談話室（海外研究体験記）

**PhD in Japan :
A Memorable Adventurous
Journey**

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**PhD Journey in Japan : A Memorable
Adventurous Journey**

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After being graduated from a Master's program in Materials Science and Engineering in Europe, I was thinking about what I would do afterward because I have two interests, namely Materials Science and Science Policy. Hence, I took some opportunities to gain hands-on experiences to decide which field I am more interested in. I was working as a research assistant at the Physics Department of Bandung Institute of Technology, Indonesia and became a teacher of Natural Science for junior and senior high school students. I also did a part-time job as a social researcher assistant in a non-government organization to arrange some programs aimed at leveraging the economy level based on women empowerment. After working as a social research assistant, I was thinking that I am more interested in Materials Science.

I aimed to gain the skills that I have learned during my Master's program, namely utilizing synchrotron radiation

that I thought as a robust facility by which I can investigate and understand the small world of materials in a very precise way. I was looking for PhD opportunities around the world. I am kind of an adventurer so a new place except Europe would give me a wonderful experience. It was around 2.5 years of PhD hunting during which I kept looking for interesting research groups to join. Frankly, that time I was not quite sure about what particular-field that I am genuinely interested in. Therefore, I thought the quite long PhD hunting period gave me enough time to assure myself about what I am truly passionate about. My work as a research assistant gave me a clue about the specific field that I would like to focus on. I had changed my interest from what I have performed in my master thesis, namely from the investigation of relationships between device properties with macroscopic structures into smaller scale, that is microscopic structures.

One day, a friend of mine posted open PhD positions within National Institute for Materials Science (NIMS) graduate assistantship scheme on her social media. I have known NIMS years ago from a lecturer of mine and had been informed that NIMS is a well-equipped research institute. Within the scheme, there are university partners including Kyushu University, University of Tsukuba, and Hokkaido University. The scheme allows the candidates to

Fig. 1. (color online). Enjoying the beauty of the sakura trees corridor and the view from the summit of Mt. Oiwa.

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earn the PhD degree from the partner universities by working part-time (28 hours a week) at NIMS so that they can receive a monthly stipend.

I was interested in joining the research group of Professor Yoshiyuki Yamashita who is affiliated with Kyushu University and has special access to perform experiments at synchrotron radiation facilities. After discussing the research plans, we agreed on the investigation of electrical properties with the electronic states of SiC-based power devices.

To be selected as PhD candidates, there were both administration and interview selections. I was fortunate to pass the administration selection so that I was invited to come to Japan for two interviews, namely at NIMS and Kyushu University. In February 2017, I arrived in Japan for the first time. I was picked in the hotel where I stayed by Professor Yoshiyuki Yamashita and we had discussion prior to the interview at NIMS. After the discussion, he also warmly introduced me to his kind-hearted wife and his smart daughter by having dinner together.

During the first interview at NIMS, almost all researchers affiliated with Kyushu University attended as the judges. I was informed directly on the same day that I passed that interview and even until now, I still remember how happy I was. The judges did not only give me questions but also constructive advice to improve my interview at Kyushu University which turned out to be one of the biggest presentations ever in my life that time. There were around 30 professors who were experts in their fields ready to ask me with a number of critical questions. Shortly, I was fortunate to get accepted and I started the first day of my PhD life at the end of April 2017.

My PhD thesis was about the investigation of relationships between electrical properties, electronic states, and atomic structures of $\text{SiO}_2/4\text{H-SiC}$ interfaces. During my PhD, I went to two synchrotron radiation institutes in Japan, namely SPring-8 and Aichi Synchrotron Radiation Center. I am proud of my achievements to be able to unveil the effect of fabrication parameters on the electronic states of interface structures and interfacial atomic structures with high accuracy. Moreover, I also performed x-ray photoelectron diffraction (both the experiment and simulation) for 4H-SiC, $\text{SiO}_2/4\text{H-SiC}$, and GaN substrates at NIMS.

The fact that I was enrolled in Materials Physics and Chemistry Department of Kyushu University required me

to compile a research proposal that has no overlap with neither my own PhD research nor the past researchers that I have ever performed. Although the subject was hard, I think that the subject is very fruitful for the students' future since researchers would need to compile a research proposal to obtain the research funding. In the end, I could publish 2 scientific papers and attended a couple of conferences as an oral speaker and symposiums as a poster presenter. To me, my PhD study was a big journey during which I could push my self-limit to the fullest. I deeply learned so many things and enjoyed the beauty and mystery of Materials Science.

My life in Japan was not only about study and research. I had a great time exploring the country and did a lot of activities. Since I live in Tsukuba, which is a very international city, I know a lot of international friends. I had a lot of activities, such as cooking and eating parties, traveled together, and some dancing with a lot of new friends. I had learned Japanese and some exercises of Kendo, the first martial art that I have ever experienced in my life. I enjoyed the traditional wrapping "origami" workshop and watched the traditional "kabuki" theatre. Another fun thing that I did was "hanami" with my friends under the beautiful "sakura" trees in spring and cycling around the wonderful ginkgo trees in autumn. I also started doing a new hobby which is hiking. So far, I have hiked Mt. Takao, Mt. Fuji, Mt. Tsukuba, Mt. Hyogo, Mt. Kentoku, Mt. Oiwa, and Mt. Minami-Yatsugatake. One of the best experiences was to go hiking to Mt. Gongen before the sunrise and to pass around 50 cm-wide trail from such height at around the mountain's summit. On the same day, after going down to the mountain hut, I did a long rock-climbing to reach the summit of Mt. Amigasa. Another unforgettable moment was the 12 km Fuji charity fun-run. I was so excited during that day. I saw people with funny costumes, such as Samurai, Doraemon, traditional dance costumes, and many else running together. Well, indeed, there are more adventures that I had in Japan which would be a very long list to share with.

All in all, I had a precious 3 years in my life as a PhD student in Japan. I passed through a lot of unforgettable memories, adventures, and most importantly self-growth, both personally and professionally. I encourage students to enroll in their PhD study in Japan since it is worth a try!