As an international research center and hub for international brain circulation, IROAST is creating groundbreaking innovation and building a well-being society

The International Research Organization for Advanced Science and Technology (IROAST) was established in April 2016 to further strengthen international research capabilities in the field of natural sciences at Kumamoto University. Director Kazuki Takashima and Auditor Takanori Sonoda discuss the achievements of IROAST that have become apparent from activities of the past six years and the role IROAST is to play in the future.

Auditor, Kumamoto University
Mr. Takanori Sonoda

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Director, International Research Organization for Advanced Science and Technology (IROAST), Kumamoto University
Dr. Kazuki Takashima

Auditor Sonoda (left) and Director Takashima (right)

IROAST's activities are growing in importance in today' s global society

—How do you feel as you look back over the past six years?

Takashima The International Research Organization for Advanced Science and Technology (IROAST), Kumamoto University was established in 2016 with support from the Ministry of Education, Culture, Sports, Science and Technology (MEXT) as part of the Program for Promoting the Enhancement of Research Universities. The six-year period, which is the same as the medium-term plan period of Kumamoto University, was set as the first phase of IROAST, and that phase ended in AY2021. During the first phase, we focused our activities on fostering the development of young researchers and international joint research centered on four priority research areas - Nano Material Science, Green Energy, Environmental Science, and Advanced Green Bio - which are strengths of Kumamoto University's natural sciences.

Human resource development of young researchers makes use of the university' s tenure-track program, a system whereby young researchers gain experience as independent researchers who are employed for a fixed term before going on to more permanent positions. We are recruiting young researchers from all over the world in the four fields, and from among these we are discovering and nurturing excellent researchers.

We have promoted international joint research by engaging researchers who are active on the front lines of the world as outstanding professors, and by inviting internationally renowned researchers as visiting professors. In addition, we have established a system for supporting overseas research by selecting young science and engineering faculty members at Kumamoto University who are expected to play active roles internationally and concurrently appoint them in the International Joint Research Faculty Members.

The results of this initiative are being demonstrated in numbers as data. For example, at the time of its establishment, the goal of the organization was to write 30 papers a year, but by 2020, more than 100 papers had been written, more than three times the target. The keyword of IROAST is "international." We set as our goal to make 80% of the papers written annually internationally co-authored papers with researchers from overseas research institutes. Approximately 15% of natural science papers in Japan are said to be co-authored internationally, so our target was far higher than that, and in 2020, the rate of international co-authored papers actually reached 83%.

Of course, writing papers is meaningful only if they are read and cited. Papers for which the number of citations is in the top 10% of papers in their respective fields are referred to as "papers in the top 10%," and research programs conducting cutting-edge research such as MEXT' s World Premier International Research Center Initiative Program (WPI Program) and the Japan Science and Technology Agency' s CREST Program are said to set a target to have 20% of their papers “papers in the top 10%.” Therefore, we set the same target, but by 2020 we went beyond that by achieving a rate of 23%. In addition, we set a target of 1.1 for the relative average citation performance, which indicates how much a paper was cited, when the world average was 1, but in 2020, our citation performance was close to 2.5. Even leading research institutes in Japan are said to be 1.5 to 1.8 at the highest, so you can see how much higher that citation performance is.

I feel that these results are the achievements of IROAST faculty members and researchers.

—Mr. Sonoda, what is your impression of IROAST?

Sonoda The achievements of IROAST are superb, and if this initiative spreads to research departments other than IROAST, we believe that our university and, by extension, Japan will be able to compete with the rest of the world.

I believe that growing countries and cities attract people, money and information. Take, for example, countries like the United States, China and India. And cities such as Texas in the United States and Tokyo in Japan. As a country, however, Japan has a contracting population due to the declining birthrate and aging population.

While there are said to be 200,000 international students in Japan, there are one million international students in the United States. Of those one million, only 18,000 are Japanese. On the other hand, there are 370,000 to 380,000 Chinese, 190,000 Indians, and more than 20,000 Vietnamese. This is because in the United States, you can not only study and live in English, but also interact with people from various countries including countries in Europe and Africa, which is both convenient and attractive. Similarly, for young Japanese, building an international human network through research and education programs in that country should be a valuable asset for their future.

The amount of direct investment in the United States from countries around the world is said to be more than 10-fold that of Japan, and China is said to be the country that receives the most direct investment. The rest of the world sees these two countries as worth investing in. On the other hand, Japan invests more in foreign countries than it receives. Consequently, it is in the red.

The number of papers produced in Japan and the international co-authorship rate are not far from those of the United States or China. I think it is necessary for Japan to build relationships with American brain groups, conduct various joint research with China, and actively engage in relationships. Therefore, I feel that the activities of IROAST will become very important.

Through deep discussion, IROAST will aim for a society that can achieve wellness

—How do you view the past six years? What are your thoughts on the role that IROAST should play?

Takashima I believe that natural disasters such as earthquakes and floods, and infectious diseases such as COVID-19 have changed the way people think, and I believe that wellness is important to people at present. I feel that what is needed from now on is a society that can achieve wellness, and in the second phase of IROAST, we will conduct international research activities focusing on science and technology for building a well-being society.

There are various forms of wellness, such as the wellness of individuals and the wellness of society. To develop and support these, we would like to support research with advanced materials, data science, and AI, focusing on "technology that is close to people" and "strengthening resilience.”

Sonoda In the 1980s, the national power of the United States weakened, but it rebounded in the 1990s. Japan, on the other hand, stopped growing after peaking in the 1980s and 1990s. China adopted a policy of uniting with the world, and grew rapidly from the late 1990s to the 2000s. At this time, China sent many more international students to the United States than other developed countries to study. They were called "sea turtles" when they returned to China. So how many "sea turtles" have been educated in Japan? I think it is important to increase the number of people who have studied and acquired skills in developed countries.

Every country changes drastically in appearance in a matter of only 10 or 20 years. At the company where I used to work, we often discussed what we would like the company to look like in five or 10 years. If we discuss matters from a long-term perspective and this kind of discussion spreads throughout Japan, I think Japan will be able to escape from the stagnation. At that time, I believe that IROAST has various roles to play, and I would like IROAST to deepen discussion from a long-term perspective.

Takashima I also think it is very important to visualize the image you want to create. Once you have a vision of what you want to see, all you have to do is decide on how to get there and to move in that direction.

Sonoda The discussions held at that time would not be discussions that AI or machines are capable of. The point is to deepen the kind of discussion that only students,professors, and we are capable of.

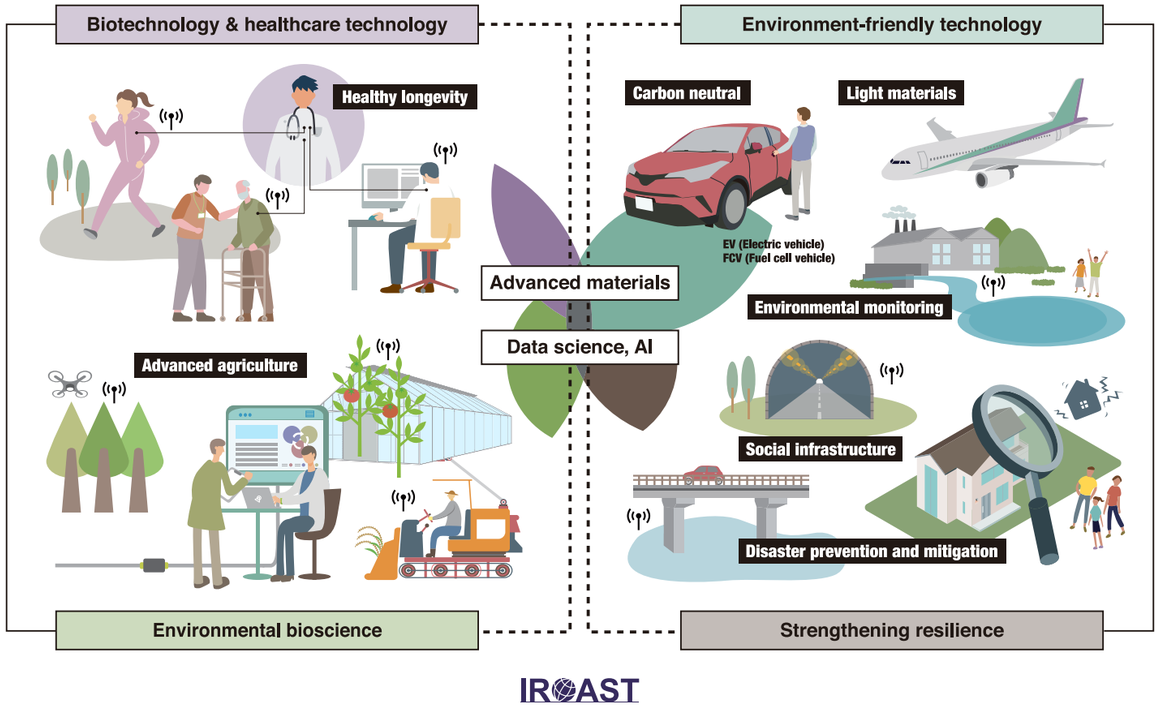
Takashima Well-being is one of the future visions we should aim for. IROAST can contribute to this through health tech, bio and medical care. In the field of bio, I think we should focus on

Visualize the image of what you want to see, and decide on the method for achieving it. Deep discussions that machines are incapable of.

Auditor, Kumamoto University

Takanori Sonoda

He completed graduate school at University of Tsukuba. He joined Honda Motor Company.engaged in overseas public relations. He traveled to the United States in1985. After working at American Honda's Washington and Detroit offices, he became Vice President of American Honda Motor Co., Inc. in 2006. In 2012, he returned to Japan, and retired from Honda Motor Co., Ltd. the following year. He became a senior research fellow at the Maureen and Mike Mansfield Foundation the same year. In September 2020, he became auditor of Kumamoto University.



Nothing is impossible. Students, courageously take on new challenges!

Director, International Research Organization for Advanced Science & Technology (IROAST), Kumamoto University

Kazuki Takashima

He received his B. Eng. degree in metallurgy from Kumamoto University, Japan in 1978, and his M. Eng. and Ph. D. degrees in metallurgy from the Tokyo Institute of Technology in 1980 and 1984 respectively. After beginning his career as a research associate at the Nagaoka University of Technology, he became a lecturer and associate professor at Kumamoto University. He was then an associate professor at the Tokyo Institute of Technology before returning as a full professor to Kumamoto University in 2005. He has been the Director of IROAST since April 2021. His research interests include mechanical properties of materials.

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infectious diseases including COVID-19 in addition to biological diseases. In the medical field, there are medical devices that can be implanted in the human body and capsule endoscopes, but there are many issues such as how to generate electricity used for these. I believe that IROAST can act as a bridge to address such issues and proceed with research in collaboration with the Faculty of Life Sciences.

In addition, low environmental load will become more and more important in the future. Deepening our research on low environmental load will lead to the wellness of people.

Sonoda I have high hopes for our professors in their ability to achieve a well-being society.

As a hub for the United States and Asia, Kumamoto will actively build relationships with the United States and China

— What is the role of IROAST in international cooperation that is required now?

Takashima The current declining number of young Japanese researchers is an issue for Japan as a whole. At IROAST, we would like to continue to be involved in fostering the development of young researchers. The people we are aiming for are people who can actively engage with the United States and China, as Mr. Sonoda noted earlier. The only way to nurture the development of such people is to have them go abroad. I would like them to go abroad, build networks with overseas researchers, and after returning to Japan, make use of those networks and their overseas experience to play active roles in Japan.

Sonoda Researchers from other countries, particularly Chinese researchers, are very fluent in English recently. They must have been trained in Europe or the United States. I think that the accumulation of such people trained overseas has built and supported the present Chinese society.

Takashima I agree. Considering that we have partners in Europe, the United States, and China, I would like to proceed with research, maintaining a good balance.

There are several Chinese professors in IROAST, and some of these have been recruited as outstanding professors. Professors from other countries at IROAST today consist mainly of persons from European countries and Asian countries such as China and Singapore. Kumamoto University has only a weak connection with the United States, so this is a problem which we want to address somehow.

Sonoda When I first came to Kumamoto University, I was honestly surprised at the weakness in the connection between the university and the United States. I thought it would be good if more Japanese and American researchers engaged in joint research.

Takashima In the future, we would also like to consider ways to collaborate with the United States.

—What are your thoughts on the role IROAST should fulfill from the perspective of "international cooperation?"

Takashima I would like to strengthen cooperation more than ever before, but we will not make progress unless we talk face to face. If we meet face to face, we can have informal chats during breaks at meetings, but that is not possible when meetings are held online, so there are some things it is difficult to convey.

Sonoda When I lived in the United States, the most important aspect when building relationships with Americans was to build relationships that went beyond business relationships. For example, you invite people home to have a meal or a barbecue. That is how I deepened relationships with people.

Takashima I previously spent a long time in the United Kingdom and one of the professors I had at that time invited me to his home every time I visited the United Kingdom thereafter.

Sonoda So, it's also important to cultivate and maintain private relationships.

If we look at Japan from the United States, Kumamoto in particular appears to be quite close to the continent of Asia. I also happen to be a researcher of the Mansfield Foundation, and I have used Kumamoto as a hub for discussing the possibility of the United States and Asia deepening exchanges. I would like IROAST professors to demonstrate to American researchers the kind of research IROAST is capable of and the ways in which IROAST can connect with Asia.

Looking beyond the SDGs Aiming for a well-being society

—Please tell us how you see the second phase of IROAST.

Takashima The SDGs have been widely adopted, but the SDGs are sustainable development goals up until 2030. A well-being society is a goal beyond the SDGs, and IROAST is aiming for that. A well-being society is a sustainable society, a healthy and long-lived society, a carbon-neutral society, a safe and secure society where disaster prevention and mitigation are mainstream, and is a society of smart cities that utilize ICT and other advanced technologies.

We would like to strengthen our capabilities in advanced materials and data science needed to support all of these.

Sonoda It's encouraging to hear such talk, I feel. And I think it is possible if we work hard on building on our research. I think it would be great if we could deepen the discussion on “the image of the future we want to see,” which I mentioned earlier, and why we want that, and to then combine various methods to finally get closer to what we envision.

Looking ahead and taking on new challenges!

—What advice do you have for those who aim to become researchers in the future?

Sonoda Looking in front of us, we can see only problems. Please approach your research by looking ahead, not in front of you.

Takashima I gave the same message in the IROAST video, citing words supposedly spoken by Audrey Hepburn: Nothing is impossible. The word itself says “I’ m possible.” In other words, “I can do it.” Nothing is impossible. I would like all students to courageously take on new challenges.