Short report for JSPS London

Mr. Marcus Gallagher-Jones

Molecular Biophysics group
Institute of Integrative Biology
University of Liverpool
Liverpool, Merseyside, UK

marcusgj@liv.ac.uk

During the course of my PhD I was lucky enough to be awarded a joint scholarship between UoL and RIKEN. For two years of this I was based within the Imaging Development team under the guidance of Dr. Changyong Song at the RIKEN Harima Spring8 centre. During this time I helped to develop new imaging techniques for the biological sciences using coherent x-rays.

By the end of my two years I was just getting to the point where I had a strong enough grasp of the research field to feel I could make some serious contributions, however I had to return to the UK before any of my new ideas could be acted upon. The award of a Short-term fellowship from JSPS provided me with the opportunity to both carry out some of the experimental ideas I continued to develop in the UK and also strengthen the ties between research groups at RIKEN and the UoL.

The research I performed involved the development of methodologies for performing Coherent Diffractive Imaging (CDI), a lens-less microscopy technique that employs coherent x-rays, for the study of biological material. CDI can provide nanoscale resolution images of intact, fully hydrated specimens, such as whole cells and organelles, without the need for sectioning or fixation, making it potentially an excellent complimentary tool in the biosciences. However, the technique requires high strength x-rays that are only available at large scale particle accelerators such as synchrotrons. Whilst there are several of these worldwide SPring8 is one of the few with dedicated facilities for performing such experiments.

The award allowed me to return to Japan to perform these experiments but also gave me the extra time needed for sample preparation, testing, and useful discussion with my colleagues before actually carrying them out. This no doubt led to the success of our imaging experiments of fully hydrated, DNA based nanomaterials. From these experiments several data sets have been captured and we hope to gain a greater insight into these materials formation and organisation.

Some advice:

- Engage in discussions with people around you as much as you can. It is a great opportunity to learn from people with different backgrounds to your own.

- Work hard, it is well appreciated, but don't try and emulate the working hours of your Japanese colleagues. The culture of long hours is not expected of you, measure your performance by results, not hours in the lab.
- Do learn some Japanese. If you are working outside of city areas, it is essential. Some basic greetings and knowledge of Kanji will go a long way.
- Make the most of free time when you get it.
- Don't just visit Tokyo.
- Don't be afraid to ask questions! It can seem a little daunting at times and you'll likely feel lost and/or isolated. People are usually very helpful and conscientious so don't worry, just ask.

Myself (Far left) with Dr. Changyong Song (centre) and the rest of the Imaging Development team.

Views from the SPring8 facility on a rainy day.