

宇宙地球フロンティア実地研修 報告書

Report for Onsite Training in Earth-Space Frontier Science

氏名/Name	Wei Lu
所属部局/ Affiliation	理学系研究科 化学専攻 Department of Chemistry, Graduate School of Science
研究機関・企業名 /Hosting Institution	九州大学 農学研究院 生命機能科学部門 生物機能分子化学講座 生物化学分野 Laboratory of Biological Chemistry Department of Bioscience and Biotechnology, Graduate School of Bioresource and Bioenvironmental Sciences, Kyushu University
期間/Period	2022年8月22日 ~ 2022年9月4日 *西暦で記入 8/22/2022 ~ 9/4/2022 mm/dd/yyyy

My research project in IGPEES program is to artificially evolve ribozymes that catalyze acylation reaction. By researching these ribozymes conjugating RNA and amino acids together, we can have a more detailed vision of the proposed 'RNA world', in the early stage of life.

In my previous research, I have already got a series of ribozymes that catalyze self-acylation. To further understand their structure, as an onsite training of the Earth-Space Frontier Science, I participated in two-week joint research with Professor Tomoyuki Numata in Kyushu University. The lab where Professor Numata affiliates focused on resolving crystal structure of DNA/RNA binding proteins. In there, Professor Numata specially experts in the structure analysis of nucleotides.

In the two weeks joint research internship at Kyushu University, I first learnt the basics of crystal structure using X-ray and Cyro EM analysis to decipher the structure of bio molecules. Then, I went on to the actual experiments of crystallization my own ribozyme. I followed the procedure of first *in vitro* transcription of the RNA, then purification by AKTA, concentration the fraction containing ideal RNAs, and finally mix the RNA solution with reservoir solution for crystallization. With the help of the Mosquito crystal robot, I was able to set several thousand of conditions to screen for the best for my ribozyme to crystallize.

Due to the short time span of two-week joint research, I could only observe some crystal of salts from the reservoir solution, but still could not observe my ribozyme crystallize before I left. Professor Numata and his lab members will help me with the following observation of crystallization and we will keep in touch if there are any updates.

(A)



(B)



(C)



Figure (A) The mosquito crystal robot for mixing the RNA solution and reservoir solution together to make a sitting drop for crystallization. (B) The microscope to observe the crystallization condition and (C) the crystal of magnesium phosphate I found in my condition screening.