

Research Report

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I visited the laboratory of Professor Simon J. Clarke at the University of Oxford (Clarke Group) as a short-time visiting student and conducted research from 30th January 2025 to 3rd March 2025. This visit was supported by the project "Next Generation Mixed-Anion Science: Reaction/Structure Control and New Functions" under the ASPIRE for the Top Scientists program (provided by Japan Science and Technology Agency (JST)).

In Oxford, I worked on the synthesis of a new mixed anion compound under the guidance of Prof. Clarke. Much of the work in the Clarke Group focuses on layered oxide chalcogenide and oxide pnictide solids, and since I always refer to their work for my research, I decided to join their Group. The theme there was very challenging, as that type of mixed anion compound was rarely previously reported. While my main synthesis method in Kageyama Group was high pressure synthesis, in Clarke Group I mostly used conventional solid-state synthesis and gas flow synthesis. Eventually, some positive results were obtained without the precursors being decomposed, which I had worried about. Now, I plan to continue this theme at the Kageyama Group, starting with the setup of the experimental apparatus. I will keep in touch to work with Clarke Group on this study. I also had a great discussion with Prof. Clarke regarding a paper manuscript I am currently writing on certain mixed anion compound. I learned a lot from his guidance on how to write a good paper and what to write. I will continue to communicate with Prof. Clarke about this as well and plan to submit my paper to a journal in May of this year.

Many students and postdoctoral researchers from all over the world work in the Inorganic Chemistry Laboratory at the University of Oxford, and the days I spent there were very stimulating and fulfilling. My research life in Oxford was to start the reaction in the morning and to finish it just before going home. Next day the powder diffraction was measured, and I decided on the next experimental plan. Occasionally I walked around the streets in Oxford or talked with the members. Unlike Japanese students, many overseas students go on to doctoral programs, and it was very useful and meaningful to hear about their life plans as well as their research, and to discuss the research situation in many countries with them. Also, unlike Japanese universities where each laboratory owns its own equipment, Oxford University's inoraganic chemical laboratories as a whole share equipment, so I thought that the speed of research progresses is different. I also felt that the level of safety awareness was more advanced than in Japan. I am sure that these experiences will be a great asset in my life. My visit would not have been possible without the help of Prof. Clarke and every member of the Clarke Group (Figure 1). I am grateful to them. Especially, Dr. Smyth taught me many things, such as how to use the experimental apparatus and how to analyze experimental data (Figure 2). I was able to communicate not only with Clarke Group but also with Hayward Group and others.

I learned the joy of doing research while interacting with people from all over the world at an overseas research institute, although this time was only a month long. Many researchers will visit Kageyama Group in the future through the ASPIRE project, so I will use this experience to actively interact with them. Finally, I would like to thank everyone who worked for me with this opportunity, including Prof. Kageyama, Prof. Clarke and the secretaries (Ms. Aoki, Ms. Nojiri and Ms. Taguchi).



Figure 1. Clarke Group and me



Figure 2. Dr. Smyth and me



