

MERIT Long-term Overseas dispatch

Dept. Materials Engineering, MERIT 7th
Miyata laboratory, Rimpei Kamegawa

Host: University of Toronto, Dept. Materials Science & Engineering, Naomi Matsuura lab.

Period: Feb. 11, 2020 – Mar. 9, 2020.

Abstract

I stayed at the Matsuura lab in University of Toronto in Toronto, Canada (north of Lake Ontario) from February 11th to March 9th to do a collaborative research. The department that I belong to has a long history of interaction with University of Toronto, and the both departments have been talking about the more deep interaction by accepting exchange students each other. Although Miyata lab that I belong to has not had strong connection with Matsuura lab in University of Toronto, but both labs have been doing researches on drug delivery systems. Therefore, I thought this was a good opportunity to begin a collaborative research. For this overseas dispatch, I applied in advance to an overseas training program hosted by the Graduate School of Engineering, and I successfully got a support money for the study abroad, so I used the support money for travel and stay expenses.

Research

The Matsuura laboratory is studying a drug delivery system that delivers drugs selectively to disease sites by loading drugs inside microbubbles and breaking down the microbubbles by irradiating ultrasonic waves at the diseased sites. Until now, only hydrophobic drug encapsulation has been realized due to restrictions on preparation conditions. Therefore, I hypothesized based on the discussion with prof. Matsuura that hydrophilic molecules can be loaded in the microbubbles by loading hydrophilic molecules in a silica nanogel particle, a material which I use for my research in my lab, misciblizing it in a nonpolar solvent using surfactants, and finally preparing microbubbles using the suspension. To check whether my hypothesis can be realized, I spent my stay in University of Toronto on the optimization of the conditions. Also, I had an opportunity to present my research that I am doing in my lab to prof. Naguib and prof. Hatton, who are also in in the department of materials science & engineering, as well as prof. Matsuura, and they kindly gave me various questions and comments. I sometimes had difficulty in doing the research, such as a lot of parameters that I had to consider to optimize the

conditions. However, I finally obtained the data that motivate me to do the additional experiments.

Daily life in Toronto

Because it is much colder in Toronto than in Tokyo in winter, I prepared a lot to survive a severe cold in Toronto. As expected, I experienced the severe cold that I have never experienced and it snowed heavily in many days. However, thanks to the perfect preparation, I safely enjoyed the daily lives in Toronto. Also, Toronto is the biggest city in Canada, and University of Toronto is located in the downtown. You might expect that it costs a lot to stay in a place close to the university. However, I was able to reduce the accommodation fees by staying a private room through the service called Airbnb. At the same time, it enabled me to enjoy cooking and eating local dishes.

People in Canada have different backgrounds and they accept and enjoy the differences. I was impressed by the situation in which students in Matsuura lab talked about their background languages and they tried to learn the foreign languages during dinner time. The stay was first time for me to live in a foreign country for a relatively longer time, so having such a time inspired me to visit various countries and have opportunity to enjoy the local culture deeply in the future.

Acknowledgement

I would like to express my thanks to Prof. Naomi Matsuura for accepting me to stay in her lab, Prof. Naguib and Prof. Hatton for supporting my research life in university of Toronto, Prof. Miyata for giving this opportunity to study abroad, Mr. Matt Chen for helping a lot me to do the experiments, and the students in Matsuura lab for welcoming me.

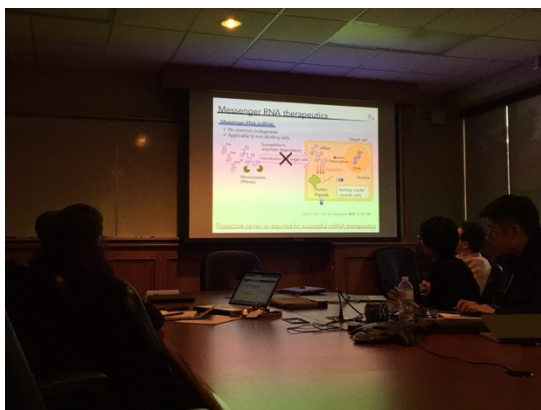


Figure 1 Research presentation to professors.



Figure 2 University of Toronto after heavy snow