Mineralogical Society of Great Britain and Ireland
Postgraduate Student Travel Bursary Award

Advanced Light Source, Berkeley, USA, 23rd June – 3rd July

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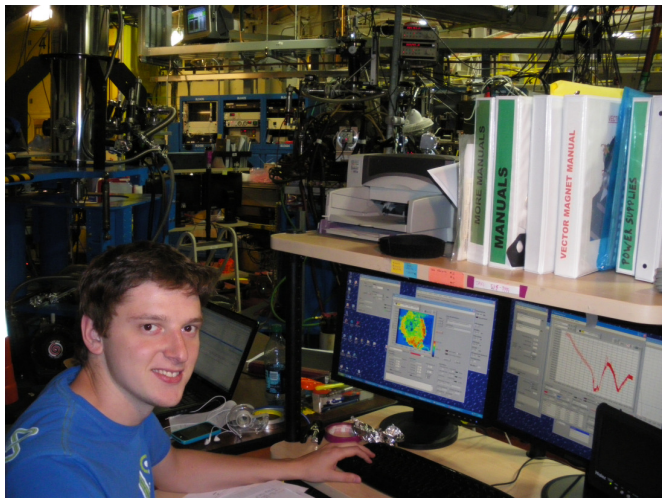
In recent decades, a lot of excitement and speculation has focused on the application of magnetic nanoparticles to many different areas of research, such as targeted cancer therapy and data storage. Magnetic nanoparticles can be produced in a number of different ways, however in my project this is achieved through the bio-reduction of iron (III) bearing minerals by the naturally occurring anaerobic bacteria *Geobacter sulfurreducens*. These micro-organisms have been producing magnetic minerals in the environment for millions of years, however it is only relatively recently that we have begun to exploit their amazing capabilities.

Different applications require different properties of these particles such as size or magnetisation. To understand how to manipulate and tailor the magnetic nanoparticles to specific requirements, a number of different analytical techniques are employed, of which those that probe mineralogical structures are some of the most important. Changes in the structure of these materials involve incorporation of dopants such as cobalt or zinc in place of the iron within the magnetite. A valuable probe of the internal mineralogical changes is the element and site specific information from X-ray magnetic circular dichroism (XMCD) measurements which are derived from X-ray absorption measurements taken in a magnetic field, at international synchrotron facilities such as the Advanced Light Source, Berkeley, USA.



My research group had been awarded six days to measure samples over a period of 24 hours each day in order to maximise the benefit of attending. During that time a number of different samples were investigated including zinc and cobalt doped magnetite. The results obtained were of great importance to my own work, and will contribute to a large section of my final thesis. The ability to measure these properties can only be achieved at synchrotron sources like the ALS, and it is only through the support of grants such as that provided by the Mineralogical society that make this possible.