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New Color-Bearers

**of Keio's Faculty of
Science and Technology**

Introducing the Researcher 1

Assistant Professor Takasumi Tanabe focuses on the development of photonic circuits, which will save the energy than electronic circuits.

Developing Optical Microresonators to pave the way to realize Photonic Circuits

Toward a super energy-efficient society

By using photons instead of electrons, photonic circuits can extremely decrease the power consumption of machinery and equipment. Optical microresonators are indispensable for putting these photonic circuits to practical use, with which we can store light like a memory, release stored light whenever needed like a transistor or a switch, and change characteristics of light.

Takasumi Tanabe

Optical microresonators indispensable to optical circuits

Perhaps you have been surprised by the heat when touching your notebook PC power adapter or the rear of a TV set. The fact is, electrical appliances, regardless of their functions, are releasing wasted heat as part of the electricity they consume. For example, even gold, which has excellent electrical conductivity, exhibits some resistance, not zero, and generates Joule heat responding to the resistance when electricity is passed. In other words, by simply passing a current the electric circuit loses heat energy proportional to its electrical resistance.

"Electronic circuits are bound to generate heat. But photonic circuits are totally different. Light, when passed through glass, causes no loss like Joule heat. Theoretically, photonic circuits work without loss," explains Assistant Professor Takasumi Tanabe.

Capable of significantly reducing energy consumption compared with ordinary electronic circuits, expectations are high for photonic circuits as a solution to major issues facing our modern society, such as conservation of energy and reduction of CO_2 emissions.

With all advantages and no apparent shortcomings, but optical circuits actually come with their problems as well. One of them is the development of a device that can confine light in one place. Negatively charged electrons can be kept in place by taking advantage of the force of plus and minus attracting each other. But light does not have electric charges as electrons do. So we need to contrive an alternative method for stopping light in one place.

"An optical microresonator is known as a device to keep light in one place. The development of this particular device is essential for putting photonic circuits to practical use. If we can confine light in one place, then it will become possible to use this optical device as a memory. We can also use the same device as a switch or a transistor by manipulating the confined light. Among several approaches attempted in this study, I used photonic crystal technology to confine light and succeeded in running an logic circuit concerning computer memory."

Practical application, first . . .

Having obtained positive results from a series of his studies, Dr. Tanabe took up the challenge of practical application of photonic circuits from this spring. His research theme is the development of an optical microresonator using silica, the main constituent of glass, as the raw material.

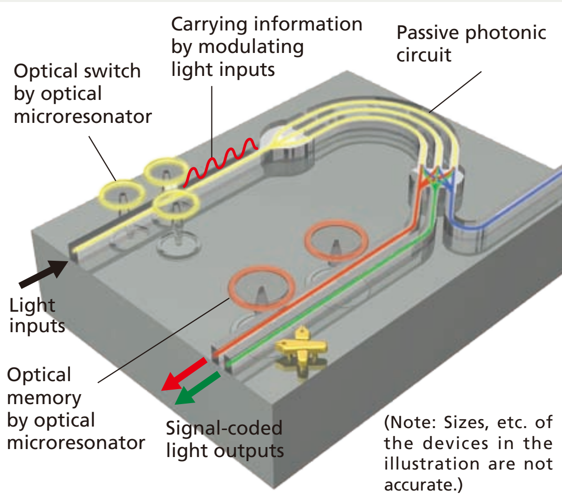
"There are several reasons for choosing silica as the raw material for my optical microresonator. First occurring to my mind was silica's high compatibility with existing optical devices. Silica is an attractive material from the application viewpoint."

Devices required for a photonic circuit include the optical fiber cable and the planar lightwave circuit. Of these, passive devices such as those used for transmission of light signals and those for information branching are approaching the level of practical use. And many of these devices are silica-based. In short, if we succeed in developing an optical microresonator with silica, we can integrate into one chip such active devices as the optical memory, optical switch and optical transistor as well as existing passive devices, thus enabling an photonic integrated circuit to be created with ease.

Furthermore, silica, when compared with silicon which is the raw material often used for photonic crystals, has different characteristics such as smaller optical nonlinear coefficients and faster nonlinear transition speeds. By using silica, it is also possible to ascertain the influence that a difference in materials exercises on device functions.

Dr. Tanabe expressed his hopes saying, "The use of silica as the raw material enables us to re-examine, across the board, issues peculiar to the whole photonic integrated circuit including peripheral equipment, rather than the optical microresonator as a single device. I think the results and issues identified in this process will go a long way to further photonic crystal and other photonic circuit studies."

(Reporter & text writer: Kaoru Watanabe)



Basic structure of the photonic integrated circuit

Optical devices made of silica glass are arranged on the silicon substrate. The disk-like devices in the upper left are optical microresonators, in which light is trapped. With optical microresonators, it is possible to vary refractive index according to the intensity of incident light, enabling the particular optical microresonator to operate as an optical switch or an optical transistor. The device in the upper right is a passive device for branching light signals. When light signals are sent from the optical switch and/or optical transistor to this optical device, it can sort out the signals by wavelength or split the signals.

Introducing the Researcher 2

Assistant Professor Yoko Saikawa investigates into and identifies materials responsible for natural phenomena.

Shedding Light on Various "Whys" in Our Daily Lives

Explaining toxicity of a mushroom by chemical approach

Yoko Saikawa

Why is hippopotamus sweat red? . . . There are so many "Whys" in our daily lives and in the world. Assistant Professor Yoko Saikawa of the Natural Product Chemistry Laboratory investigates into materials responsible for a variety of natural phenomena. She recently identified the toxic component of the poisonous *Russula subnigricans* mushroom.

The *Russula subnigricans*, popularly known in Japan as "Nise Kurohatsu" (see photo below), looks truly tasty but is actually a poisonous mushroom. It was first announced as a mushroom of fatal toxicity during the 1950s. But it has almost been forgotten because no accidental deaths were reported during the ensuing 50 years and also because there are several other similar-looking mushrooms.

In July 2009 the British scientific magazine *Nature Chemical Biology* carried an article announcing that the poison in *Russula subnigricans* mushroom is cycloprop-2-ene carboxylic acid.

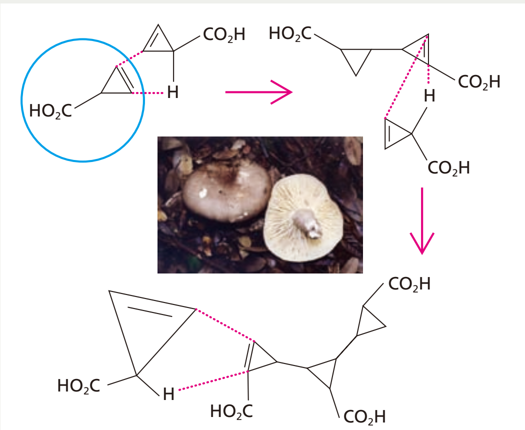
This achievement was the result of joint research with Dr. Kimiko Hashimoto (now Associate Professor at Kyoto Pharmaceutical University) as well as with Professor Masaya Nakata and Dr. Masanori Matsuura (then student) of the laboratory, to which Dr. Saikawa belongs. In the world of natural products investigation where almost all natural substances have been thoroughly investigated, this achievement has become a significant topic of conversation.

Toxic substance that disappears

Cycloprop-2-ene carboxylic acid is a small substance – a ring consisting of three carbon atoms, to which carboxylic acid is attached. "Such a simple, small substance has long been left unidentified!" Dr. Saikawa talks about the surprise that struck her after years of investigation.

Although its molecular structure is simple, its extraction was far from easy. The investigative study began with identification of the *Russula subnigricans* mushroom. To evaluate the toxicity, the team adopted the method of injecting the toxic substance into the peritoneal cavity of mice. But before long it became known that mice would die even when non-toxic substance was injected. So the experiment had to be done anew by changing the policy to feed mice with the toxic substance.

The hardest problem encountered was that the toxic substance would disappear when an ordinary separation process was employed. Looking back over those days, Dr. Saikawa says, "We tried this way, and if it didn't work we didn't hesitate to take that way. In that sense, research scientists like us are quick-tempered." The readiness to review and change research approaches as necessary and the toughness for devising and carrying out new solutions in rapid succession seem to be required. Finally, she found that the toxic substance disappeared due to concentration, which led to the improvement of the extraction process. Cycloprop-2-ene carboxylic acid was thus identified as the culprit for the *Russula subnigricans* mushroom after eight long years.



Cycloprop-2-ene carboxylic acid and polymerization

Russula subnigricans (photo) had been the only fatally poisonous mushroom the toxic component of which remained unidentified. But the lethally toxic component was finally identified as cycloprop-2-ene carboxylic acid (the blue-circled part in the upper left of the Fig.). When cycloprop-2-ene carboxylic acid molecules come closer to each other, polymerization takes place, which nullifies the toxicity. This explains why the toxicity disappeared during the concentration process of toxicity extraction. (Photo by Yoko Saikawa)

Scales falling from her eyes – an exciting moment!

"It was hard and depressing when positive results were not in sight. But the moment its structure was known, everything became clear and I found all answers just before my eyes." Once the structure of the toxic substance was identified, the question of the toxicity lost in the process of concentration was not a question at all. This excitingly fresh feeling derived from achievement seems to drive Dr. Saikawa into scientific pursuit. From this particular research project, she could also appreciate the joy of discovery of the natural world.

Discovery of new substances is also exciting as it allows her to pose new questions to other scientific fields. The greatest feature of this particular poison is that it causes "rhabdomyolysis" in which muscles melt. Since its mechanism remains totally unknown, the achievement of her team is now a focus of attention within medical circles.

I spare no trouble finding new seeds of research.

As a research scientist, Dr. Saikawa is about to launch a research theme on her own for the first time. In the past she frequented a zoo to sample hippopotamus sweat and climbed mountains many times in search of the targeted mushroom. From such experience she says, "Seeds of research themes are everywhere. But you can't find them if you're just sitting back watching TV or browsing through magazines. The only way is to use your own legs." To find new research themes, she often goes out to sea as early as 4:00 in the morning with a fisherman with whom she recently befriended.

(Reporter & text writer: Akiko Ikeda)

Introducing the Researcher ❸

Assistant Professor Yoichi Kamihara, who has discovered an iron-based high-temperature superconductive material, proposes new possibilities.

Creating Lossless Power Transmission Cables Using Iron-based High-Temperature Superconductive Material

Toward the ultimate electric lines

Superconductivity refers to a phenomenon in which electrical resistivity drops to zero when certain materials are cooled to low temperatures. It had long been believed that superconductivity is a phenomenon peculiar to certain materials and it can hardly occur in materials containing iron. But Dr. Kamihara made a breakthrough in 2008 by discovering superconductivity with a layered iron-based compound.

Yoichi Kamihara

Superconductivity with materials containing iron

In 1911 Heike Kamerlingh Onnes of the Netherlands discovered that electrical resistivity of mercury cooled to 4.2K (kelvin = the unit of absolute temperature, 0K being -273.15 °C) drops to zero. The temperature at which electrical resistivity becomes zero is known as the superconductivity transition temperature(T_c). Efforts in quest of materials that can become superconductive at higher temperatures have been made in the ensuing years.

"Just a century has passed since the discovery of superconductivity, during which time a number of superconductive materials have been identified. These materials are roughly divided into metal-based compounds and cuprate-based ones. In terms of transition temperature, 39K for MgB_2 discovered in 2001 is the highest of metal-based compounds while high-temperature superconductivity at 135K for a cuprate-based material was confirmed in 1993. After that no significant discoveries had been reported," Dr. Kamihara outlines the development of superconductivity. Amid the stagnancy in the exploration of superconductive materials, Dr. Kamihara and co-workers (his bosses & a student) presented an original paper in 2008. The key point of the paper was the confirmation of superconductivity occurring in a compound containing iron, which overthrew the conventional view that iron, responsible for magnetism, is not suitable for superconductive materials. The paper was soon followed by a Chinese researcher reporting high-temperature superconductivity at 55 K, together leading to the discovery of the third type of high-T_c superconductive material.

"The superconductive material we found this time was an iron-based four-element compound. This combination of elements has great potential for application to other materials in addition to iron. I heard of a positive evaluation that the number of candidate combinations has increased dramatically. It also came to be known that its single crystal is in the shape of a thin plate and that electric current flows in the longitudinal direction through the single crystal thin plate. The establishment of an electric cable processing technology taking advantage of the single crystal's structure is said to be the key to practical application of the superconductor."

The paper surprised and intrigued numerous researchers and became No. 1 in the world in 2008 in the number of citations of theses written in English. In 2009, Dr. Kamihara was honored with the 13th Superconductivity Science and Technology Prize.

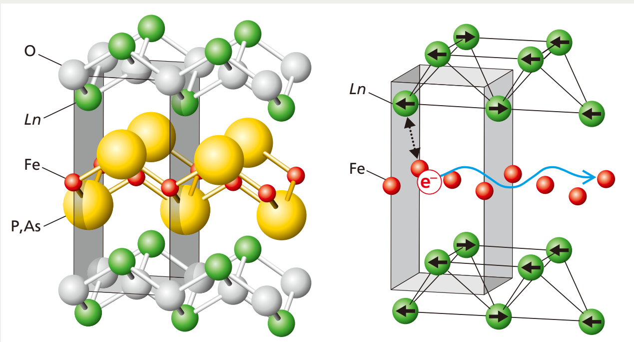
From discovery of superconductivity to practical application

Much is expected of superconductivity for application to many fields such as linear motor, electric power transmission and strong magnetic field generation. Above all, you can safely say the field of application on which the greatest hope is placed is the electric cable made of a superconductive material with zero electrical resistance. Given zero electrical resistance, it is theoretically possible to create electric cables without transmission loss – the ultimate cable that does not waste energy at all during transmission.

"In reality, however, I must admit that there are many problems. Even if we successfully identified an excellent material with a high transition temperature and elucidated its structure, heaps of problems would have to be solved before using the material in electric cables. For example, since an iron-based superconductive material is ceramics made up of small single crystals ranging in size from 1 to 100 micrometers, you cannot process it by stretching or melting like a metal. In order to form a long electric cable, heretofore unknown technologies need to be developed, such as a processing technology capable of orderly arranging the small single crystals, and a technology to prevent the junction between crystals from becoming oxidized, for example. What's more, how should protective coating for the cable be, and how should the cable be connected to the electrode? All such problems must be cleared."

While Dr. Kamihara began to address studies to put superconductivity into practical use, his inquisitive spirit is also directed to exploration into the fourth type of superconductive materials beyond iron-based ones. We'd like to see the fruition of his new challenge.

(Reporter & text writer: Kaoru Watanabe)



Crystal structure of iron-based high-temperature superconductor (left)

The figure on the right is a structural drawing picking out only iron (Fe) and lanthanide (Ln), showing how free iron electrons migrate during power transmission. In the center is a layer of iron, which is sandwiched from above and below by layers of rare earth elements such as lanthanum and samarium. Its single crystal is apt to grow sideways, tending to form a thin plate structure. In the crystal, the element mainly responsible for power transmission is iron; electricity is transmitted as free iron electrons migrate.

A Special Round-table

Looking Anew at Scientific Pursuit and Education at Keio's Faculty of Science and Technology

From this April, Assistant Professors Takasumi Tanabe and Yoichi Kamihara returned to Keio, their alma mater, as faculty members while Assistant Professor Yoko Saikawa came back after a one-year study overseas. The three fresh researchers suitable for the new school year have been invited to talk about Keio University as a venue of scientific studies and education.

Keio as a venue of scientific pursuit

MC : Mr. Tanabe and Mr. Kamihara, both of you have joined Keio's teaching staff from outside research institutions from this new school year. Will you tell us about your impressions of Keio: as seen from outside and as upon arrival at your respective posts?

Kamihara : A research institute is where people around you are all research specialists. All people working in the same field of study and having the same terminology at their fingertips – this is a very comfortable environment from the study perspective.

MC : I see.

Kamihara : But it is a very limited field. Of course the field we engage in contributes to society in a broad sense, but it remains a very enthusiastic field as an academic category. As a researcher, scientific research was the only work assigned to me, which sometimes made me worry about its value or significance. “Is my work really contributing to society?” “If so, is it appealing to the world?” . . . Questions like these.

At Keio's Faculty of Science and Technology, we rarely have two or more specialists in one specific field of study. The number of research fields is almost the same as the number of instructors. Accordingly many people say that they don't quite understand what I'm doing. In this sense, the world of Keio seems to be broader and multi-faceted. To put it another way, being with Keio puts me in a bit better position to become aware of my position in society.

Tanabe : I had exactly the same impression as his. According to circumstances, the realm of my study not overlapping with others' can be a demerit. But I think it's possible to turn it into an advantage if I expand collaboration with outside researchers and other fields of research.

Speaking of my impression upon arrival at my post, I can say Keio is filled with a very unrestricted atmosphere.

MC : Ms. Saikawa, you studied at Harvard Medical School. What idea or feelings did you have when attending Harvard? And how did Keio look like when seen from out there?

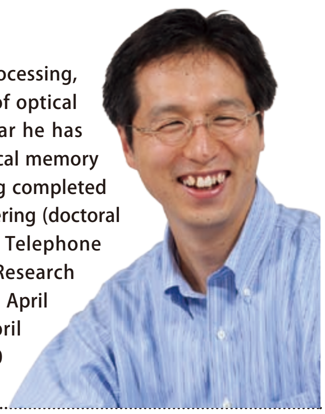
Saikawa : Ever since I first joined Keio as an undergraduate, I'd had no chance to study overseas – engaging for years in similar research themes at the same laboratory. Harvard Medical School is literally a “medical graduate school.” As a person with little experience in traveling abroad, studying abroad itself was a challenge. So were the medical and biomedical fields that would be involved. Getting out of my laboratory appeared like a rare experience. “I will see and experience as many new things as I can” . . . this was the feeling I had before flying to the United States.

I got this opportunity thanks to our department's system that allows one young researcher to study abroad every year. Because of this system, I came to feel like studying overseas. It proved to be a truly precious opportunity for me since it would have been difficult to do so on my own.

Once settled there, I was greatly impressed with Harvard in some aspects. I generally found the students enjoying their own campus lives while studying hard at the same time – a major similarity with Keio. When people asked me where I was from, quite a few of them knew the name of Keio. I got the impression that Keio was well known globally.

If asked about my specialty, I am a person of chemistry rather than medicine. Not all researchers in the medical field are knowledgeable about chemistry, and vice versa. On occasion I saw chemistry still being held in high esteem in the world of medicine. Chemistry is a very old field of science whereas biology is gaining in popularity

Takasumi Tanabe



To achieve extremely small-power and high-speed signal processing, Mr. Tanabe focuses on optical nonlinear control by means of optical microresonator based on photonic crystals and silica. So far he has succeeded in the development of an optical switch and optical memory that can be integrated on a semiconductor chip. After having completed Keio University Graduate School of Integrated Design Engineering (doctoral program) in March 2004, he joined Nippon Telegraph and Telephone Corporation (NTT) in April and was assigned to NTT Basic Research Laboratories with promotion to the research scientist post in April 2009. He assumed the current post at Keio University in April 2010. Awards he received include the Scientific American 50 Award in 2007.

A day in his life

6:10	Woken up by his wife, then waking his children.
6:45 ~ 7:40	Breakfast (Weekday breakfasts are the only time when all family members are present.)
7:40 ~ 8:00	Communication with children: preparation for escorting the first son to kindergarten and helping the second son in brushing teeth, etc.
9:10 ~ 12:00	Arrival at Keio. Conducts clerical work, such as checking of incoming e-mails and meetings with suppliers.
12:00 ~ 13:00	Lunch time (Frequents the coffee shop OKO.)
13:00 ~ 21:00	Conducts experiments, clerical work, etc. (May vary daily.)
21:00 ~ 22:00	Goes home while reading a printed thesis.
22:00 ~ 24:00	Dinner, then goes to bed.

as of late. But I got the impression that chemistry is still a worthwhile pursuit.

MC : Imporrtance of chemistry has been recognized again because you went to Harvard Medical School, you mean?

Saikawa : Maybe so. Discussions often become hot and mutually aggressive when talking with persons from medicine. It seems we talk at cross-purposes as the other party never sees problems from the perspective of chemical structure. But if we communicated thoroughly, both parties would come to understand and say, "Oh, I didn't know about such a perspective." In this way I could learn many new perspectives and approaches, which was a valuable experience.

MC: What do you think Keio's good points are in developing research activities?

Kamihara : When it comes to scientific pursuit, we shouldn't hesitate to collaborate with other research institutes. Keio encourages such collaboration, which is good.

MC : What do you mean by "shouldn't hesitate"?

Kamihara : At universities, there is only one specialist for each specific field of study. This creates the possibility that I may be the only source of inputs for my students, which is pitiful. Of course other teachers with specialties close to mine are around and available for advice, which is important. At the same time it's important to communicate with outside people. In university's peculiar environment, scientific pursuit wouldn't develop fully if you hesitated to collaborate with the outside. We have to be outgoing. I'm always telling my students, "Go out and associate with outside people." And it's good that I can say so without hesitation.

Saikawa : Conversely, our department seems to be rather self-sufficient. There are as many as 30 teachers at our Department of Applied Chemistry alone, and our research fields range widely from those concerning compound structures to those involving elements of biology though within the framework of chemistry. Whenever you initiate something new, you can easily find good teachers right around you, who are willing to offer advice from the forefront of their respective specialties. Originally a graduate of Keio, I always feel at home here and see little barriers whenever I take up a new challenge. In this sense, I rarely feel it necessary to go out and seek information and technologies from various other fields.

MC : It sounds like there are differences according to departments . . .

Tanabe : With my department, too, there seem to be few overlaps, and I want to take advantage of it. In other words, I'd like to make the most of Keio's merits as a university. Another point is the effective use of the many Keio graduates who are active in the industrial world. We shouldn't forget that either. The work I'm engaged in is fundamental research. It takes a long time to put a project like mine to practical use. This makes it quite difficult even for specialists to envisage a route it will follow and what fruit it will eventually bear as a useful technology.

In spite of such difficulty, I feel somewhat compelled to appeal my work to society. So, by receiving advice from various people actively at work in the industrial world, I'd like to say, "I'm now doing this. Is there any good way you can use it?"

Keio as a venue of learning for students

MC : From your viewpoints as teachers, what is Keio like as a venue of learning for students? And what do Keio students look like?

Tanabe : It seems that Keio has great diversity. There are so many different types of people. It may be partly because there are various routes of entry. Take leading national universities for example. Most students there are survivors of entrance exam wars. Look around and you only find winners. In the case of Keio, however, some have come all the way through Keio from the elementary school level. Also there are those who have been admitted by recommendation. And some have passed the entrance exam with a strong wish to join Keio while others may have joined Keio "regretfully" after failure with other universities.

MC : That's true. (laughter)

Tanabe : There are those who have experienced frustrations due to failure. The so-called "winners" can broaden their perspectives by knowing there are those that have experienced failure. Conversely, those having regrets may be encouraged or expand their scope of view by seeing other students enjoying bright campus lives. In my opinion, all these people with different experiences and mindsets getting together underlie Keio's diversity.

Kamihara : I don't know much about the students yet because I graduated from Keio five years ago and have just returned as an assistant professor. If Keio has not changed much from back then, I can say Keio students are good at helping each other. As Mr. Tanabe put it just a while ago, generally they are self-motivated, have a high ability for basic learning, and have latitude in seeing things. Students with mental latitude are helping each other in a friendly way. It may be safe to say this is the Keio culture. From my own experience as a dull student, I can say there is at least one bright student nearby. If you respect, target or copy that student, you can attain significant growth. In this respect, Keio offers an ideal environment.

Saikawa : Regarding "latitude," a variety of paths are made available at Keio.

Yoko Saikawa

Focusing on key compounds responsible for natural phenomena, she works on isolation of such natural products and determination of their structures. She also addresses the synthesis of complicated natural compounds by ingenious means, such as intramolecular Doetz reaction method. In March 2003 she earned credits for Keio University Graduate School of Fundamental Science and Technology (doctoral program). In April 2002 she became assistant for Department of Applied Chemistry, Keio Faculty of Science and Technology. In 2004, she obtained a doctorate (science). In April 2008, she assumed the current post. From September 2008 to September 2009, she worked as a visiting scholar at Harvard Medical School (under Prof. Jon Clardy). Among other awards, she received an Incentive Award at the 45th Symposium on the Chemistry of Natural Products in 2003.

A day in her life

5:30	Waking. Seeing her husband off after handing him a box lunch.
8:00 ~ 9:00	Visits a fishing port in Yokohama to receive test samples.
10:30 ~ 18:00	Arrival at Keio. Some clerical work, experiments and discussions.
18:00 ~ 19:30	Masters' study meeting.
19:30 ~ 0:00	Preparations for class work, discussions, sample analysis.
0:30	Back home.

Yoichi Kamihara

Toward the goal of "discovery" of compounds exhibiting high-temperature superconductivity, Mr. Kamihara creates and evaluates highly crystalline samples and pursues studies to elucidate correlations between local structures of the obtained crystals and their electrical properties and magnetism. In March 2005, he completed the doctoral program at Keio University Graduate School of Fundamental Science and Technology. From April 2005, he served as a researcher in the ERATO SORST Hosono Transparent Electroactivity Project at the Japan Science and Technology Agency (JST). From October 2008, he served as a researcher of JST's Transformative Research-project on Iron Particles (TRIP). He assumed the current post at Keio from April 2010. Chief among awards he received is the 13th Superconductivity Science and Technology Award (2009).

A day in his life

9:00 ~ 10:00	Arrival at Keio and check incoming e-mail.
10:00 ~ 11:30	Maintenance on X-ray analyzer, etc.
11:30 ~ 12:30	Lunch time.
12:30 ~ 13:00	Checking postbox for mail, and replying to e-mail.
13:00 ~ 16:30	Discussions with students on research work.
16:30 ~ 21:00	Preparation of samples and materials, and preparation for presentation.
22:00	Back home, dinner, and reads manga before going to bed.

I also have the impression that Keio is intent to foster latitude of students' individuality. Though I know little about other universities, Keio appears tolerant to almost anything students do – instead of fostering specialists from the beginning. In the worst case this attitude may lead them nowhere, but there are actually those students who maintain an unexpected combination of totally different interests, some saying "I like computation and organic chemistry at the same time." And such students advance and join laboratories without losing interest.

I know studying in laboratories inevitably requires specialized knowledge, but I'm doing my best so that they won't lose their multi-faceted interests. It's interesting to find gaps in them – unexpected gaps between their academic pursuits and their special abilities. It seems students who have been within Keio since childhood have been educated so as not to lose such individuality.

Tanabe : That's very important. I agree. In the field of science, one needs to focus on one particular thing. But engineers bring in two seemingly unrelated things and combine them to create something new.

Saikawa : Yes, combining things ingeniously is a wonder.

Momentums for becoming research scientists

MC : Now please tell us why you set your mind on science or chose your careers as researchers.

Tanabe : As a junior high student I saw an NHK Special TV program entitled "The Autobiography of Japan as an Electronics-based Nation." It was an account of Japan having striven as an electronics-based nation, introducing the transistor and other developments. So impressed by the program, I wanted to do something like that in the future.

Kamihara : Since childhood, I haven't been a type with special abilities. So, like most of the friends around me, I thought I would enter a university and find employment with a company. Looking at my school report card, I found myself rather weak at English . . . but math and science records were acceptable, which encouraged me to go on to a university. Because my father was a high school teacher, I wanted to follow suit. So, upon graduation, I took an entrance exam for Tokyo Gakugei University – the result was a total failure. During one year of preparing for the next chance, I frequented the home of my high school physics teacher when he recommended several physics-oriented introductory books like an introduction to the theory of relativity, which intrigued me. Then I was admitted into the present department the following year. Since then to date I have simply focused on challenges just before my eyes, going along the stream of things. I'm not a type with great ambition.

Tanabe : So was my case. I was so weak at the Japanese language that I had to choose the science course in college.

Kamihara : Ancient Japanese literature was interesting as far as its content, but I never became inclined to memorize what was written. After having escaped from all my weaknesses, I now find myself working in this course.

MC : Both of you left strong fields after having eliminated weak fields, right?

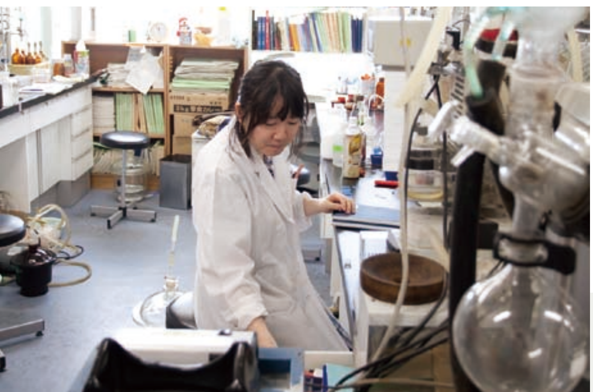
Kamihara : Well, to be exact, it's a field where I could be "competitive" with others, rather than a "strong" field.

Saikawa : To tell you the truth, I used to definitely be a liberal arts type student. I loved and was good at subjects like the Japanese language and music. I didn't like math and science so much. At home we often ate mountain vegetables. They might have been roadside grass. My eyes gradually opened to plants and the world of nature as I referred to an illustrated book of flora as to their classification and to check whether they were edible or not. I liked doing so and it was a necessity of life.

In the autumn of high school sophomore year, I had to choose which course to take, liberal arts or science. By that time, I was not so good at the Japanese language. I particularly disliked the ambiguity associated with questions like "Describe the author's thought or feelings." The teacher would give me an NG (X) mark to my answer but I couldn't understand why. Conversely, subjects such as chemistry and biology appealed to me as they used clear-cut approaches like "The constituents of this plant are so and so." So I suddenly decided to change my course from liberal arts to science. It was the catalyst for shifting my career to this side.

I seem to be an inquisitive type by nature, asking myself "What is this plant?", "What constituents is this made of?", "Is this edible?", "When does this plant grow?" and other questions. But basically I'm a liberal arts type person in the way of thinking. This sometimes makes me regret my course change when I talk with persons who have come straight through scientific pursuit.

MC : Well, each one of you has his or her own individuality. With these teachers credited with outstanding achievements, we're sure your students can foster hopes for a bright future. Thank you very much for your time and precious remarks. Newly arriving at your posts or just returning from overseas study, you must be highly motivated. We sincerely hope your research activities will develop greatly and produce superb results.



For the full text of this interview, please refer to:

http://www.st.keio.ac.jp/kyurizukai

私の本棚 My favorite books

The front cover photo shows the three featured assistant professors with books in their hands as recommend reading for you. Their comments on each of these books are given below.
***All books are written in Japanese.**

Mr. Tanabe's recommendation:

"The Basics of Technical English You Should Master"

(Richard Cowell, Yo Kinka; Corona Co., Ltd., publisher)

While most how-to books on English writing stress grammatically correct English, this book emphasizes English writing that gives a professional impression. It's full of natural English expressions, which is extremely useful. I strongly recommend this book to graduate students who have written their theses in English before. By comparing your writing with the examples in the book, I'm sure you'll understand what natural English expressions are like. The content is easily understandable by undergraduates and even high school students.

Ms. Saikawa's recommendation:

"New Course of Experimental Chemistry"

(Compiled by Chemical Society of Japan; Maruzen Co., Ltd., publisher)

A number of series of this line have been published so far. But this green-covered series, the oldest I own, are rich in content, which I find very useful. As a true source of wisdom it has inspired so many of us at our laboratory over the years.

"Night on The Milky Way Train"

(Authored by Kenji Miyazawa; Shueisha Co., Ltd., publisher)

I like the author Kenji Miyazawa's view of the world. The excitement of traveling to the imaginable possible extraterrestrial world, the unique culture you encounter there, and the strange rules you instinctively feel obliged to follow . . . all these fresh surprises and discoveries otherwise unobtainable have much in common with your mindset when accepting a new research challenge.

Mr. Kamihara's recommendation:

"Actual Powder X-ray diffraction analysis"

(Compiled by Izumi Nakai and Fujio Izumi; Asakura Shoten Co., Ltd., publisher)

This is a good textbook on the method of determining structures of unknown crystals by means of X-ray Bragg reflection. Though it's a textbook, it's practical enough as a reading for active researchers as it covers from basic principles to the latest in technology. It's no exaggeration to say that my scientific pursuit would be nothing without this technology.

"Gin tama (1)" (Hideaki Sorachi; Shueisha Inc., publisher)

This is a gag manga book. The stage is the city of Edo (old name of Tokyo) whose level of technology far exceeds that of today as a result of invasion by extraterrestrials. Main characters are the leading figures in the closing days of the Tokugawa shogunate regime. As a book for relaxation it is valuable especially when we are frustrated with troubles, either business or private. I like Taizo Hasegawa and/or Madao.

Editor's postscript

Summer has come to the hills of Yagami. Thanks to your support and favorable reception since the inaugural issue, the "New Kyurizukai" has entered its second year. We plan to publish three issues again for the current school year.

The current issue featured three assistant professors, the content of which is so rich and plentiful that it can hardly fit in the 8-page space. The key word is the "Fresh Three" assistant professors, of whom two are newly appointed and one is just back from overseas study. Interviews were conducted in the form of a round table. Though there were some differences in their approaches to research and ways of thinking, they shared the same aspirations for research beyond such differences, which was a new discovery.

From the next issue on, each issue will feature one researcher. An international-minded associate professor will be featured in Issue 5. Please look forward to our bulletin!

(Saori Taira)

Science and Technology Information

Guest Professor Kazuyo Sejima honored with the Pritzker Architecture Prize

In May 2010, Guest Professor Kazuyo Sejima of Department of System Design Engineering, Faculty of Science and Technology, was honored with the Pritzker Architecture Prize together with Mr. Ryue Nishizawa, a leading architect. This prestigious prize is popularly known as the "Nobel Prize of the architectural world." Ms. Sejima became the fourth Japanese winner of this prize, following Mr. Kenzo Tange (1987), Mr. Fumihiko Maki (1993) and Mr. Tadao Ando (1995).

The Keio Photonics Research Institute (KPRI) Established

http://kpri.keio.ac.jp/

Keio University

In April 2010, the Keio Photonics Research Institute (KPRI) was established as a laboratory affiliated with Keio University's Faculty and Graduate School of Science and Technology. Headed by Professor Yasuhiro Koike of the Department of Applied Physics and Physico-Informatics, the objective of the KPRI is to carry through research on the "Creation of Face-to-Face Communication Industry by Ultra High-Speed Plastic Optical Fiber and Photonics Polymers for High-Resolution and Large-Size Display" – a project under the Cabinet Office-initiated "Funding Program for World-Leading Innovative R&D on Science and Technology (FIRST) FOR 2009." We would like to call your attention to activities of the KPRI.

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