

MERIT Report for long-term overseas stay

Faculty of Engineering, Department of Applied Chemistry, Fujita group
(majoring in supramolecular chemistry, coordination chemistry)

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Host: Karlsruhe Institute of Technology (KIT), Institute of nanotechnology (INT)

Stay period: 1st Apr. 2019 ~ 30th Sep. 2019.



1. Overview of the stay

I stayed at Karlsruhe institute of technology (KIT) which is located in Karlsruhe, the southwest of Germany on the border with France for 6 months. The chance for this stay was given by prof. Makoto Fujita, my supervisor in UT, at the international conference (International Conference of Coordination Chemistry) held on August, 2018. I was supervised for the 6 months by prof. Mario Ruben and worked at Ruben group*¹ about molecular magnetics, surface analysis related to supramolecular chemistry. The cost of this stay was covered by a research grant for short-term stay provided by DAAD*².



Fig. 1 The site of Karlsruhe
(reference: <https://genealogy.org.il/>)

*1 Ruben Group: <http://www.ruben-group.de/home.html>

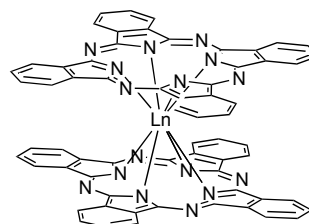
*2 DAAD; Deutscher Akademischer Austauschdienst – Research Grants (Short-Term Grants)

Provided money : €1,200/month + travel costs

2. Research

The structure of supramolecular metal-peptide complex (Ag^{I} ion is especially used) possesses a high symmetry and chirality. When the metal ion is displaced with the other metal ions with quantum spin, the supramolecular complex can become a chiral molecular magnet, which would lead to the outcome of that quantum spin chirality can be controlled by structural chirality. However, the coordinative structure differs from metal ions to metal ions, therefore, the structurally similar complex cannot be obtained straightforwardly. In this research, I searched for the new synthesis of lanthanide ion (III) based supramolecular complexes along with learning the knowledge on lanthanide ion (III) complexes created by Ruben group.

Then, I focused on the complexation and crystallization experiments of lanthanide-peptide complex from the peptide ligands



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that I brought from Japan. In parallel, I learned the synthetic methods of bis(phthalocyaninato)lanthanide complexes (**1**; chemical structure is shown in previous page).

3. Life with Ruben group members

The laboratory of Ruben group was located in the Campus North of KIT, which is 12 km far from my living city center of Karlsruhe. It was possible to commute by a bus or a tram train, but I chose to commute by a bicycle because I would like to save time (saved 20 mins for every morning and every evening!), to reduce the mental stress from hectic morning, and to exercise my body.

The international members of Ruben group were from Russia, India, China, Panama, Ethiopia, Germany and Japan. We spoke in English as a second language about our cultural difference, and what is better, we took care of each other so nicely. I could talk about myself in English and also could listen to the different cultures and customs. It was really comfortable for me to stay with them.

In particular, to experience the several entertainments with the international members was one of the most interesting activities in my life there. We played the board game at the house of Panamanian couple. We enjoyed “Bier Pong” game, a popular party game in Germany, in a birthday party hosted by a German friend of mine. I think that such a band between us was build up tightly due to the internationality and carefulness of each other.



Fig. 2 International group members (in fact, I also interacted with other members in the institutes.)

4. Other activities

I also spent energetic days in Germany other than research. On weekends, I joined in the factory tour of Mercedes-Benz in Stuttgart hosted by the international office of KIT. I also interacted with the Japanese people staying in Karlsruhe and other German students. The most impressive thing was a visit to memorial and museum of Auschwitz-Birkenau in the south of Poland because I have been interested in the history of World War II since my childhood. (The exhibition of killed people’s belongings and hairs was shocking for me.)

5. Acknowledgement

I would like to thank Prof. Makoto Fujita for this chance, Prof. Mario Ruben, Dr. Svetlana Kyatskaya for supervising, Dr. Yuya Domoto, Dr. Tomohisa Sawada for advices on research, and specially thank Dr. Asato Mizuno for every help.