

## Long-term Overseas Dispatch

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I had been in Groningen, the Netherlands, from 11<sup>th</sup> of January to 10<sup>th</sup> of March. I studied at the University of Groningen for 2 months under supervision of Professor Ben L. Feringa. He have been developed catalytic asymmetric reactions with transition metal catalyst and photo- and thermo-sensitive molecular motors and so on.

I had tried to develop new chiral organocatalysts in his laboratory. Previously, his group reported phosphoramidite ligands as powerful chiral mono-dentate ligands for asymmetric reactions. This time, I was interested in phosphoramidates, related compounds as a phosphoramidites, as a new class of organocatalyst, and I tried to find a possibility of the catalyst. The research itself is very simple. I designed a structure of phosphoramidate catalyst and synthesized it. Then, I evaluated the ability of the catalyst in catalytic asymmetric reactions. In my research, I synthesized several catalysts. Fortunately, some catalysts shows the possibility of the chiral organocatalysts and one of them gave a desired compound with moderate enantioselectivity.

Here, I will write different points from Japan. First of all, working time is limited from 8:30 to 20:00. If I want to work after 8pm, I need to submit a paper to the department. This short working time make me be confused. Especially, I had stayed there only for 2 months and I could not waste time. Thus, I considered and checked my research too much before starting my experiments. This working style is completely different from my style in Japan, but it is very nice experience for me. Next, I felt many experimental glasswares and analytical machine was different from our laboratory in Japan. Especially, some glasswares were not used in Japan and I needed to understand how to use it. In addition, glasswares that I was familiar with in Japan was used different way compared to Japan. Thus, I was a little confused in first few weeks. And I found many analytical machines was

automatic. Thus, it was very easy to analyze samples overnight. I felt it was very convenient and nice to work efficiently. As other points I found were that they had coffee break twice a day, a party was held on every Friday in a building of chemistry and so on. I think they can do two things with good balance: efficient development of the research and enjoying their life fully.

An atmosphere of the group is very friendly. We always went to a lunch with other group people and they gave me some interesting information about life in Groningen. In Feringa's laboratory, we have two meetings: group meeting and sub-group meeting. In both meeting, they gave many ideas to presenter and it could expand the possibility of the research. In addition, the discussion is not limited to the group meeting and sub-group meeting. When they had a good idea, they said their opinion even in lunch and coffee break. I felt they are interested in the topics that was held by others so much and they cultivated themselves by many discussions.

Finally, I will write about a life in Groningen. Groningen is located at north part of the Netherlands, and it is very cold even in March. In addition, sunrise of there is at 9am in middle of January. These things make me feel to go abroad and very interesting for me. There are many students in Groningen, and many people used a bicycle as means of transportation. The city have a road for bicycles in almost all road and it is very good and safe to ride a bicycle in the city. In addition, a market was held several times a week near the city center and I could buy cheap and nice vegetables, meats and cheeses. In the market, I found several shops to sell foods that can eat immediately, and I also enjoyed such kind of foods. It is very interesting and fascinating for me to live in Groningen.

I would like to say thanks to Professor Ben L. Feringa to give me a good opportunity to join his group and to do chemistry. And thanks to Feringa's laboratory members to support me how to live in the Netherlands and to teach me how to do research. I appreciate Professor Kobayashi and Nakamura to give me a chance to learn chemistry outside Japan. Thanks to all MERIT members to support my stay in Groningen.