

Experience as a Short-Term JSPS Fellow

by Alex Malins

Current Position: PhD Student, Bristol Centre for Complexity Sciences, University of Bristol

Host Institution: Institute of Industrial Science, University of Tokyo

Host Researcher: Professor Hajime Tanaka

Fellowship Period: August 2010 to January 2011 (6 Months)

A. The Research Project

I landed at Tokyo's Narita airport and felt a warm feeling of nostalgia as I entered the arrivals hall to be surrounded once again by the crowds, the Kanji and the Kana. This was in fact my fourth visit to Japan to conduct research in a Japanese laboratory. Of the previous three trips, each lasting for a month, two had occurred over the previous two years of my PhD and one was whilst studying for my Masters degree in the same field.

I had come to study something on display all around at the airport: *glass*. Glass remains a bit of a puzzle to scientists. Broadly speaking when a liquid is cooled below its freezing point one of two things can happen. It can either crystallize, where the molecules arrange themselves into a structure of simple, repeating patterns. Or if cooled quickly enough, it can form a glass, where the structure of the molecules looks at first glance to be the same as the liquid, but the molecules can no longer flow around themselves like a normal liquid - the molecules suddenly become fixed to the spot in a seemingly random configuration. However it is not known how to best describe the glass transition theoretically and there are many competing theories. Some have even commented that the possible theories outnumber the theorists proposing them [1].

I was hosted by Professor Hajime Tanaka at the Institute of Industrial Science at the University of Tokyo. Our research proposal was submitted to study the relationship between the motions of molecules in a supercooled liquid before the glass transition occurs and the microscopic structure of the liquid. The research helps us select the theories which best describe the glass transition. It involved me first writing a computer simulation of a liquid which forms a glass, and then studying the structure using a tool first developed by a collaborator in Australia [2]. Meanwhile I was drawing upon the help and expertise of students and researchers of the Tanaka lab who also study the microscopic structure of glasses both in experiments and simulations, as well as supervision from Prof. Tanaka himself.

B. Research in Japan

It was nice to arrive in Japan and on almost the first day sit down, log into the computer, and begin research straight away. However as general advice to fellows arriving at their host institutions for the first time it seems worthwhile to mention the following points.

Before departing the UK it is worth checking that the host institution will be able to provide any software or equipment you will need for your research in an English language version. At a basic level it's nice to have a English spell checker, but more vital is having the software you need displaying its menus and manuals in English.

Also it is worthwhile checking that the equipment you need for your project is available. I believe most of the JSPS fellowships provide a research allowance which can be used for equipment hire and for purchase of consumables to be used for research activities. The scope of the allowance extends to research publishing costs and for anyone generating lots of data, hard-disk drives count as consumables within the rules of the allowance.

One of the things I most enjoyed about working in Prof. Tanaka's laboratory was how sociable all the lab members are. Everyday work would stop at 12:30pm and everyone would go down to the canteen together to eat lunch. This was a great time to discuss research, but more generally what was happening on campus, festivals in Tokyo, and goings on further afield.

C. Life in Japan

One of the things I most enjoy about life in Japan is how many differences there are with day-to-day life in England. Everyday I would wake up with a childish excitement for something new, colourful and different was probably going to happen. A big barrier at all times is the Japanese language. There are no bones about it - speaking, listening, writing and reading in Japanese is a difficult task at whatever level. For those interesting in learning it is worth asking your host institution if they offer any tuition. The University of Tokyo do, it is free and it is often under-subscribed.

Everyone talks about the undoubted brilliance of the Japanese train and subway systems, but less well referenced is how great things are for cyclists in Japan. I commuted everyday to University on my road bike which I brought with me from England (Tip: if you speak to JSPS's travel agents, they can book you a flight with Virgin Atlantic who will let you take a bike as sports equipment baggage for no additional charge). It might seem daunting taking to the road in Japan, but many things are actually on your side. Cyclists (and their bicycles) are in general well-respected but for obvious reasons navigation can be challenging at times. Have fun and stay safe.

I am grateful to Prof. Tanaka for hosting me in his laboratory. His support and that of the members of his laboratory has helped me progress with my PhD, and understand why glass proves such a mystery to physicists. I acknowledge the financial support of the JSPS to this research project. When I'm sitting in the departures lounge of Narita airport waiting for my flight to return home, I'm sure I'll have a warm feeling about my time spent in Japan. It has been both productive scientifically and enjoyable personally.

[1] The Nature of Glass Remains Anything but Clear, NYTimes.com -

http://www.nytimes.com/2008/07/29/science/29glass.html?_r=1

[2] Topological Classification of Clusters, Stephen R. Williams - <http://arxiv.org/abs/0705.0203>



My possessions and bicycle making their way from the airport into Tokyo



The Tanaka Laboratory and some aspiring researchers

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