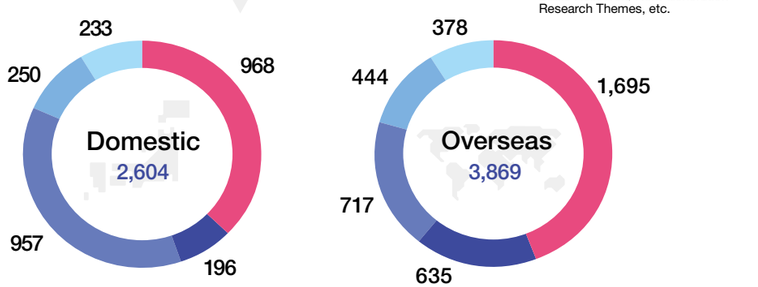
| | |
|---|---|
| **Copyrights** | Rights granted to the creators of works such as novels, music, and art. No application is required, as the right is granted as soon as the work is created. |
| **Patents** | Rights that protect inventions. To obtain a patent, the invention must be novel and not easily conceived from known technologies. |
| **Utility Model Rights** | Rights that protect ideas related to the shape, structure, or combination of goods. Unlike patents, they do not require a high level of innovation and can be granted quickly without an examination. |
| **Trademarks** | Exclusive rights granted to a trademark used for goods or services. Trademarks can include letters, figures, symbols, three-dimensional shapes, sounds, and more. |
| **Design Rights** | Exclusive rights granted to the designs of objects, buildings, or images. This protection typically applies to the designs of industrial items. |

## Intellectual Property Rights Held by Denka

Denka holds various intellectual properties. As of FY2023, the company holds 2,604 domestic patents and 3,869 overseas patents. With the rising importance of intellectual property in recent years, Denka has been actively pursuing patent applications, leading to a steady rise in the number of filings.

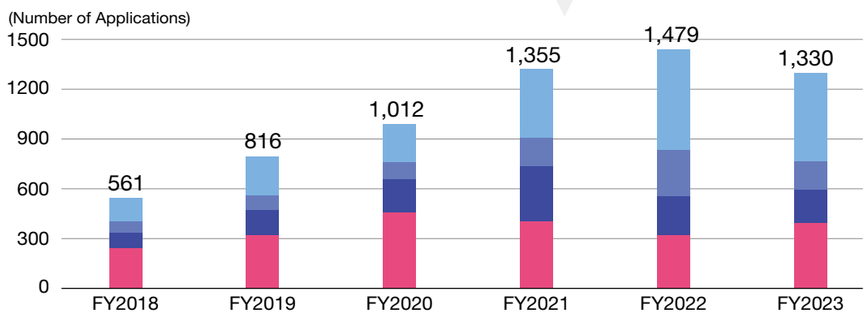
### Number of Patents Held in FY2023

Patents are held across various domestic and overseas departments




### Denka’s Patent Applications Over Time

Denka has been actively pursuing applications, with a consistent upward trend each year.




*PCT (Patent Cooperation Treaty): A system where submitting a single application provides the same effect as applying simultaneously to all member countries of the PCT.

# IP Landscaping:

## Using IP Information to Guide the Company

Intellectual property is becoming increasingly important in business activities. It is now closely tied not only to the protection of rights, enhancing corporate value, and business partnerships, but also to business strategy. The key to such intellectual property strategy lies in utilizing intellectual property information (hereafter referred to as "IP information") for new initiatives, which is referred to as "IP landscaping."

## What is IP landscaping?

While there are various definitions, it is generally considered to refer to the proposal of business strategies using IP information. This involves analyzing a company's patent or non-patent information, as well as that of competitors, to identify strengths, weaknesses, and market trends, enabling employees to develop management, business, and technology strategies and offer recommendations to executives. Unlike traditional use of intellectual property to protect rights from others, it can be described as a "proactive use of intellectual property" aimed at expanding business. IP landscaping has been increasingly utilized by many companies since the 2021 revision of the Corporate Governance Code.

### Proactive Use of IP Information to Reach a New Stage

## 5 Steps! of IP Landscape Analysis!

Denka began implementing IP landscaping in 2020. The Intellectual Property Department closely collaborates with other business divisions to make business strategy recommendations through five steps.

### 1 Narrowing down themes based on in-house patent information

Using Denka's patent map, the Intellectual Property Department conducts interviews with business divisions to narrow down themes that can lead to valuable proposals.

### 2 Setting hypotheses based on the identified themes

Based on the identified themes, preliminary research is conducted to gather input from stakeholders, and hypotheses are set for the report.

### 3 Conducting interviews with stakeholders

The hypotheses are explained to stakeholders, and interviews are conducted to confirm the direction for advancing the initiative.

### 4 Creating the report

A report is created based on the information gathered from the interviews.

### 5 Presentation

The proposal is presented to the business division and relevant stakeholders, and feedback is obtained.

**Making business strategy recommendations!**

### Interview with the General Manager of the Intellectual Property Department

# The Utilization of Intellectual Property and Denka's Future

**Hiroshi Hirose**
General Manager, Intellectual Property Dept.

**Profile**

Joined Denka mid-career in 2018. Since April 2024, he has been working as the General Manager of the Intellectual Property Department in New Business Development. Using his wide range of expertise as a patent attorney, IP analyst, and MBA (Master of Business Administration), he continues to challenge himself to enhance corporate value through intellectual property activities. In his private life, he enjoys surfing with his family on weekends.

### Q. When and how did Denka start using IP landscaping?

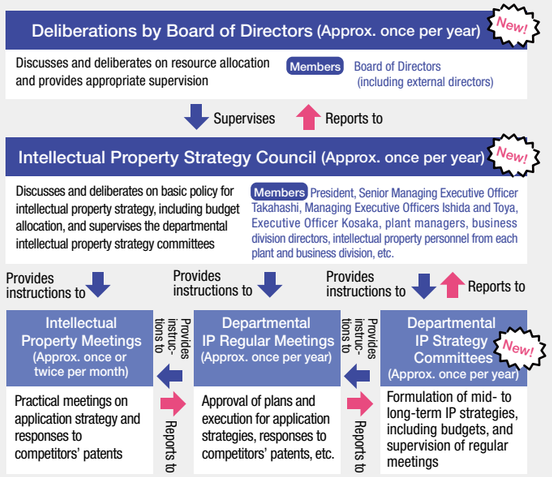
With the increasing importance of IP information in Japan, the use of IP landscaping became mainstream in the entire intellectual property industry around 2018. Denka also began preparations around then and started its activities in 2020. Initially, we received themes from management, conducted research, and reported the findings to the relevant departments. Since 2021, the Intellectual Property Department has identified themes based on the business strategies and portfolios of each business division and held discussions with the relevant business divisions to make proposals.

### Q. How has the work of the Intellectual Property Department changed due to IP landscaping?

Before 2018, our main tasks were patent application procedures. However, after the introduction of IP landscaping, we also began conducting theme research and interviews with business divisions. Furthermore, to enhance the value of Denka's intangible assets, we collaborate with external patent attorneys and conduct interviews with inventors, not just to file applications, but also to ensure that we acquire rights in a more reliable and comprehensive manner.

### Q. What is the purpose of the Intellectual Property Strategy Council launched this year?

The 2021 revision of the Corporate Governance Code specified that the board of directors should oversee activities related to intellectual property strategy. In response to this, the Intellectual Property Strategy Council was created as an annual meeting where each department presents their intellectual property strategies and seeks approval from the members. This will consolidate the intellectual property strategies previously carried out separately by each business division and make them available for sharing across the company. Additionally, by placing intellectual property personnel in each business division and plant, we promote the use of intellectual property within each organization.



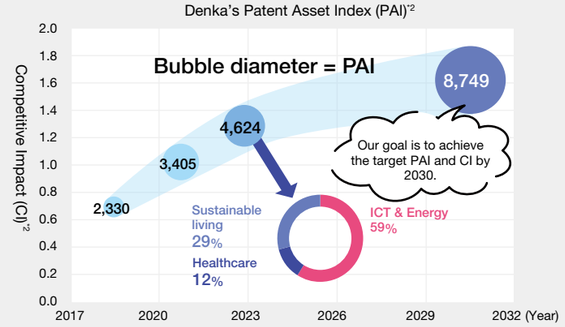

### Q. Please tell us about the Intellectual Property Department's vision for achieving Mission 2030.

For Mission 2030, our goal is to maximize the value of Denka's intangible assets. By 2030, we aim to elevate the asset value of our patents and their relative value to the target levels (see the diagram below). Achieving this will require department members to hone their expertise and deeply understand business and technology strategies. In recent years, an increasing number of our department members have obtained patent attorney qualifications, further strengthening our specialization.

Our intellectual property team will serve as a bridge between the research and development team and each business division, working diligently to enhance the value of our patent assets. By promoting organic collaboration between departments, we aim to create new value for Denka and play a role in supporting the overall growth of the company.

### Patent Asset Value and Mission 2030 Target

**Based on the operating profit goal set by Mission 2030, the PAI value will be set at 8,749, and the CI value at 1.6.*1**




*1 Calculated based on the correlation between operating income and PAI for 100 chemical manufacturers.
*2 PAI (Patent Asset Index) is an indicator of the competitive advantage and overall value of a patent portfolio, calculated using LexisNexis's PatentSight® tool. CI (Competitive Impact) is an indicator of the technological value of a patent and its market recognition.

# INTERVIEW The People Protecting and Utilizing Our Intellectual Property

## Becoming the bridge that connects valuable inventions and society

### Megumi Sudo

**Intellectual Property Dept.**
**New Business Development**

Joined the company as a new graduate in 2017. After being involved in research work for adhesives at the Denka Innovation Center, she started her current position in 2021. In addition to her normal work, which includes acquiring the rights for inventions, she is responsible for running Morning Seminar, a department study session, and Children's Invention Class, which is held for children of people within and outside of Denka.

**—What is rewarding about your work in the Intellectual Property Department?**

Giving shape to the inventions created by the hard work of researchers. It's also interesting to think about how to connect these inventions to the company's profits and how they can help society as a whole. Moreover, it's important to make operations more efficient in order to deliver the benefits of these valuable inventions to as many people as possible. As intellectual property management requires many procedures, the deadlines are also strict. While there are many tasks where mistakes are not allowed, we are currently breaking the work down into smaller parts and considering whether we can eliminate unnecessary tasks by listening to team members' opinions.

**—What is your goal for the future?**

I passed the patent attorney exam in 2024. I want to register as a patent attorney as quickly as possible and receive the trust of research departments and business divisions. My policy is that "the inventor is the most important." By respecting the inventions created by researchers and ensuring that applications and patent procedures are carried out in line with intellectual property strategies, I will contribute to the development of Denka and establish intellectual properties that will help society.

**Ms. Sudo's work day**

- 8:30 Morning group meeting
- 9:00 Participate in department study session
- 10:00 Confirm operational efficiency consideration list and review operational process with people in charge
- 13:00 Check documents for planned patent applications
- 15:00 Meeting for operation of Children's Invention Class

## Aiming to establish intangible assets that contribute to Denka's future


### Hiroko Negishi

**Intellectual Property Dept.**
**New Business Development**

Obtained patent attorney certification in 2005 when she worked at a patent office. She has been involved in application filing in a wide range of fields, patent clearance, and other work. She joined Denka in April 2023 with the desire to plan intellectual property strategies from a position even closer to product development.

**—What are you responsible for?**

I am primarily responsible for rights acquisition applications, intellectual property education, and IP landscape. For rights acquisition applications, I focus on drafting application policies in line with business strategies in order to establish the intangible assets that are the sources of Denka's competitiveness. For intellectual property education, I plan and carry out various seminars while collaborating with department members in order to deepen interest and understanding of intellectual property. In addition to seminars for researchers, I'm also an instructor at the Children's Invention Class, which is carried out for children of Denka's employees.

**—What is rewarding about your work in the Intellectual Property Department?**

Being able to interact with new technologies and imagine the future. I primarily support rights acquisition for technologies from the Polymer Solutions division that reduce environmental impact. My work is very rewarding as I feel that the outstanding research results of our researchers will help realize a sustainable future while I discover inventions that contribute to business. To realize a sustainable future, I will deepen my understanding of Denka's technologies and establish intangible assets that will contribute to business and the future while working closely with business divisions, research departments, and patent offices.

**Ms. Negishi's work day**

- 8:30 Morning group meeting
- 9:00 Department study session (as instructor)
- 10:30 Look into application strategies based on prior technology search
- 13:00 Intellectual Property Dept. meeting
- 14:30 Meeting with patent office and researchers
- 16:00 Confirm application documents, etc.

## Kid's Innovation Workshop —Conveying the value of inventions to as many people as possible

"Intellectual property seems difficult…" Since some people believe this, the Kid's Innovation Workshop was contrived with the aim of making it understandable even for children. The first session was held at Denka's headquarters in 2023. It provides invention experience for children in elementary school and older. The children work on inventions while learning about the process for taking the initiative to give shape to their ideas. It has been extremely well received by their guardians as it is a valuable experience for enhancing children's creativity. By continuing to hold sessions, the Kid's Innovation Workshop will contribute to the development of future inventors.

## Contributing to decarbonization of society as a whole with Denka's technologies Participation in WIPO GREEN as a partner

Denka has participated in WIPO GREEN, an environment-related technology global platform that operates the World Intellectual Property Organization (WIPO), as a partner since July 2022. Denka has not only been reducing the $CO_2$ emissions that it generates but has also been working on a number of products that contribute to the environment and products that reduce environmental impact. Now that corporate environmental management is in the spotlight, Denka will create innovations by interacting with other partners who are interested in its technologies and contribute to decarbonization for society as a whole by registering its technologies on this platform.

Proud partner of WIPO GREEN

Vol. 06
New Visions × All Denka Employees

# My Vision

## Denka's Future as Envisaged by Each of Us

We will ask employees from various positions, generations, and workplaces about the future they envision for Denka, changing the theme in each issue.

**Part 5:**

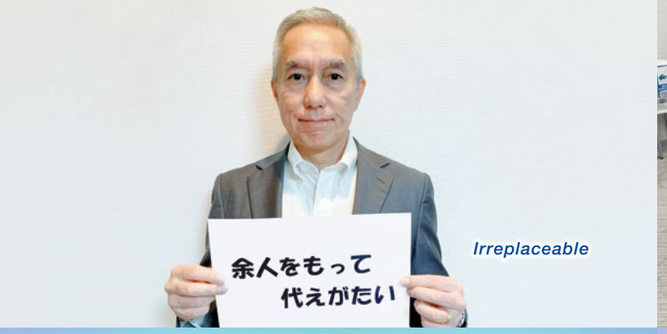
## "What kind of specialist do you aspire to be?"


**Yuta Kida**
Administrative Department

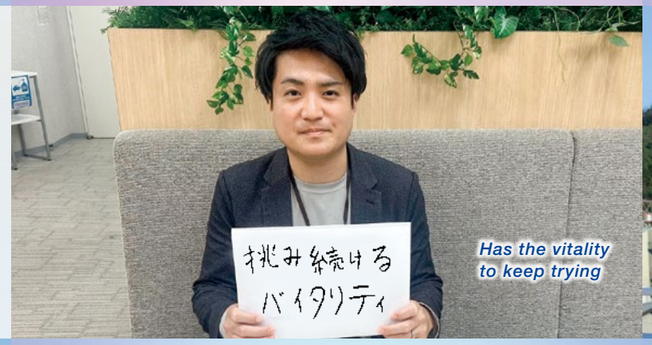

**Taisuke Kudo**
Finance Department


**Shinpei Yamada**
Performance Plastics Department
Polymer Solutions


**Kohei Takeshita**
Electronic Materials Section
Osaka Branch

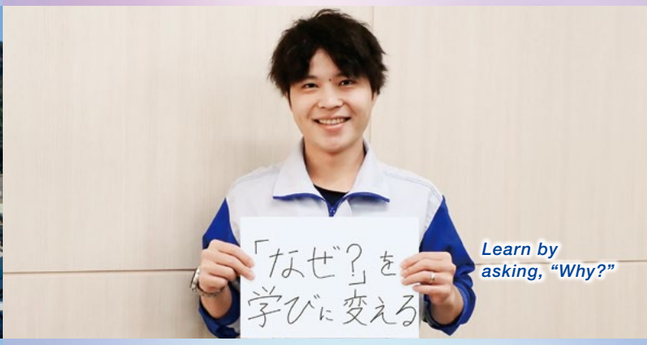



**Makoto Ozawa**
General Manager, Purchasing & Logistics Department




**Masanari Nagatomi**
Business Promoting Department
Electronics & Innovative Products


**Hidehito Otsuka**
General Manager, Organic Materials No. 1 Department
Omi Plant

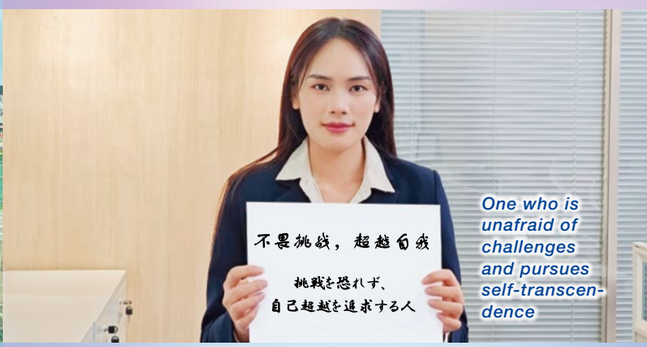



**Atsuhiro Takagawa**
LDM Project, M30 Project Promotion Department
Chiba Plant


**Tomohiro Ogawa**
Domestic Sales Section, Clinical Reagent Department
Life Innovation


**Takahiro Morisawa**
Global Marketing Group, Special Cement Additives Department
Elastomers & Infrastructure Solutions


**Iris Foo**
Leader, Group HR and Admin Department
Denka Chemicals Holdings Asia Pacific Pte. Ltd. (DCHA)




**Qiao Ting Zhang**
Shenzhen Branch
Denka Chemicals Shanghai Co., Ltd.

Pick Up

Oct.

# Exhibits at Highly-functional Material Week!

Denka exhibited at Highly-functional Material Week, a three-day exhibition held at Makuhari Messe on October 29. The Electronics & Innovative Products division and New Business Creation Department collaborated to showcase many of Denka's products.


Highly-functional Material Week, one of the world's largest exhibitions for cutting-edge material technologies, such as functional films, plastics, cellulose, carbon fiber composites, metal, ceramics, and more, was held at Makuhari Messe from October 29 to 31. A record-high 930 companies participated in the exhibition, and the number of visitors reached 46,813 over three days, making it a great success.

Denka exhibited at the event with the primary aims of introducing products, enhancing recognition, gathering information to differentiate its products and services from competitors', listening to customers' needs, and acquiring new domestic and international customers.

Additionally, the Electronics & Innovative Products division and New Business Creation Department jointly exhibited for the first time in order to showcase many of Denka's products. This resulted in the company's booth attracting approximately 1,800 visitors, making the event a great success. The booth attracted significant interest from many visitors and provided them with detailed explanations on the company's products and technologies.

### List of Denka's displayed products

Here are the products displayed at the event.

| | |
|---|---|
| Business Promoting Department Electronics & Innovative Products | -Microfabrication technology<br>-Newly developed filler |
| Advanced Specialty Materials Department | -Dielectric control filler<br>-Heat dissipation filler |
| Functional Ceramics Department | -Fluorescent materials<br>-Insulating filler<br>-Silicon nitride<br>-Boron nitride shapes |
| High Functional Adhesive Materials Department | -Double-sided tape for securing moving parts<br>-HARDLOC |
| New Business Creation Department | -Egg shell plastic<br>-Porous carbon<br>-Wearable biosensors<br>-Carbon nanotube, fullerene |
| Toyo Styrene | -Polystyrene chemical recycling<br>-Material recycled polystyrene<br>-Biomass-based polystyrene alloy |
| Denka Elastlution | -Thermally expandable fireproof materials<br>-Heat dissipation materials |

## Display of numerous products

The display of Denka's numerous products promoted the company's technological capabilities, which are able to meet various needs.
We asked everyone who supported the exhibition to reflect on the event.

1. Creative approaches taken at the event
2. Outcomes from the event

**Ayako Kakegawa**
**New Business Creation Dept., New Business Development**

1. Our department's projects didn't have much information that could be provided to external parties, so we created panels with diagrams to help visitors visualize our projects.
2. Since many promising companies visited Denka's booth as potential customers for new products, this event provided us with an opportunity to find new customers.

**Kyosuke Yamaga**
**Advanced Specialty Materials Dept., Electronics & Innovative Products**

1. Our department focused on raising the recognition of SNECTON, a new product that we are aiming to multilaterally introduce to the market, which has increasing demand for low-dielectric materials for high-speed communication and other applications.
2. In addition to inquiries about sample evaluation and mass production for Denka's products, our department saw high heat dissipation products draw a lot of attention.

**Yu Takabayashi**
**Functional Ceramics Dept., Electronics & Innovative Products**

1. Since the use of ceramics powder is not immediately apparent, our department focused on explaining specific application examples and its properties.
2. Our department received inquiries about applications other than existing ones and drew a lot of attention to Denka's products, enabling us to hold meetings and provide product samples.

**Mitsuki Shirota**
**Electronic Materials Research Dept. (Shibukawa Plant), Electronics & Innovative Products**

1. Many visitors, including international ones, visited Denka's booth, so I made sure to listen to what characteristics they wanted from HARDLOC and provide clear explanations.
2. Our department received favorable feedback from a lot of visitors who expressed interest in using the product, successfully promoting Denka's products to a wider range of customers.

**Kazuya Ichise**
**Basic Research Office, Laboratory, Toyo Styrene Co., Ltd.**

1. To deepen visitors' understanding of a circulating society, our department thoughtfully considered creating the display of Denka's products in an easy-to-see manner and the layout of its products.
2. Our department not only exchanged opinions with companies that were involved in recycling businesses, but also promoted polystyrene as a recycling material.

**Takayuki Nomura**
**Sales Section, Sales Dep., Denka Elastlution Co., Ltd.**

1. Our department welcomed a number of visitors, including international ones, so I made sure to communicate clearly when explaining Denka's products.
2. Many visitors showed interest in Denka's products, leading to several opportunities for the next step, such as meetings.

Sep.

## Briefing held for individual investors

On September 17, a briefing for individual investors was held in a hybrid format, both at a venue in Fukuoka Prefecture and via live streaming. A total of 377 people, 44 in-person and 333 online, participated in the briefing. The meeting introduced the overview of Denka from eight perspectives, such as its history and measures to return to a growth trajectory, which served as an opportunity to showcase the company's competitiveness and advantages. A post-briefing survey revealed that approximately 70% of the participants evaluated the briefing as "good." The briefing's materials and video are posted on the IR Library page on Denka's Japanese website.

Sep.

## Tour of Omuta Plant for institutional investors and analysts held with Mitsui Chemicals

From September 17 to 18, tours of the Omuta Plant (Fukuoka Prefecture) were held in collaboration with Mitsui Chemicals, with a total of 13 institutional investors and analysts in attendance. During the Q&A session, Denka received a number of questions about its major products, marking a high level of interest in Denka's technologies, quality, and other aspects of competitiveness. In the north area of the plant, the company established the new manufacturing facility area—North Highland. These tours provided the participants with an opportunity to understand the growth strategies of the plant, which aims to reach new heights in the field of ICT & Energy.

Oct.

## Investment in a startup company to expand high-functional material business

Denka invested in the American startup company Ares Materials Inc. through a corporate venture capital (CVC) fund. The startup developed a design technique that utilizes materials informatics[*2] for using used ene-thiol[*1] as a raw material and possesses the technology to manufacture high-performance optical films. Through this investment, Denka will establish a partnership in joint development for improving display performance by combining Denka's HARDLOC OP Series enethiol adhesives with Ares Materials' optical films and in market development with the aim of social implementation in the flexible display field.

Oct.

## Company Alumni Association general meeting for 2024 held

Company Alumni Association Chairperson Matsugami

On October 2, Denka invited 162 company alumni to the Company Alumni Association general meeting held at Mandarin Oriental, Tokyo. This meeting started with opening remarks by Company Alumni Association Chairperson Matsugami, who resigned from this position after the general meeting, followed by President Imai explaining Denka's financial results and latest news. After that, Senior Managing Executive Officer Takahashi made a toast to start the get-together. With executive officers from Tokyo in attendance, there was a lot of friendly conversation as people reunited with familiar faces. Although the participants were reluctant to part, the party concluded with the closing remarks made by Former Vice President Ito, who was appointed to be the new chairperson of the association.

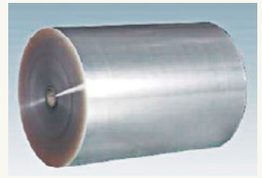
Nov.

## Financial results briefing held together with financial results announcement

On November 8, Denka announced the financial results for the second quarter of FY2024 and held the financial results briefing online. The company explained to the participating institutional investors, analysts, and journalists about its thoughts regarding the financial results and approach to business forecasts, the progress of its focus areas, responses to the changing business environment, and more. Following that, the company received from participants various questions about trends in demand for the major products of each division, its future prospects, and other topics.

Dec.

## Launches Biomass BOPS Blended with an Environmentally Friendly Material



Denka launched Biomass BOPS, an eco-friendly sustainable polystyrene sheet, which incorporates biomass-derived materials. It has been used in the containers of some dessert products provided by FamilyMart Co., Ltd. as an ISCC PLUS certified product for which sustainable raw materials have been allocated using the mass balance approach. Denka will continue to meet society's and customers' needs for reducing environmental impact.

*1 A reaction between a thiol (R-SH) and an alkene (C=C-R).
*2 Efforts to improve efficiency by using information science technology for material development.