We Are *Tomodachi*

Autumn 2019

FEATURE

Evolving Innovation in Achieving SDGs

Building a sustainable future through innovative ideas and technologies

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We Are *Tomodachi*
Autumn 2019

"We Are *Tomodachi*" is a magazine published with the aim of further deepening people's understanding of the initiatives of the Government of Japan and the charms of Japan. *Tomodachi* means "friend" in Japanese, and the magazine's title expresses that Japan is a friend of the countries of the world—and which will cooperate and grow together with them.

FEATURE

Evolving Innovation in Achieving SDGs

COVER

Prime Minister Shinzo Abe chaired the first G20 Summit in Japan, held in Osaka, June 28-29, 2019. Japan took leadership as the host nation, ensuring that the G20 expressed a strong message to the world via the G20 Osaka Leaders' Declaration.

PORTRAITS OF JAPAN
北海道
長野

Breathtaking Colors in the Japanese Autumn

One of the wonderful forms of beauty to be experienced in Japan is the way the hues of nature change as the seasons pass. When fall comes, colorful autumn leaves cover the mountains of Japan, and there are some places where the seasonal colors offer something a little different that is certainly worth the trip to take in.

Chino | **NAGANO** 長野

A Spread of Red Under Autumn Skies

Abashiri, a city in northeastern Hokkaido, faces the Sea of Okhotsk. There you can take in a vast blanket of vivid red glasswort covering the salt marsh along Lake Notoro, a lagoon where the seawater seeps in. When autumn comes, the flowering plants' stems turn red, seemingly painting the ground with a scarlet brush. The contrast between the carpet of red glasswort and the blue sky stretching out into the distance is simply stunning. A wooden walking path allows visitors to stroll through this crimson sea.

https://www.abakanko.jp/en/

A Golden Gleam on a Mystic Pond

There lies a mystic pond in the woods of one of Japan's premier upland resorts in the Tateshina Highlands of Chino, Nagano Prefecture. The body of water, found at an elevation of 1,500 meters, is Mishaka Pond, whose name comes from its association with traditional religious rituals. The pond is also notable for a cold, acidic mineral spring that pours in water. That makes the pond uninhabitable for fish, which is why the water is so incredibly clear. The surface acts like a mirror, reflecting the larch trees lining the shore to produce a sight of divine beauty. That spectacle captivated a great Japanese painter who made the pond a motif in one of his most esteemed works. In autumn, the tranquil pond shines with a golden brilliance.

https://navi.chinotabi.jp/en/

Artificial Photosynthesis Changes CO_2 into Energy

Fuel can be produced by combining the hydrogen produced from solar energy with greenhouse gases emitted by humans. A method to convert carbon into energy was proposed by Dr. Akira Fujishima, the discoverer of photocatalysis.

Dr. Akira Fujishima is the director of the Photocatalysis International Research Center at the Tokyo University of Science. He discovered photocatalysis while enrolled at the University of Tokyo Graduate School. That discovery was later called the Honda–Fujishima effect, with research on artificial photosynthesis then being initiated around the world.

It is not widely known that the glass pyramid in the courtyard of the Louvre Museum in Paris has a transparent coating that exhibits an antifouling effect upon exposure to natural light; neither electricity nor special chemicals are required for initiating that effect. Dr. Akira Fujishima, a Japanese researcher, was the first person to discover the photocatalysis that forms the basis of the effect.

The phenomenon of photocatalysis, announced in 1967 by Dr. Fujishima along with Dr. Kenichi Honda, is able to produce a variety of effects using only light, and without using any electricity. Its applications have since expanded to supplying antifouling and antifogging effects, as well as oxidation-reduction, among many others. Dr. Fujishima's research regarding artificial photosynthesis, which was concerned with extracting hydrogen from water and using it as energy, has gained a particularly large amount of attention.

Photocatalysis acts as an antifouling and antifogging effect simply by the irradiation of light. It has also been used in the glass covering the pyramid-shaped entrance of the Louvre Museum. The glass maintains its transparent beauty by decomposing dirt.

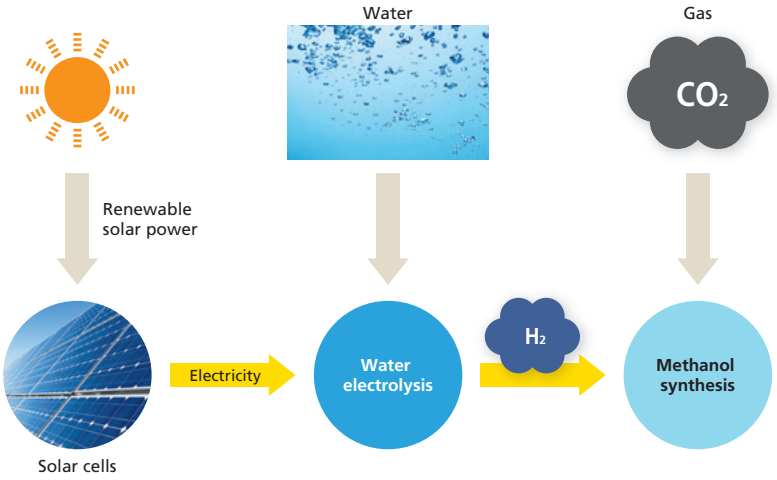
Dr. Fujishima says, "To achieve the practical application of hydrogen production using photosynthesis, the high efficiency of hydrogen extraction is, of course, the basic key factor. However, the other key factors are whether we can find a catalyst that satisfies the remaining various conditions; this includes whether the materials used as catalysts can be easily obtained, whether a large surface area photocatalyst can be manufactured, and whether any harmful substances are contained in the material. We are waiting for a breakthrough for those things in the future."

The reduction of greenhouse gases is also a prerequisite for achieving Sustainable Development Goals (SDGs). As Prime Minister Shinzo Abe stated at the World Economic Forum this year, an existing technology of methanation to remove CO_2 is getting attention anew by creating resources through the combination of CO_2 and hydrogen, in efforts toward the realization of a decarbonized society.

In consideration of that viewpoint, Dr. Fujishima has proposed the following method; first, extract hydrogen through water electrolysis using the electricity produced from highly efficient solar cells. Next, combine the extracted hydrogen with the CO_2 emitted from power plants and factories. Finally, synthesize methane gas, which can be used as an energy source. If this process is realized, gases containing carbon, such as CO_2, will no longer contribute to the greenhouse effect. Rather, those gases will become "resources" to replace oil and natural gas. This

Converting CO_2 into a resource toward a decarbonized society

Generating new energy from sunlight, water, and CO_2



mechanism is known as carbon recycling. Dr. Fujishima added, "The production of methane is a methodology to contribute to both climate change and the resource issue. At present, we must overcome a number of big hurdles, and I am also actively conducting research on them."

The innovation of efficient carbon recycling will surely lead to the resolution of global issues. ✻

Used Tea Leaves Found to Enhance Photoreduction

Japanese high school students, Kizu (left) and Matsumoto, discovered that the ingredients contained in used tea leaves can enhance the photoreduction of iron ions.

Similar to Dr. Fujishima, a scientist who opened the door to a new world of science more than half a century ago, several young scientists are working every day making new observations that will lead to the future. Two such young scientists are Hisato Kizu and Hayato Matsumoto from the Shizuoka Kita High School Science Club, who devised a method to effectively produce hydrogen from water by utilizing used tea leaves.

The two young scientists initially demonstrated that when iron ions are used as catalysts, with the oxidation of iron ions, water electrolysis occurs at a voltage lower than that which is found under normal conditions. Furthermore, inspired by the fact that iron ions and green tea are used for dyeing fabrics, they repeated the experiments considering that the polyphenol contained in tea may be effective in the reduction of oxidized iron ions. Consequently, they observed that photoreduction is promoted by the used tea leaves. These scientists also participated in and presented their research at the Stockholm Junior Water Prize held in Sweden in August.

Shizuoka is known as the prefecture which produces the most tea in Japan. Although Japanese tea is said to contain a high polyphenol content and thus is good for health, used tea leaves are generally discarded. However, the leaves would not be discarded if they were utilized as a catalyst that produces hydrogen as an energy source in a low-cost and eco-friendly way. Such a day may come in the future. "We want to become useful people for the world," the two students said with a smile.

Conceptual drawing of the completed Fukushima Hydrogen Energy Research Field (FH2R), a major step towards a hydrogen-powered society.

FEATURE >>> Evolving Innovation in Achieving SDGs

The Hydrogen Society Starts from Fukushima

Hydrogen, a source of next-generation clean energy, holds the key to solving the problems of carbon reduction and energy supply. In Fukushima Prefecture, where the restoration from the devastating earthquake continues to gain momentum, the Fukushima Hydrogen Energy Research Field will be the world's largest-scale hydrogen production facility upon its completion in the spring of 2020.

As the world switches over to clean energy, hydrogen is drawing ever more attention. Unlike petroleum and coal, it can be used without generating CO_2. It can also be produced from a variety of resources. When renewable energy resources, such as solar power, wind power, and biomass are used, the entire process is almost entirely carbon-free, from production to utilization. In order to achieve the Sustainable Development Goals (SDGs) of climate change mitigation and universal access to energy, hydrogen is indispensable.

Looking towards the realization of a hydrogen society, Japan already leads the world with technological solutions, of which the introduction of the world's first marketable fuel cell vehicle is a good example. Japan is also showing leadership in other ways, such as the "Basic Hydrogen Strategy," established in 2017 as an action plan to realize a hydrogen-powered society, and by hosting the Hydrogen Energy Ministerial Meeting, which in 2018 was the world's first cabinet-level discussion devoted to the issue.

An important role is being played in the strategy by the Fukushima Hydrogen Energy Research Field (FH2R), which will be completed next spring. Equipped with a 10,000kW-class hydrogen production facility, and utilizing renewable energy sources, such as electricity generated by solar panels arrayed around it, the facility will be able to produce up to several hundred tons of hydrogen a year.

Achieving a hydrogen society requires promoting a total integration of "making," "storing," and "using" hydrogen. A particularly critical issue is responding to fluctuations in electrical power when the hydrogen is made from renewable energy sources that vary according to the weather

and other factors. This issue will be addressed by the verification tests at FH2R, which, as the world's largest-scale facility for producing hydrogen from renewable sources, will help to establish a total management system that embodies optimizable operating procedures.

The significance of the facility is described in the following terms by Eiji Ohira of the New Energy and Industrial Technology Development Organization (NEDO), the organizer of the project, "FH2R is presently the largest research facility in the world. The experience and data acquired through operating, maintaining, and otherwise managing the facility will be invaluable for commercial implementations in the future."

The third step of "using" is also making progress, as hydrogen is introduced into the supply chain to replace fossil fuels previously used in Japan. A fuel cell for the home known as Ene-Farm is already becoming a normal part of life. Ever since the roll-out of Mirai, the world's first fuel cell car, hydrogen fueling stations have been spreading through the country, and fuel cell buses are now operating regularly, particularly in Tokyo. Plans are being studied to utilize hydrogen energy in practical ways, such as at the residential villages for the Olympic and Paralympic Games Tokyo 2020 to be held next year. The range for future implementation is widening to include applications such as electric vehicles, ships, and aircraft.

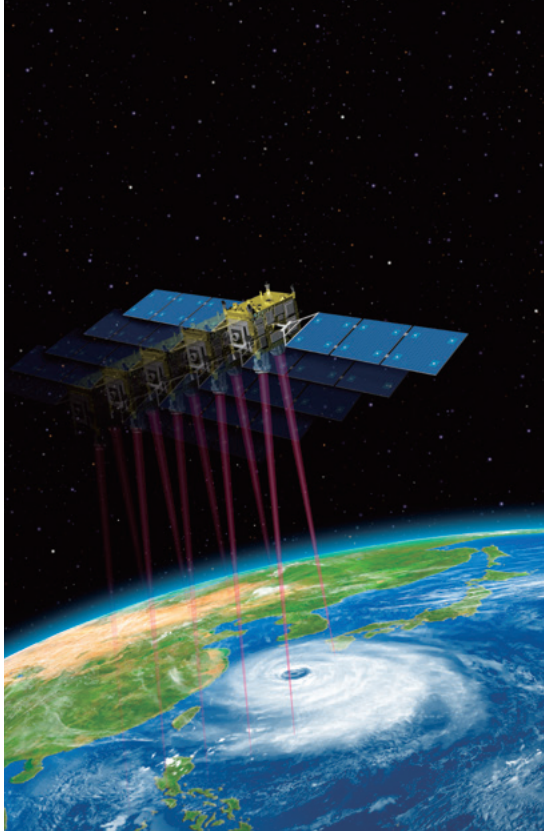
Hydrogen, a clean fuel that can be easily stored and transported, gives flexibility and new possibilities to society beyond what was previously available with conventional energy sources. With humanity facing so many problems in need of solutions, great hopes are being placed on the switch to hydrogen. ✻

Panasonic plans to commercialize a pure hydrogen fuel cell in about 2021. The new product is even cleaner because, without using city gas, it generates electricity directly from hydrogen supplied from hydrogen stations. Anticipated uses include factories, commercial facilities, and condominiums.

A hydrogen station in Iwaki City, Fukushima Prefecture. There are 109 hydrogen stations around the country at present.

With the increasing number of hydrogen stations, fuel cell automobiles, buses, and other vehicles are becoming more common. Plans are being made to have at least 100 fuel cell buses running in Tokyo and other cities by 2020.

Satellites Find Optimal Flight Routes to Reduce CO_2



Spurred by an idea from Ayako Matsumoto, an employee at ANA HOLDINGS INC., a collaborative research project between Japanese research institutes and that company is now developing a satellite system for the accurate observation of wind direction and speed. Expectations are growing that the system will help reduce CO_2 emissions from aircraft and combat climate change.

By using satellites to measure wind and then optimize aircraft flight routes, the project will reduce CO_2 emissions to mitigate climate change. Holding the key to this effort is the Space-based Doppler Wind Lidar (DWL), a technology for which R&D is being conducted by the Meteorological Research Institute, the National Institute of Information and Communications Technology (NICT) and the Japan Aerospace Exploration Agency (JAXA).

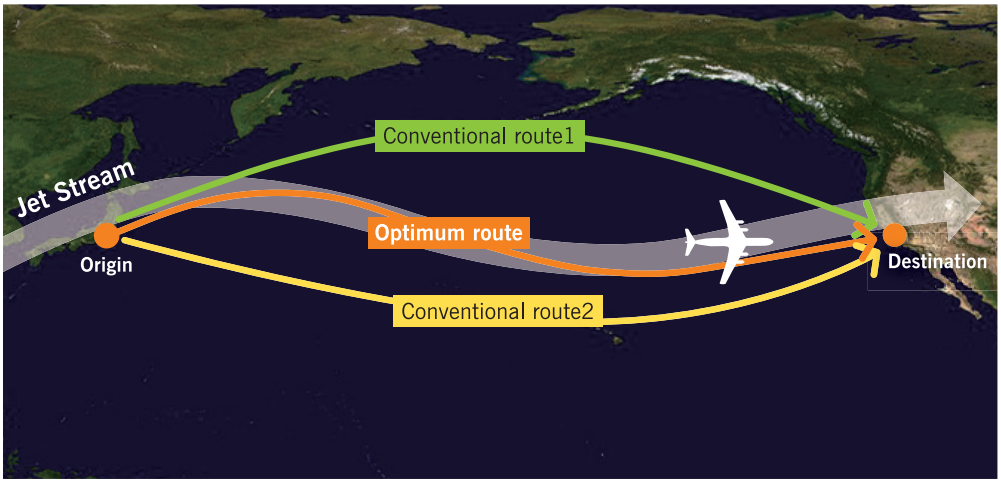
DWL system fires laser light—safe to the human eye—into the atmosphere and examines how the light scatters upon striking particles in the wind to monitor their positions as well as wind direction and speed. Ground-based equipment systems have already been installed and are operating at some airports and elsewhere, however, Space-based DWL will reportedly enable the collection of global wind profiling data from areas where ground-based weather stations do not exist, such as in remote regions on the land or above the sea.

This research caught the attention of Ayako Matsumoto at ANA HOLDINGS INC., the parent company of ALL NIPPON AIRWAYS, as she wondered about potential applications with aircraft. The amount of aviation fuel that is carried depends on an aircraft's flight route, which is calculated according to wind readings and other meteorological data. Noting that wind can affect how much fuel is consumed, Matsumoto, whose experience has been in flight-

The collaboration between research institutes and airlines may enable future applications of Space-based Doppler Wind Lidar.

This figure shows Space-based Doppler Wind Lidar in action. The system is also expected to raise the accuracy of weather forecasts for typhoon paths, torrential rain, and more.

An accurate understanding of wind movement with Space-based Doppler Wind Lidar would lead to aircraft flying optimized routes, minimizing fuel amounts, and lowering CO_2 emissions.



support operations, mused whether the wind distribution data derived from Space-based DWL could enable better routes with more accurate predictions, and if it could help save fuel. Those ponderings led Matsumoto to present her ideas at a business contest. Her proposal made research institutes realize the great potential for industrial applications with Space-based DWL, as they had previously focused their research only on meteorological observations. Matsumoto and Keio University estimate that if the world's airlines operated their aircraft using data from Space-based DWL, they could cut annual fuel consumption by 1.5% and CO_2 emissions by 0.2% from 2018 levels.

The benefits that Space-based DWL would bring to our planet do not stop at curbing CO_2 emissions. As Kozo Okamoto from the Meteorological Research Institute explains, based on numerical weather prediction models, Space-based DWL observations "would give us information on wind, air temperature, water vapor, and so on, which would allow more accurate predictions of typhoon paths and torrential rainfall." Shoken Ishii of the NICT sees promise in the system, because in addition to mitigating damage from natural disasters, he says the accumulated data would assist with medium- to long-term climate change predictions, which would then "lead to solutions for food crises and poverty."

Space-based DWL is fostering hopes that it can also contribute to achieving the Sustainable Development Goals (SDGs) for combating climate change and climate-related disasters. According to Daisuke Sakaizawa of the JAXA, expanded collaboration with relevant institutions in the United States and Europe is also currently under consideration. With industry, academia and the government moving R&D forward, we can look ahead to the day when Space-based DWL can make a major contribution to addressing issues affecting the Earth's environment.

The project team consisting of members from the Meteorological Research Institute, NICT, JAXA and ANA. Ayako Matsumoto of ANA is in the middle.

Wood and Paper Surpass Plastic

Japanese companies are addressing the global issue of plastic waste with traditional techniques, novel ideas, and a strong desire to help bring about a sustainable, recycling-oriented society

Dealing with plastic waste in the oceans is currently an urgent global issue. In fact, it was a topic of utmost importance at the G20 Osaka Summit in June 2019. Now, many people have begun thinking about how we use plastic products.

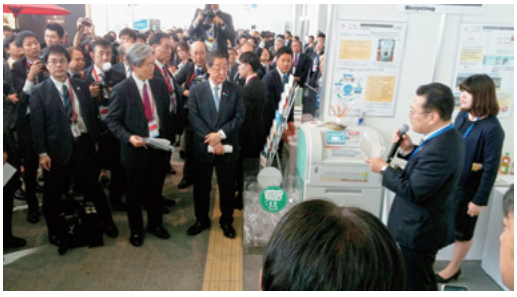
That sense of crisis led to the creation of wooden straws made with the thinnings left over from forest conservation work. Aqura Home Co., Ltd., a Japanese wooden house builder, invented the straw. At first, the company was looking for a way to hollow out pieces of wood, but then a traditional Japanese technique for shaving wood into a smooth surface caught its attention. An idea to wrap thin slices of wood about 0.15mm thick into a helical shape led to the product.

Aqura Home President Toshiya Miyazawa says, "Our goal is to produce three billion straws a year, but we consider the wooden straws a business that contributes to society. That's why we're publicizing our production method and techniques so that the straws can quickly come into widespread use. In addition to straws, we encourage people to switch from other plastic items to wood. As a green company, we believe that this is our mission." Some Japanese hotel chains have already started using the straws,

Toshiya Miyazawa, representative director and president of Aqura Home Co., Ltd., became a carpenter at age 15 and later founded his company. His penchant for carving wood with a traditional Japanese hand plane called a *kanna* led to the idea for developing the wooden straws.

Even after being placed in a drink for one or two days, the straw still stands strong. Japan Food Research Laboratories verified that the product is safe to put in one's mouth.

The straws were placed in drinks served at the G20 Summit and G20 Ministerial Meetings, and attracted attention from the participating countries' delegations.



and Aqura Home says that it has received a flood of inquiries from other potential customers in Japan and abroad.

One reason that the wooden straws came to be is the people who came together after hearing about the development project. Other companies and individuals who also see the issue from Aqura Home's perspective endorsed the idea for a wooden straw and offered to lend their assistance. That serves as proof that growing awareness about the plastic waste issue is already spreading on the grassroots level.

Another company's experiment seeks to address plastic waste through yet another approach. The most interesting thing about Wasara, paper tableware that still looks stylish even when stacked with hors d'oeuvres, is that it is made from bamboo fiber and bagasse, a fiber derived from sugarcane. After primary fermentation for 25 days and secondary fermentation for 60 days, the material returns to the soil. This makes Wasara sustainable tableware that can be disposed of without producing garbage.

And yet some people who use Wasara tableware say they do not want to throw it away because of its stylish design with a familiar texture reminiscent of *washi* paper or ceramics. Keiichiro Ito, the product's developer and president of Wasara Co., Ltd., said, "At first, people wouldn't give us the time of day. That is probably because attitudes have changed, but even so, no matter how environmentally friendly the product is, if it does not have excellent utility or design, then most people will not be interested in it. Wasara was the result of much innovative, rewarding work."

Recently, upscale restaurants, cruise ships and airport lounges have been using the product. Wasara has also started collecting used products and returning them to the soil at its plant. The tableware will likely come into more widespread use since it is strong, yet much lighter than ceramics and glass. The possibilities are for new tableware designed to be green and convenient endless.

Wasara seeks to develop paper tableware that will not warp, even with a steak on it. It also stays strong and solid when exposed to water. Plus, the thin material has a gentle feel on the mouth.

At receptions held at embassies and other formal settings, Wasara catches the eyes of guests for its attractive designs. Wasara is even suitable for use at a traditional Japanese tea ceremony.

Keiichiro Ito, representative director of Wasara Co., Ltd., previously served as president of a tableware package manufacturer founded over 100 years ago. In 2005, he began designing sustainable paper containers. Wasara is the product of a three-year development project.

Each of these endeavors—wooden straws and paper tableware—could be the first step to solving global issues. ✻

Saving Lives from Furniture Sent Flying by Quakes

A tenacious Japanese entrepreneur, five years after losing a friend during the giant earthquake that struck Kobe and vicinity in 1995, develops an innovative gel pad that resists seismic shocks

During the frequent large-scale earthquakes that have occurred around the world, many lives have been lost by heavy items such as furniture toppling over. In order to prevent those unfortunate deaths, a small business has utilized innovative technology to develop a product so that furniture will not fly about dangerously even when shaken at a seismic intensity of level 7 (the highest level set by the Japan Meteorological Agency).

"In an age when people can go to the moon in rockets, I could not accept someone dying through being hit by a *tansu* (traditional storage cabinet)." Seizo Kodama, the chairman and founder of Proseven Co., Ltd., recalls. During the giant earthquake that struck Kobe and vicinity in 1995 (maximum intensity of level 7), a close friend of his died after being struck by a *tansu* that literally "flew across the room" while he slept. Kodama promised his friend's children, "I will definitely find a way to prevent *tansu* from flying across rooms."

He then began to look throughout the world for a product that would prevent furniture from falling, but could not find anything that could withstand earthquake tremors. "To keep my promise to his children, my only choice was to make something myself." With that in mind, Kodama started his own research project to develop new material. Selling off his personal assets, his development expenses had reached almost 200 million yen (1.8 million dollars) when the turning point came. One day, while lifting up a cup of hot sake, he noticed that the saucer underneath remained attached to it. "Eureka! I've got it!" Hot sake had spilled onto the cold saucer, creating a temperature difference that generated an adhesive force (intermolecular force). He immediately began testing new chemical compounds under conditions of carefully controlled temperature, and succeeded in developing a new material that could withstand tremors of intensity level 7. A full five years had already passed since he had started his project.

The newly developed material had

Kodama developed earthquake test vehicles that are being used to demonstrate the effect of the gel pad at disaster awareness events.

The two photos at right demonstrate the contrast between not using Pro-7 (top) and using it (bottom).

Expanding Applications for Pro-7

Pro-7's advantageous properties do not just safeguard homes. Applications are being expanded to include factories, ships, medical settings, and other spaces.

excellent adhesive strength that resisted momentary vibrations, yet could also be peeled away neatly without damaging the adhesive surface. That combination of two apparently contradictory properties allows it to be used repeatedly. The "miraculous new material" could only have been developed by a small or medium company, because such a company has the flexibility, whenever new ideas emerge, to promptly test them out—in this case, to exhaustively test every possible combination of chemical substances—and then translate the findings into a commercially feasible product.

Having depleted his funds during the product's development, Kodama's lack of resources available to promote sales worried him. Fortunately, he started a cooperative effort with a large relocation service company, and customers who used the gel pads in their new locations were pleased with the result. Favorable reports began to circulate, and sales took off. Now, whenever a large earthquake occurs, he often hears appreciative remarks, "Thanks to Pro-7, none of my furniture fell over." Without question, that helps achieve one of the Sustainable Development Goals (SDGs), to reduce mortality and the number of people affected by disasters.

In addition to earthquake resistance, its other advantageous properties include superior shock absorption and acoustic insulation, which expand the range of its applications beyond the home. It is now being used in the factories of major automobile manufacturers and at university research facilities, and recently there have been many inquiries from hospitals where a need for securely attached medical devices is foreseen. What originally stimulated Kodama to create products was his strong desire to prevent people from suffering because of an earthquake. He hopes to continue developing the product in the future, to save the lives of as many people as possible. ✻

Seizo Kodama, was born in Hiroshima, Japan, in 1942. After gaining sales experience in cosmetics and electrical appliances, he took over the family business of kimono production and wholesaling. The experience of losing a friend in an earthquake prompted him to develop an earthquake-resistant pad and establish Proseven Co., Ltd. The name "Pro-7" refers to "professional plus seismic intensity 7."

Brilliant Proposals from Young Students at the G20 Ministerial Meetings

There are places where food is left over and thrown away and places where people are suffering from poor harvests, starvation, and malnutrition. What should we do to eliminate this "food imbalance?" Japanese High school students came up with ideas for solving these problems.

Student Proposals

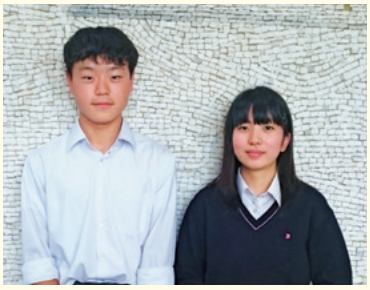
Managing Food Safety and Efficient Distribution

At the G20 Ministerial Meeting on Trade and Digital Economy held in Tsukuba City, Ibaraki Prefecture, six second-year high school student representatives of the Ibaraki Prefectural Namiki Secondary School proposed the "Innovative Food Transportation System." Rintaro Kanazawa, who participated in the proposal, said, "Students who volunteer at the local children's cafeteria pointed out that food, especially fresh food products, do not reach the places where they are necessary, and therefore began searching for a new transportation method." They proposed a system where the government manages foodbanks and quickly delivers surplus food to people who need it, by using drones or a hyperloop (a next-generation high-speed means of transportation). The principal attribute of this system is its capability to quickly determine the safety of food through the use of AI, and to transport it to multiple regions and remote islands. In the future, if people around the world can have equal access to eat safe food, it would lead to a solution of "zero hunger" in the SDGs.

According to Yu Sasao, who participated in the proposal, the idea was summarized from "various ideas from 150 students in the same grade," and six individuals finalized it into its present form. "I learned about hyperloop from the United States, where research on this is very advanced, and thus, the plan became even more tangible. In addition, we interviewed foreign students from the University of Tsukuba about the situation of flying drones in their home countries and on the merits and demerits on using them, which led to further discussions." Kanazawa said, "I was worried about the proposal, because it was still far from being realized and has some areas which may be still unrealistic. I was pleased, however, that the ministers listened seriously. I'd like to use my time off to learn more about how food banks work in Japan."

Presentation in front of ministers from each country at the G20 Ministerial Meeting on Trade and Digital Economy.

Kanazawa (left) and Sasao were pleased that the ministers listened to them attentively.



Sustainable Development Goals (SDGs) have a variety of goals, one of which is related to hunger and ensuring food security. 820 million people in the world suffer from famine. On the other hand, a large amount of food that could be consumed has been discarded, and the world's annual food waste has reached 1.3 billion tons.

In order to eliminate such "food imbalance," it will be necessary for each consumer not only to reduce their food waste, but also to create a system to properly manage the remaining food and transport it to places where it has not been delivered. In addition, technical assistance for improving agricultural productivity would also be helpful.

At the ministerial meetings of the G20 held in Japan in June 2019, two groups of high school students focused on food distribution imbalances and each group made proposals on a new logistical system of food distribution and efforts to improve food productivity (see articles below). ✻

It is said that, in the world, one-third of the food produced is discarded.

Student Proposals

Agriculture Olympics to Share Farm Technology

Students making new announcements on sustainable agriculture at the G20 Agriculture Ministers' Meeting.

At the G20 Agriculture Ministers' Meeting held in Niigata City, Niigata Prefecture, where agriculture is flourishing, an announcement was made by 19 second-year high school student volunteers from the Niigata Municipal Kohshi Secondary School. One of them, Rin Gonoi, said, "With 19 people working on the theme of sustainable agriculture, we had a lot of discussions and sometimes conflicts. Even though we were facing the same direction, we realized the difficulty of putting together our opinions." They focused on the issue of water. "Although in Niigata, where we live, we are blessed with water, but worldwide there is a shortage of water. We thought it was an important theme." They proposed the Agriculture Olympics because two-thirds of the world's precious groundwater is used for crop cultivation and irrigation, which is leading to the depletion of freshwater and making food production more difficult.

"Every country has different environments and situations, but what they have in common is the importance of food. We felt that we all had to solve the problem together, so we thought about a system where everyone could participate," said Haruka Koizumi. The idea was to create a team of developed and developing countries with similar climates and geographical conditions, to share the process and results of exploring better cultivation methods and mechanizations with the world. In this way, we would share "a feeling of gratitude towards food" and this could lead to a world free from hunger and conflict.

"Another aim of the Agriculture Olympics is to change the one-way traffic of support from developed countries to developing countries," Koizumi adds. "I was able to set a goal to learn more about agriculture and the environment at university."

Koizumi (left) and Gonoi learned the importance of mutual collaboration with others while developing their proposals.

“Sea of Japan,” The One and Only Internationally Established Name

The name “Sea of Japan” is the only internationally established name for the sea area concerned. Japan strongly opposes unfounded arguments concerning the name “Sea of Japan” and is calling for a better understanding of the issue and support for Japan's position from the international community in order to maintain the sole use of the name, “Sea of Japan.”

The Origins of the Name “Sea of Japan”

It is likely that the name “Sea of Japan” derives from the geographical factor that this sea area is mainly separated from the Pacific Ocean by the Japanese archipelago, and the name later became generally accepted worldwide.

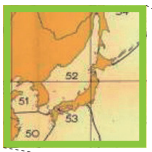
There are many sea areas that have been named in a similar way, such as the Andaman Sea, separated from the Indian Ocean by the Andaman Islands, and the Gulf of California, separated from the Pacific Ocean by the California Peninsula.

“JAPANISCHES M” shown here means “Sea of Japan” in German.

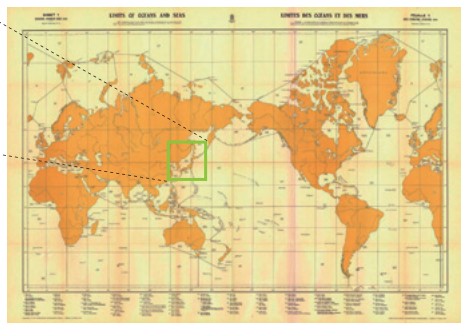
A map of the world created in Germany in 1856

The United Nations and the governments of major nations such as the United States recognize “Sea of Japan” as the official name.

Map from the UN Secretariat



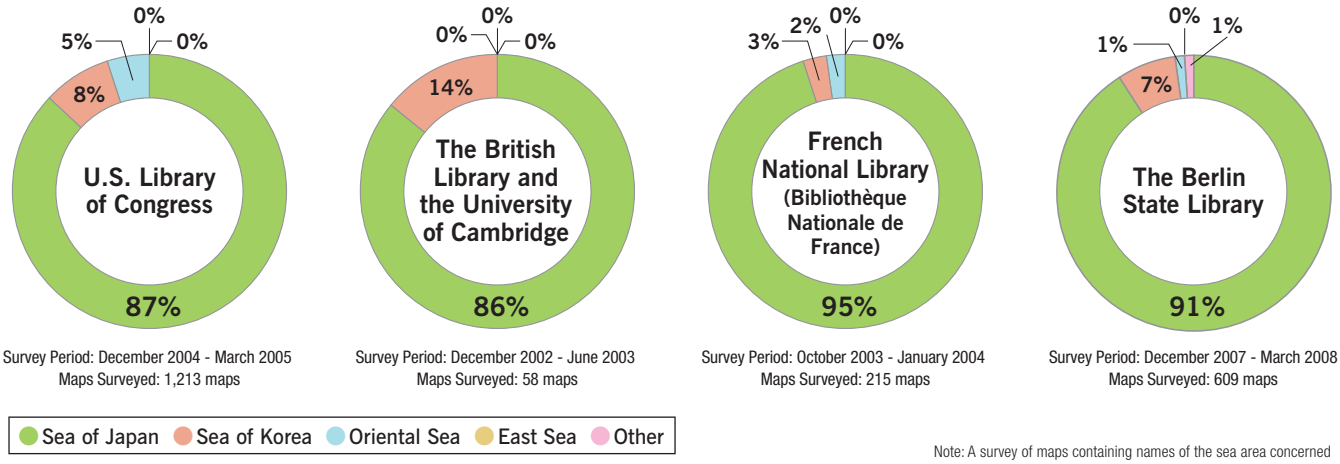
52. Japan Sea



The IHO publication “Limits of Oceans and Seas” uses the name “Japan Sea” for the sea area concerned.

Results of the Ministry of Foreign Affairs' Survey of Historical Maps

(Percentages indicate the ratio of use of the various names for the sea area concerned)



Survey Period: December 2004 - March 2005
Maps Surveyed: 1,213 maps

Survey Period: December 2002 - June 2003
Maps Surveyed: 58 maps

Survey Period: October 2003 - January 2004
Maps Surveyed: 215 maps

Survey Period: December 2007 - March 2008
Maps Surveyed: 609 maps

Note: A survey of maps containing names of the sea area concerned

Despite these origins, at the Sixth United Nations Conference on the Standardization of Geographical Names in 1992, the Republic of Korea (ROK) began to claim that the name of the sea be changed to "East Sea," a name used only within the ROK.

Worldwide Acceptance of the Name "Sea of Japan"

Japan has studied maps possessed by the U.S. Library of Congress, the British Library, the Bibliothèque Nationale de France, the Berlin State Library and other bodies and found that the name "Sea of Japan" was already used with overwhelming frequency(87% in the US, 86% in the UK, 95% in France, 91% in Germany) in early 19th century maps. A world map designed and published in Germany in 1856 which was recently highlighted in the press also refers to the name "Sea of Japan." Japan during the Edo Period (1603–1867) had an isolationist policy, and was unable to exercise any influence to establish the name "Sea of Japan."

Countries around the world including the United States, the United Kingdom, France, and Germany use the name "Sea of Japan." For example, the United States government has repeatedly stated that it uses the name, both on its website and through press conferences given by senior officials. The United Nations recognized "Sea of Japan" as the standard geographical term in 2004, and UN policy states that the standard geographical term be used in official UN publications. Furthermore, the International Hydrographic Organization's Limits of Oceans and Seas, which includes names for the world's seas, uses the name "Japan Sea."

Protecting Legitimacy of the Name "Sea of Japan"

If all countries followed the ROK and started naming the seas to their east or west as "East Sea" or "West Sea," countless similar names would spread around the world causing unnecessary confusion. (For example, people in Germany call the Baltic Sea "Ostee"("East Sea" in German)) Japan will continue to oppose any attempts to change the only historically and internationally established name for the "Sea of Japan" to "East Sea." ✻

For more information, see
the Ministry of Foreign Affairs of Japan website:
http://www.mofa.go.jp/policy/maritime/japan/index.html

"Sea of Japan" A globally established name
https://www.youtube.com/watch?v=ac58ARaacAM

Just the sight of *uchimizu*, the traditional custom of sprinkling water that is part of the summer routine in Japan, makes the day feel cooler.

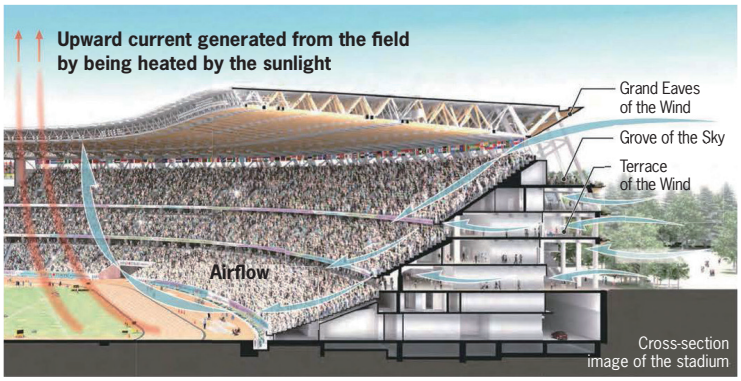
Beat the Heat with Japanese Technology and Ingenuity

At last, we are only one year away from the Olympic and Paralympic Games Tokyo 2020. Preparations are steadily underway in Japan to provide both athletes and spectators with the ultimate experience.

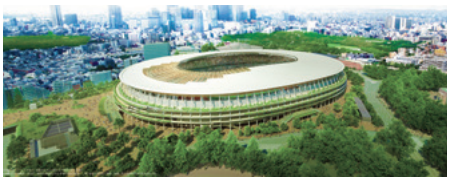
In the summer of 2020, the Summer Olympic and Paralympic Games will be held in Tokyo 56 years after the last Tokyo Games in 1964. Events for 33 Olympic sports and 22 Paralympic sports are scheduled from July 24 to September 6. Excitement for the intense midsummer competition is already rising, but beating the heat will be critical, too.

The finishing touches are being put on the Olympic Stadium, whose target date for completion is the end of November 2019. With the concept of "Stadium in Forest" that blends in with the natural surroundings, the sports venue employs modern technology to present traditional Japanese wooden architecture. Its innovative design allows the wind to flow through easily, thus mitigating the heat.

While the space above the



Olympic Stadium



A stadium of trees and greenery designed around Japan's climate, nature and traditions. (Image is an artist's rendition of the completed stadium with grown trees about 10 years later.)

Design Works and Construction Works of Taisei Corporation, Azusa Sekkei Co., Ltd. and Kengo Kuma and Associates JV/Courtesy of JSC

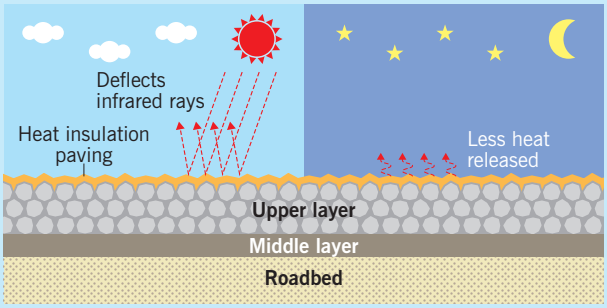
stadium's field is open, the spectator seats are fully covered by the roof to block direct sunlight. In addition, the structural design of Grand Eaves of the Wind and Terrace of the Wind is made to facilitate the flow of seasonal winds to the stands. The sunbathed field will create an updraft that the incoming breeze will ride, carrying the stadium's heat and humidity over the field and outside. Meanwhile, the 185 airflow-creating fans blowing air from behind the seats will help strengthen the flow of air throughout the stadium. Furthermore, air-conditioned break rooms and cold water fountains to keep spectators hydrated will be complemented by a mist cooling system to cool down their bodies for a full suite of measures to counter the summer heat.

Japan is also taking steps to make the marathon and other events on public roads more comfortable for athletes and spectators. First, approximately 136km of road, including the marathon course, have a special pavement to suppress rising road surface temperatures. The chief technology behind that innovation is heat insulation paving, which was developed in Japan. It applies a heat-shielding coat to the road surface that deflects many of the sun's infrared rays. That prevents the road from retaining as much heat, thus keeping the road surface's temperature about eight degrees Celsius cooler.

Additionally, the time-honored Japanese method of *uchimizu* has garnered notice. This involves sprinkling water on the road to produce water vapor that allows the heat in the ground to escape into the air. Since long ago, families and local shopkeepers have done this as a way to recycle their wastewater and combat the heat in an environmentally friendly manner. Furthermore, a sight that will make anyone feel cooler will be people sprinkling water while dressed in colorful *yukata*, a lightweight summer kimono that is a traditional piece of Japanese dress. Those standard features of the Japanese summer will provide visiting spectators with a fresh view of the host country's long-practiced customs.

The composite array of cutting-edge technology and knowledge acquired long ago is an essential quality of Japan and will be the key to the variety of countermeasures to overcome the heat. Preparations are in full swing to welcome athletes and spectators from across the globe with the renowned Japanese style of hospitality known as *omotenashi*. ✻

Heat Insulation Paving



A coat of resin on top of the pavement deflects infrared rays to suppress temperature increases on the road surface. The coating also prevents the road from radiating as much heat at night.

"I want to be able to provide health screening, hospital visits, and treatments at a cost affordable to anyone, even in areas with limited access to medical services," says Sako.

Health for All through Innovative Examination System and Remote Healthcare

A young Japanese woman has set up a medical venture in Bangladesh that utilizes AI as well as ICT to create a system that makes healthcare accessible to anyone, even residents of regions with a shortage of medical services

Mari Sako, CEO of the medical venture miup, Inc., will never forget a telephone call she received from a resident of a farming village in Bangladesh who had taken one of the company's medical tests. Because miup had been providing health screenings in his neighborhood, he learned that he had developed a chronic disease, and left untreated, it could have taken his life. Without the medical test, his life and his family's life would have been thrown into chaos. "Afterwards, out of gratitude for having been saved by our medical test, he phoned me personally. In that instant, the vital nature of the service our company provides became clear to me," Sako recalls.

In her student years, motivated by a desire to help developing countries, Sako studied agriculture and life science, but felt there were many hurdles when trying to apply academic findings to the real world. She came up with the idea of starting her own business, to use research findings from the developed world and apply them. After discussing the idea with a university friend who had studied medical AI and bioinformatics, they co-founded miup in 2015 and began operating a health-related business in Bangladesh. It was selected as the first country to start the business because, despite maintaining an economic growth rate of around 6% each year, it has been experiencing widening disparity in healthcare access. Having grown up in a family of a long line of doctors, Sako reacted against the assumption that she, too, would naturally pursue a medical career. As fate would have it, her chosen path led her to a different way of contributing to people's health.

There is the perception that in

While preparations are underway in rural areas for the deployment of a healthcare system using AI and remote healthcare technology, in urban areas, miup operates a more advanced delivery-type health screening service.

Mari Sako

Sako majored in agriculture and life science at the University of Tokyo Graduate School and researched ways to assist developing countries. In 2015, she teamed up with a friend from university to found the medical venture miup, Inc. Her goal is now to realize an AI-based service that delivers medical care to areas lacking medical services.

"Because they don't have the well-established systems enjoyed by developed countries, developing countries can more quickly adopt and popularize new technologies to solve social problems," says Sako.

Bangladesh, many people suffer from acute diseases such as infections, but with economic growth, the incidence of chronic diseases is on the rise as lifestyles become more affluent. Unlike infections and other acute diseases that are easily known by their symptoms, chronic diseases require medical testing for diagnosis. The lack of such tests is a serious problem in some parts of the world. "In rural Bangladesh, where 70% of the population lives, there is an overwhelming shortage of doctors—a ratio of only one for every 15,000 people. It is quite common for people to medicate themselves without seeing a doctor or having a proper prescription. Given this situation, we thought we should provide medical treatment that draws on sophisticated use of medical data and technology."

The shortage of medical services can only be resolved by tremendous amounts of money over a long period of time, but miup is trying to solve the problem with a different approach that uses AI and remote healthcare. Using data comprised of easily-measured blood pressure and pulse rate, photographs and medical interviews, miup's AI-based system will screen for risks. People who fall into a high-risk category will be recommended to consult a doctor remotely using an Internet-accessing device such as a tablet. Through this system, healthcare can be provided far more efficiently, and residents living in areas lacking medical services will be able to receive health examinations at an affordable price. Currently, miup is conducting large-scale medical tests to improve the accuracy of AI diagnostics and remote healthcare software, with the idea of having a commercial version available as early as one or two years from now.

"Similar problems are common around the world. Once our health screening model is successfully running in Bangladesh, I would like to make it available to more countries," says Sako. The year of miup's launch, 2015, was also when the United Nations established Sustainable Development Goals (SDGs), which assert the importance of universal health coverage to protect the health of everyone. Both concepts resonate harmoniously with each other.

Bangladeshi doctors and consultants sympathetic with miup's vision have been collaborating in the program even before miup was established. (Sako shown in the center)

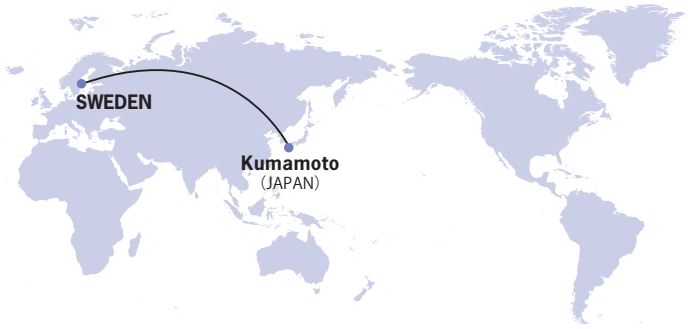
Passing On the Artisan Spirit to Posterity

A fascination with Japanese swords in his youth led the Swede Hans Koga to become a craftsman of *koshirae* (outer sword components) in Japan. While helping preserve traditional techniques that date back more than four centuries in Kumamoto, he is conveying the soul of the samurai to the world and to future generations.

The Japanese sword, which was once a samurai weapon, now attracts many overseas enthusiasts as a piece of art. In addition to being appreciated for its functionality on the battlefield, it is also revered for its aesthetic value. The two major factors that determine this beauty are the cylindrical *saya* (sheath), which houses the blade, and the *tsuka* (hilt). Those components of the sword are collectively called *koshirae*, and one of the few craftsmen still actively producing *koshirae* is a Swede by the name of Hans Koga.

"When I was a boy, I had the opportunity to watch a

The process called *tsukamaki* (hilt wrapping) involves wrapping leather cord around the hilt to strengthen it and provide a better grip. The diamond-patterned *tsukamaki* is so solidly wrapped that it must have been indestructible on the battlefield.



demonstration of *iaido* (martial arts using Japanese swords) in Stockholm, and I was completely fascinated by the Japanese swords. With their extraordinary power, they really seemed to possess the soul of the samurai," he recalls.

After graduating from a polytechnic high school, he worked as a ship carpenter. But when a major injury forced him to quit that line of work, his interest in Japanese swords was reignited. He moved to Japan and while studying at a sword studio, he learned about the various regional styles of *koshirae*. Among them he became particularly attracted to the *Higo-koshirae* of Kumamoto Prefecture in Kyushu, southwestern Japan (Higo is the old name for Kumamoto).

"The *Higo-koshirae* have robust and functional structures with no tolerance for the unnecessary. But, at the same time, they have an aesthetic quality as refined as any tea ceremony. And the proportions of the hilt and the blade are excellent."

Koga moved to Kumamoto in 2015. While receiving guidance from a retired senior craftsman, he also expanded his skill and knowledge by studying old masterpieces and materials. Even after his house was destroyed in the 2016 Kumamoto earthquake, he says he had no plans to leave the area.

"I want to continue working to pass on this wonderful culture. I also love the people and nature of Kumamoto, and I admire everyone's tenacity in the face of natural disaster."

After the earthquake, Koga built a workshop in a corner of a traditional house that is over 300 years old. Benefiting from active promotion using social media, he has a constant backlog of orders from both Japan and overseas. He must work hard to keep up, but he never lowers his standards. "The *koshirae*, which are made using the same natural materials and traditional techniques as in the olden days, are guaranteed to last for more than one century. They are labor-intensive, but I hope to continue putting all my care into making high-quality pieces as my lifelong work," Koga says. His words clearly indicate that he shares the strong devotion of the Japanese craftsman who works hard every day at his craft without compromising on workmanship. ✻

Hans Koga

Born in Stockholm, Sweden, in 1972. After working for a yacht builder in Sweden, he moved to Japan in 2011. He studied at a Japanese sword studio in Tokyo before moving to Kumamoto Prefecture in 2015, where he learned the technique of *Higo-koshirae*. Today, he works as a *koshirae* craftsman devoted to both production and restoration.

Japanese swords vary in style depending on the region. The *Higo-koshirae* is a style that marries function with beauty. It was established by a local lord who was also a master in *sado* (Tea Ceremony).

Enthusiastic Vocalist Inspires Japanese Students

Even after more than three decades in Japan, what Prisca Molotsi teaches, from classrooms to live music houses, are things about her homeland, South Africa, and a greatly enriched humanity

An English class at Aichi Shukutoku University. Molotsi's voice comes from the heart, and her English lessons go beyond the textbook.

Prisca Molotsi's classroom, where her teaching focuses on conversation, abounds with energy, shared by the students who enjoy studying English with total dedication. As lecturer, she encourages them to express themselves amidst laughter.

In 1986, Molotsi first came to Japan on a UN fellowship, assigned to Nagoya, where she researched urban design. At the time, the number of South Africans in Nagoya was exceptionally small. She recalls that, with limited social contacts, "Life was so lonely that I thought I would return as soon as the half-year contract was over." However, kindhearted Japanese people, together with the orderliness and safety of living in Japan, soon captivated her. Then came marriage to a Japanese, and before she realized it, 33 years had passed.

Posing with her high school students, Molotsi says, "Japanese high school students have so much energy. Their intense yearning to express themselves in English makes it a pleasure to teach them."

Now, when she hears someone ask, "How do you, as a person from a distant country, feel about Japan?" She responds with a smile, "So thoroughly have I melted into Japan that I find it difficult to answer." In fact, her favorite foods are *kishimen* noodles and miso soup made with *wakame* (seaweed), and she has acquired a black belt in *karate*, learned *ikebana* and tea ceremony, and likes Japan more than anybody else around her.

Currently she teaches English at colleges and high schools in Nagoya, and gives lectures on South Africa. In Japan, not everybody realizes the tremendous variety of culture and nature in all the different countries.

She finds ways to draw connections between Japan and remote Africa by mentioning the history and culture of her homeland, South Africa.

In addition to her teaching, her dynamic expressiveness as a jazz singer can be heard at hotels and other live music venues. By the age of 14, her singing was already good enough to be recorded onto an album presented to the President of Zambia.

"At live performances, I sing at least one song from South Africa," Molotsi says. This song is peppered with click sounds typical of the tribal languages of South Africa—totally unique. "Never having heard these sounds before, Japanese audiences are astonished and delighted." She is amazed that, even without understanding the lyrics, people can be moved to tears by her singing."Whenever I feel that deep emotional connection, I feel ecstatic!"

Molotsi is often asked, "Between teaching and singing, which one is your real job?" In fact, the idea that she must choose one or the other seems nonsensical to her.

Raised in an open-minded home, her sense of values grew wide. Whether teaching or performing in front of a live audience, she thus seeks to communicate not only about English language and South African living, but more amazing things beyond. Even during class on the day of our visit, she made a fervent appeal to her students, saying "I want you to know even more about the world, and to have a variety of experiences that broadens your horizons. I know there will be disappointments. But we should keep rising to the challenge every time: the spirit of Never Give Up!"

She also mentions e-mails, sent from former students, telling her that, "During tough times, your words were a source of strength." Her passionate feelings are expanding the future of Japanese youth. ✻

Prisca Molotsi

Originally from South Africa, she came to Japan in 1986 on a UN fellowship. While lecturing on English and South Africa, she is also active as a professional singer. Her singing talents were showcased at a concert event marking the centenary of Nelson Mandela's birth.

Oita—A City with Many Centuries of Overseas Ties

Steeped in a centuries-long tradition of forming ties with other countries through trade, the city of Oita today is flourishing with international exchange through friendly bonds with cities

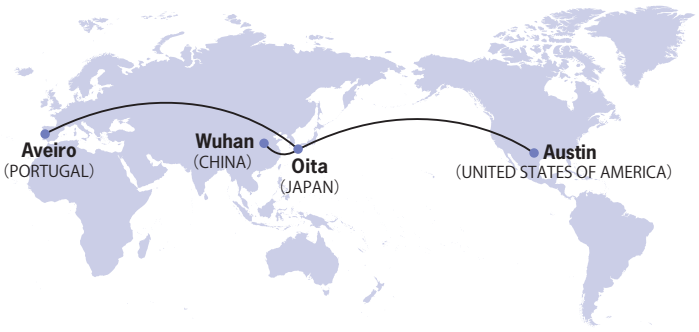
Oita City (OITA PREFECTURE)

Oita Prefecture's largest and capital city, Oita is located in Kyushu, the southwestern part of Japan. In addition to having a long history as an industrial city, Oita is set among beautiful nature, facing the ocean to the north and being surrounded by mountains. Popular local gourmet seafoods are *Seki Saba* mackerel and *Seki Aji* horse mackerel, which are widely known as high-grade brands.

Looking over a sparkling blue ocean, the city of Oita is surrounded by forested mountains. While blessed with a warm climate and abundant nature, it is also one of Kyushu's major industrial cities. It has gained much admiration and drawn many observers from around the world for developing as a green city while still being an industrial center.

About 450 years ago, when Japan was embroiled in the Warring States period, Oita flourished as one of Japan's prominent trading cities. The feudal lord governing at that time was Sorin Otomo, who was an avid Christian. As the first city in Japan to embrace Western medicine, music, drama, its blossoming so-called *Nanban* culture (Western culture) was highly influential.

That inclination to actively embrace different cultures has been continuously carried down until today, a boom time for international exchange made possible through sister-city and similar relationships. Visitors from overseas often remark, "The city looks so beautiful!" Those impressions are swayed by not only the stunning nature, but also the various beautification activities that the city orchestrates. "Oita is



with **Aveiro** (PORTUGUESE REPUBLIC)

Exchange with the city of Aveiro in the strong soccer nation of Portugal can be very exciting for children.

with **Austin** (UNITED STATES OF AMERICA)

In 2015, Oita and Austin celebrated the 25th anniversary of sister-city relations. Oita's mayor, Kiichiro Sato visited Austin where he conducted a planting ceremony with Austin's mayor, Steve Adler to commemorate the anniversary.

with **Wuhan** (PEOPLE'S REPUBLIC OF CHINA)

At a music festival held every October in Oita, many musicians perform on street stages in various spots around the city. Musicians from Wuhan City are invited every year to perform traditional Chinese musical instruments such as the Erhu.

an industrial city with many scenic attractions. The tours of world-renowned architect Arata Isozaki's buildings are also highly popular among visitors," says Kiichiro Sato, mayor of Oita City.

Currently Oita has Aveiro of Portugal and Austin of the United States as sister cities, and Wuhan of China as a friendship city.

Exchange with Aveiro, a city in central Portugal, can be traced back to the age of Sorin Otomo. In 2018, the two cities celebrated the 40th anniversary of sister-city relations. Through soccer exchanges and the like, many children of the two cities visit the respective sister city. By learning the history of cultural exchange that occurred a very long time ago, children from both cities can deepen their understanding.

The U.S. city of Austin in the state of Texas is a city well known for its music festivals and as a center for high-tech industry. Sharing so much in common, the two cities seem to have a natural affinity for each other. In addition to music exchange, where Country musicians from Austin are invited to Oita, and Japanese drum performers from Oita visit Austin, efforts are also being put into exchanges between young entrepreneurs of both cities with a focus on new business development.

The Chinese city of Wuhan, with which Oita has long had active exchanges among steel industry engineers, is especially close geographically to Oita, and exchange is carried out on a much more frequent basis. The age range and the scope of activities in such exchanges are also diverse, with junior-high students going on short visits, musicians who play traditional Chinese musical instruments being invited to local musical events in Oita, and athletes being invited to compete in the Oita International Wheelchair Marathon.

"Because those various exchanges provide opportunities to learn different cultures and deepen mutual understanding, I think they serve a major role, particularly in the education of our children. I want to continue to highly value the relations that many predecessors have fostered and carry them down to the next generation," says Mayor Sato. When the children who have gained that precious experience have their turn at shaping the future, there is no doubt that Oita will only further develop as a cosmopolitan city. ✻

Kiichiro Sato has served as the mayor of Oita City since 2015. He was born in Oita and grew up in the city until he finished high school. Inheriting Oita's centuries-long tradition of proactive exchange with the world, he is eager to even further expand the circle of international exchange in the future.

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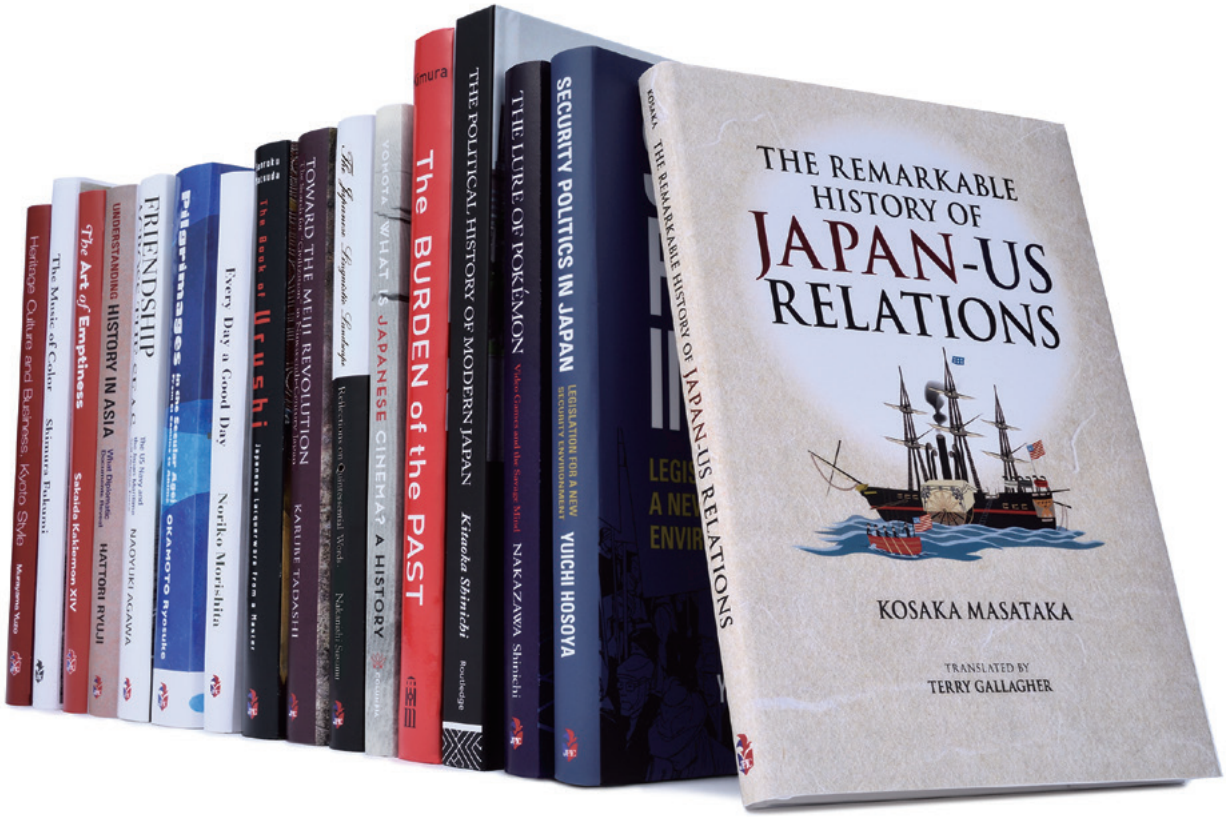

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