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**Featured Article**  
**Solving Social Issues Through Products Against Infectious Diseases**

# The antiviral, antimicrobial, and insect repellent functions of RIKEGUARD reduce the risk of various infectious diseases that exist in society

As social uncertainty arising from infectious diseases embroil the world, what are the important things for RIKEN TECHNOS to contribute to society through business? Three Senior General Managers involved in the development and sales of the antiviral and antimicrobial product RIKEGUARD gathered together and talking about their thoughts on solving social issues through products against infectious diseases.

(Date of interview: July 22, 2020) \* The antiviral features mentioned in the article do not apply to all viruses.

## Impetus for Developing RIKEGUARD

### When did development of RIKEGUARD start and what was the impetus?

**Sugino:** The development of RIKEGUARD was started in 2015. It was originally a compound product that adds antimicrobial function to boots and handrails.

**Otani:** For the film product, we decided to also develop products against infectious diseases after a smartphone manufacturer told us in 2017 about their policy that the entire smartphone should be antimicrobial.

**Sugino:** It is the same with the compound product. There was first a request from manufacturers that they want to make their handrails antiviral and antimicrobial as a policy and hope we can carry out development. Boots used in places like cafeterias also have a strong need to be

antimicrobial, so the main focus during initial development was antimicrobial. Being antiviral is something like a by-product.

**Kajiyama:** The increased awareness about infection control in society became a major opportunity for the company to develop antiviral, antimicrobial, and insect repellent products. The first compound product bearing the RIKEGUARD name was launched in 2017.

**Otani:** For the film product, the basic development product was completed in January 2019, the SIAA mark was obtained in September, and in December, we achieved a new antiviral processed product that is extremely clear and can be applied to the surfaces of smartphones and tablet devices.

**Sugino:** Of course, not everything was due to requests from customers. There is also motivation within the company. Since the previous three-year mid-term business plan

formulated in 2016, we have been using the slogan “Aiming to become the leading provider of comfort for all living spaces.” The development of infection control products is also part of the actions for achieving this goal of “Aiming to become the leading provider of comfort for all living spaces.” We do not stop at antiviral and antimicrobial functions. Research and development in pursuit of comfort for living spaces—including deodorant functions and measures against allergies and electromagnetic waves—continue to be carried out today.

**Kajiyama:** I think it is because we have this slogan that we were able to unite all employees—not just development departments but covering manufacturing and sales and marketing departments too—toward the same goal.

**Otani:** Recently, to achieve comfort for living spaces, there is stronger emphasis especially for the need to be safe and reliable. What do you think?

**Sugino:** That’s right. At the R&D Center, we always keep in mind the R&D policy of being safe and gentle to people. Specifically, we are taking on challenges in various innovations with “beautifully”, “lightly” and “safely” as the three keywords. I think our position of not bringing harm to people and reducing society’s risks will continue to be important themes for research and development going forward.

## Presence of RIKEGUARD as a Measure Against Infectious Diseases

### Was there any impact on the development and launch of RIKEGUARD from COVID-19?

**Kajiyama:** The development and sales of RIKEGUARD itself started way before COVID-19 appeared. After the appearance of COVID-19, the major movement was to accelerate the introduction of film products which have cleared antiviral and antimicrobial tests based on international standards and obtained the SIAA mark. RIKEGUARD is the first antiviral film product in the world to obtain the SIAA mark.

**Otani:** We obtained the antiviral SIAA mark in September last year. Back then, we did not feel any real market need.



As we entered 2020, there were more and more news about COVID-19, but at that time, there was still not sense of crisis in Japan. It seems no one felt it would develop into a situation like this. However, now, I feel that society as a whole is showing great interest for antiviral products.

**Kajiyama:** While SIAA does not guarantee effectiveness against COVID-19, as the whole world is concerned about measures against infectious diseases, there was a strong desire to quickly launch products with the SIAA mark that recognizes effectiveness against viruses. There is also significant meaning in terms of social contribution, so we increased speed in all aspects.

**Otani:** It was only after February started that we were able to commence full-scale sales of RIKEGUARD film with SIAA mark. We first started by expanding sales aimed at mobile devices and glass for windows. Subsequently, from end March, we started seeing people wearing face shields. Acrylic and other such materials have smooth surfaces which allows viruses to remain active for long periods of time. If we do nothing about it, there is a possibility that they may end up being sources of infections. Therefore, we quickly developed and started selling the RIKEGUARD face shield which has antiviral coating on both sides. This immediately started showing antiviral effects, allowing the spread of infections through contact to be curbed. I think it was a timely launch.

### Please tell us about the antimicrobial and antiviral mechanisms.

**Otani:** There are still many people who think that being antimicrobial and disinfectant means effectiveness against viruses. Actually, microbes and viruses are entirely different



things. Many people think that disinfecting will cause viruses to die, but viruses do not have cell membranes and are not living things, so we cannot say “to kill viruses.”

**Kajiyama:** We reduce viruses. The correct way is to say that the antiviral coating of RIKEGUARD suppresses the propagation of viruses.

**Sugino:** I will start by explaining antimicrobial function. Certain metal ions have the property of attacking microbes and this effect kills microbes. This has the same effect on viruses. Metal ions deactivate viruses, which means viruses can no longer be active. However, this theory has not been scientifically proven.

**Otani:** Technologically, it is the same for compounds and films. Surrounding negatively charged microbes and viruses with positively charged metal ions will kill or deactivate them.

**Kajiyama:** There are various theories behind antimicrobial and antiviral functions which continue to be debated among experts. However, the effects of reducing and suppressing propagation have been verified.

**Sugino:** In fact, when obtaining SIAA certification, it is necessary to show data that viruses have been reduced to 1% or less. RIKEGUARD reduces viruses to 0.01% or less and clears SIAA's standards by a wide margin.

**Otani:** 0.01% is almost the same as being at the limits of detection. This is not our own unique way of measurement.

We use test methods based on international standards.

**Sugino:** Even now, we are continuing with research based on scientific data to see the effects of introducing varying amounts of different metal ions to various general-purpose plastics.

## Various New Values Provided by RIKEGUARD

### What was especially difficult in the development of RIKEGUARD?

**Otani:** It is the extremely small size that we are dealing with. Microbes are measured in micrometers and viruses in nanometers. Specifically, the reduction of viruses is in the realm of chemical reactions. It is not possible to show metal ions attacking viruses using photographs or videos.

**Kajiyama:** Viruses form plaques that cannot be seen by the eyes. We verify the ways these plaques are reduced. As there is still not clinical trial specifically targeting COVID-19, we carried out a multitude of tests using similar types of viruses.

**Otani:** What is even more difficult is that we must add antiviral and antimicrobial functions without sacrificing the product's original functions and values. For example, in the case of screen protectors for smartphones, there are requirements such as the touch panel's reaction must not degrade, fingerprints must not stay on easily, and it must be resistant to scratches. It is necessary to apply blending and processing technologies to the respective products so that adding antiviral function does not undermine their original usability. In the first place, it requires extremely high technological capabilities to add antiviral and antimicrobial functions while maintaining high transparency as films.

**Kajiyama:** Compounds and films also differ in applications and requirements, and it was quite difficult to match their respective circumstances.

**Sugino:** For example, RIKEGUARD compound is used in the wheels of suitcases. To add antiviral function to wheels which experience a lot of wear and tear, it is necessary to use processing technologies different from those for films. It is very tedious to establish designs and production technologies matching the respective product values.

**Otani:** Another requirement is the speed of development.



RIKEGUARD caster



RIKEGUARD face shield



For example, face shields using RIKEGUARD were finished two weeks after seeing people wear them on television. This is because there was a strong desire to reduce the number of infections as far as possible and contribute to society, and we thought such a sense of speed was important to help people such as those working in hospitals and care facilities.

**Sugino:** As virus-related tests take time, the Technical Division also does its best so as to be able to provide data as soon as possible.

**Otani:** We also took great pains in the diversification of sales methods. A dentist with a private clinic saw RIKEGUARD products on our website and inquired about them. However, we did not have in place a system which could sell small lots of three to four units when the products were first launched. We therefore worked to allow the high transparency film product to be sold in small lots and online, but it took more time to build this system than we expected.

## Currently, what are the main applications of RIKEGUARD?

**Kajiyama:** In addition to what we have introduced so far—such as the compound product for handrails, boots, and wheels; screen protectors for smartphones and tablets; and face shields—it is being used in vending machines such as the buttons as well as the flaps of product and change outlets. This can reduce the risk of infection when removing products or change.

**Sugino:** Japan is said to have more than one million vending machines. As they are used by many different people, we think there is significant infection control effect. Infection control products are not profitable as a business if there is no market need, but we think it is something to be

undertaken even if we are at a stage where needs cannot be seen. We also recognize the necessity of preparing products that look ahead toward future risks aimed at social contribution.

## Toward New Value Creation in the Future

### Going forward, value creation linked to the three-year mid-term business plan will continue. Please tell us your vision for the future.

**Sugino:** For myself, as a development personnel, I have lived based on the motto of not giving up. In development work, it is rare to see results in one or two years. There is a need to keep taking on various challenges and keep hitting walls. But if we give up at that point, we will never achieve results. It is only by continuing to persevere that we will eventually be rewarded. I hope to continue to treasure this spirit as I take on new challenges in value creation.

**Kajiyama:** As the Senior General Manager of Sales & Marketing Division, I hope to continue to focus on how to quickly deliver the new values born from the engineers' spirit of never giving up to society and people. There are all kinds of values, and different people have different perspective about what is most valuable. RIKEN TECHNOS is a resin manufacturer that processes and provides various resins. To fulfill this mission, I hope to always remember the attitude of providing comfort for all living spaces, cooperate with technology and manufacturing departments, and continue to provide unending value.

**Otani:** In addition, it is important that this value provision is carried out with love. Similar to consideration for the environment and achieving the targets of the SDGs, if actions are not founded on love, there is no differentiation from using social concerns to make money. It is necessary to have the desire to contribute toward doing things for people. I think that, going forward, the world will shift toward emphasizing such sharing of desires. If the desire to contribute to society and love and protect people comes first, I personally think that profits will subsequently follow as a result.

## Antiviral & antimicrobial film

# RIKE+GUARD<sup>®</sup>

Reduces certain viruses on film surface by

# 99.99%!



Keeps below **1%**

Fluctuation of certain bacteria on film surface, compared to generic coated products

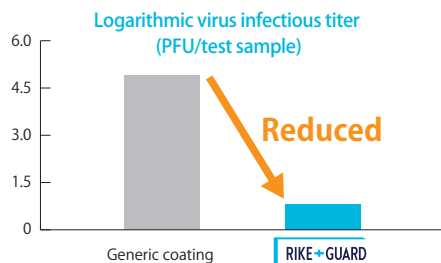
RIKEGUARD<sup>®</sup> is developed against infections by pathogens such as viruses and bacteria. There are film and compound products. This time, we will mainly introduce film products.

### Antiviral Function

The number of certain viruses on the product's surface is reduced by 99.99%. It is effective against both enveloped\* and non-enveloped viruses. This is a reliable product with the SIAA mark, conformed SIAA standard.

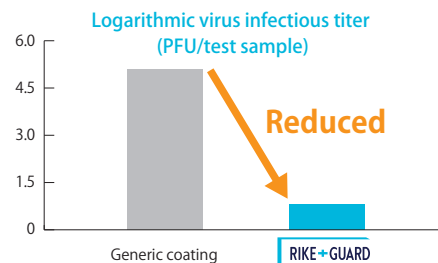
#### Non-enveloped

ATCC VR-782 performance evaluation (after 24 hours)



#### Enveloped

ATCC VR-1679 performance evaluation (after 24 hours)



The SIAA mark can be displayed on products which carry out quality management and information disclosure according to the guidelines of the Society of International sustaining growth for Antimicrobial Articles (SIAA) based on evaluation results using the ISO 21702 method. This product is not a pharmaceutical product. It reduces the number of certain viruses on the product. It uses antiviral materials which have cleared the safety standards of SIAA and complies with the SIAA's safety standards. Antiviral processing is not for the purpose of treating or preventing illnesses.

\* The envelope refers to the fat membrane of viruses. Viruses are largely categorized into two types: enveloped and non-enveloped. Typical enveloped viruses include influenza and SARS viruses, while typical non-enveloped viruses include norovirus and adenovirus.

### Antimicrobial Function

Compared to the surface of products without antimicrobial processing, the ratio of bacteria reproduction is less than 1%. This is a reliable product with the SIAA mark, clearing the standards set by SIAA.

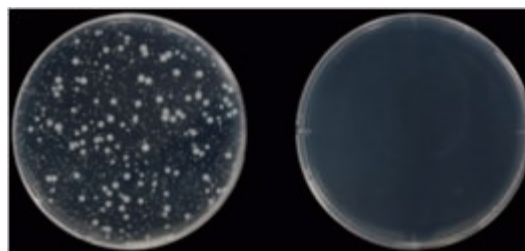
#### Staphylococcus aureus



Conventional product

RIKEGUARD KV210

#### Escherichia coli



Conventional product

RIKEGUARD KV210

Test method: JIS Z2801 Test time: 24 hours

The SIAA mark can be displayed on products which carry out quality management and information disclosure according to the guidelines of the Society of International sustaining growth for Antimicrobial Articles (SIAA) based on evaluation results using the ISO 22196 method. This product is not a pharmaceutical product. It does not suppress the reproduction of all bacteria. It uses antimicrobial materials which have cleared the safety standards of SIAA.



RIKE+GUARD

# High transparency type

## Features

- This is a tough and high transparent film with anti-virus and anti-bacteria performance.
- It is a glassitic\* film that is resistant to scratches and gives a sense of high quality.
- There are various grades available, including super hard and antiviral and antimicrobial effect on both sides.
- It can be used for applications such as touch panels and other displays, product cases in stores, elevator buttons, and face shields.

\* A word combining "glass" and "plastic" expressing an appearance like glass.



RIKE+GUARD

# Soft type



## Features

- It has antiviral and antimicrobial performance certified by SIAA.
- It can be freely cut and pasted to places as needed.
- It can also be easily pasted on curved places as it is a soft PVC product.
- It has been treated so that bubbles do not form easily under the sheet when pasting.
- Reliability can be seen as it is printed with the SIAA mark and RIKEGUARD logo.
- The separator is printed with grid lines to make it easy to cut.
- It can be pasted and used on various places touched by hands, such as handrails, door knobs, telephone receivers, and switches.

\* Specifications may change without prior notice for the purpose of quality improvement.



# Actions Toward SDGs

We will contribute to the creation of a sustainable society while addressing our five major tasks.

Three-year Mid-term Business Plan Major Tasks	Actions Toward SDGs	
<p><b>1</b> Intensifying Global Management and Generating Synergies</p> <p><b>2</b> Improving the Capacity to Generate Revenues and Profits through Strategic Thinking</p>	<p><b>3</b> GOOD HEALTH AND WELL-BEING</p> <p><b>Provide medical products globally</b></p> <p>We support medical devices with safe and reliable compound products. RIKEN TECHNOS products are hygienic and designed to ensure that medical devices operate smoothly, reducing the burden on both patients and medical professionals.</p> 	<p><b>9</b> INDUSTRY, INNOVATION AND INFRASTRUCTURE</p> <p><b>EV product development</b></p> <p>We will deliver a wide range of products, including charging cable covering materials and sensor covers.</p> 
<p><b>3</b> Realizing a Production Structure that Reflects the Thorough Pursuit of Efficiency</p>	<p><b>6</b> CLEAN WATER AND SANITATION</p> <p><b>Appropriate management of chemical substances and waste</b></p> <p>In all processes from product development to disposal, we control chemical substances and waste in order to reduce the environmental impact of environmentally hazardous substances.</p> 	
<p><b>4</b> Contributing to Sustainable Societies</p>	<p><b>3</b> GOOD HEALTH AND WELL-BEING</p> <p><b>Expanding sales of RIKEGUARD</b></p> <p>We develop and sell RIKEGUARD products that provide antimicrobial, antiviral (SIAA), deodorant, disinfectant, stain-resistant, and insect repellent functions to contribute toward measures against infections.</p> 	<p><b>6</b> CLEAN WATER AND SANITATION</p> <p><b>Conserving water</b></p> <p>In the event of a disaster, high-performance wrap can reduce the amount of washing water used. Food wrap is delivered to the affected areas as relief supplies.</p> 
<p><b>5</b> Strengthening Corporate Foundations through Management Emphasizing Human Resource Development and Governance</p>	<p><b>1</b> NO POVERTY</p> <p><b>Ongoing support</b></p> <p>We will continue to donate through United Way, etc.</p> 	<p><b>4</b> QUALITY EDUCATION</p> <p><b>Supporting the future generation</b></p> <p>We will provide scholarships to students and services to schools in the communities where we are located. We also support students who work hard through the production of the "YUME=Lab" TV program.</p> 

The RIKEN TECHNOS GROUP will contribute to the creation of a sustainable society. We will also strengthen our efforts towards the SDGs, which are universal goals in the 2030 Agenda for Sustainable Development adopted at a United Nations Summit. The entire RIKEN TECHNOS GROUP will strive to identify and resolve goals in accordance with the five major tasks set forth in the three-year mid-term business plan.

SDGs common to all major tasks

**12 RESPONSIBLE CONSUMPTION AND PRODUCTION**

**Respond to social needs such as recycling, weight reduction, and food loss reduction**

For example, we will expand sales of elastomer compounds with excellent recyclability as rubber substitutes.

Film products play a role as paint substitutes and contribute to reducing VOCs\*. In addition, metallic replacement parts contribute to weight reduction.

In food packaging, we contribute to reducing food loss by keeping food hygienic and preserving excess food.



**16 PEACE, JUSTICE AND STRONG INSTITUTIONS**

**Contributions to the information society**

RIKEN TECHNOS electromagnetic shielding materials and high-speed transmission materials (5G compatible) are indispensable products for the information society.


In addition, covering materials for LAN and optic cables support a stable Internet environment.



**12 RESPONSIBLE CONSUMPTION AND PRODUCTION**

**Increasing production efficiency**

We will continue to increase production efficiency through manpower reduction and automation. Increasing production efficiency can improve the working environment and reduce material and energy losses. We will continue our efforts to improve efficiency.



**7 AFFORDABLE AND CLEAN ENERGY**

**Contributing to renewable energy**

Elastomer compound Trinity® FR is used in solar cable coatings to support clean energy transmission.



**12 RESPONSIBLE CONSUMPTION AND PRODUCTION**

**CO2 reduction, waste reduction and chemical control**

These are the major environmental tasks being tackled by the RIKEN TECHNOS GROUP throughout all value chains



**13 CLIMATE ACTION**

**Flood control by tree planting**

We plant trees every year in Indonesia to prevent repeated floods.



**5 GENDER EQUALITY**

**Promoting active participation of women**

We will promote the active participation of women globally.



**8 DECENT WORK AND ECONOMIC GROWTH**

**Occupational safety and health and human resource utilization**

We are strengthening our efforts and consider occupational safety and health as one of the most important foundations of our corporate activities. We will also promote diversification of human resources through internal recruitment, etc.



**10 REDUCED INEQUALITIES**

**Utilizing diverse human resources**

We will employ diverse human resources and provide opportunities for them to play active roles.





Our partnerships with stakeholders are indispensable for addressing all major tasks. The RIKEN TECHNOS GROUP will work with everyone to realize "More Value to All 2021: Generating Greater Value Together!"

\* Volatile organic compounds (VOCs) are a cause of suspended particulate matter and photochemical oxidants. Japan's Ministry of the Environment aims to control the emission of VOCs.