

Vol.6 Dr Nicholas Ekins-Daukes



Ned and family at Inuyama Castle, Aichi-ken.

Dr Nicholas Ekins-Daukes

Reader in Solid State Physics, Royal Society Industry Fellow,
Imperial College London

Biography

1991-1995 BSc Physics & Electronics, University of St Andrews

1995-1996 MSc and PhD Semiconductor Physics, Imperial College London

1999-2003 Research Associate, Imperial College London

2003-2005 JSPS Fellow at Toyota Technological Institute

2005-2007 Lecturer in Physics at the University of Sydney

2008-2010 Lecturer, Imperial College London

2010-2016 Senior Lecturer in Physics, Imperial College London

2016- Reader in Solid State Physics and Royal Society Industry Fellow, Imperial College London

JSPS Concerning

• 2003-2005 JSPS Postdoctoral Fellowship (Standard)

This time, Dr Nicholas Ekins-Daukes reports on his experience of being a JSPS Fellow. His 2 years in Japan was scientifically very productive. He tells us about plenty of aspects as to how doing research in Japan can be successful as well as how he enjoyed his private life in Japan with his family!

My first realisation that Japan might be an interesting place to visit came to me early in life. As a young boy I was fascinated by electronics and would take broken radios apart and reuse the parts for my own projects. The label "Made in Japan" usually meant the electronics would be ingeniously designed, carefully constructed and often using valuable components. I could periodically justify my hobby to my non-technical parents by repairing electronic appliances, but they had an understandable fear that I would one day set the house on fire with my activities. As a consequence I was forbidden from working on any electrical items that were powered from the mains. This meant that much of my meagre income was spent on batteries, until one day I noticed that the local electronics shop had a small solar panel for sale. Several weeks of battery budget was spent on this panel and I was delighted to find I could power some, but not all of my electronic gadgets using nothing but the power of the sun. This early experience with solar energy and a concern for preserving the environment, took me on a circuitous journey that eventually led me to work as a JSPS research fellow at the

Toyota Technological Institute in Nagoya.

My PhD research involved applying nanotechnology to highly efficient solar cells and I was remarkably fortunate to have the opportunity to participate in a Monbusho exchange project with the Toyota Technological Institute, led by Professor Masafumi Yamaguchi. He had pioneered several photovoltaic technologies and in the late 1990s his group was setting world records for solar cell efficiency. The research visit was fascinating and I quickly realised that although the Toyota Technological Institute is affiliated to Toyota, it operates as an open, technical university, graduating students and operating research groups. Many of the researchers working at the institute had been seconded by their respective companies to work on a joint project either with the institute staff or with other companies who had also embedded staff at the institute. The result was a vibrant research environment that blended student training, academic scholarship and industrial research unlike anywhere I had seen, then or since.

On my return to London I subsequently met my future wife thanks to the two of us realising we both spoke some Japanese; my wife learning hers at school in Australia and I having memorised stock phrases from a 'Teach yourself Japanese' tape and several weeks of practice in Japan. The benefits of learning even a few words of a new language should never be underestimated!

After my PhD, working in London and happily married, my wife and I decided that it would be interesting to spend some time in Japan. I applied to the long-term JSPS fellowship scheme to return to the Toyota Technological Institute and was lucky to be given the opportunity, this time with my wife and baby daughter who had just been born.

We rented a small ground floor apartment a few kilometres from the Institute on what was then, the edge of town. It was a good choice since there were two play areas nearby and my wife soon made friends with local mothers who brought their children to the park to play. It was a special time for us all and quite by chance my daughter decided to take her first steps in the Meiji Jingu garden during a visit to Tokyo. Of course, there were considerable challenges involved in bringing a baby to Japan, away from the support that close family can give, but the friends we made in Japan were hugely supportive and in public my little daughter could be forgiven for thinking her name was 'Kawaii'. We were regulars at the local bakery and the onigiri shop, which tragically closed after our first year in Japan and was replaced by a Baskin Robbins ice-cream store. To this day my daughter has an appetite for Japanese food and nori in particular, which in England is considered very peculiar, but is easily understood by anyone who has lived in Japan.

At the Toyota Technological Institute research proceeded at a pace which was unimaginable in London. All the equipment we needed was there and the Institute benefited greatly from its industrial partners. Sharp Corporation supplied semiconductor materials, a local steel company had an ambitious project to build a solar concentrating collector, a device that uses lenses to focus sunlight onto small but highly efficient solar cells. My colleagues were magicians. They had an uncanny instinct for finding the solution to problems, working very quickly and efficiently to the solution. My amateur language skill meant I needed help in the lab, although fortunately I was assigned a student to mentor and we made a good team. He could read the instruction manuals while I could contribute experience and insight. My two years as a JSPS fellow were the most

scientifically productive I have ever had and it is interesting to ask why.

The fellowship holds the luxury of shielding you from administrative duties, so it is one of the few times when you can focus entirely on research. However there are other factors. The standard canteen lunch was the healthiest food I have ever eaten and my 20 minute cycle to and from the institute was an important slab of exercise. Our laboratory had a motto, "Be Ambitious!" which was amplified by the superb research environment and well-maintained equipment. One of the most remarkable aspects was how highly performing teams were formed from an ever revolving set of graduate students and visiting researchers. The momentum generated by these teams was one of the thrilling parts of working in Japan. Seemingly impossible obstacles were overcome through a combination of perseverance and ingenuity, together with a fair amount of hard work. The lab had a strong social dimension with regular events, dinners and karaoke. Traditional Japanese ballads were sung by our professors, alongside, J-pop, heavy metal and Beatles songs, and to my astonishment, I discovered the ability entertain the entire lab with 'YMCA'.

After my fellowship I was fortunate to take up a lectureship at the University of Sydney in Australia and then return to Imperial College in London some years later. I have since held several grants with my colleagues in Japan, either directly from Toyota Motor Corporation, as an international collaborator on NEDO projects or through joint EU-Japan cooperative programmes. My family and I owe our friends and colleagues in Japan much for a very happy time during my time as a JSPS fellow. They generously introduced us to their way of life, customs and conventions, many of which remain with us to this day.



Ned in the semiconductor clean room at the Toyota Technological Institute