

Sensing gases with ferromagnetic resonance at the University of Western Australia

For my Master project, I decided to go abroad, more specifically to Australia. My motivation was to do world-class research on a topic in magnetism, use, what I have learnt in my studies and bolster up my English. After a thorough search of the web for groups investigating magnetism in Australia, I found the Spintronics and Magnetisation Dynamics research group at the University of Western Australia in Perth. Prof Mikhail Kostylev group leader of said group was so kind to offer me a project. The group has specialised in ferromagnetic resonance spectroscopy. In ferromagnetic resonance spectroscopy, the naturally occurring resonance in ferromagnetic materials is excited by microwave fields and the absorption of this microwave current is measured. The absorption at resonance condition gives information about the effective saturation magnetisation and the gyromagnetic ratio. The group has developed a method to use the ferromagnetic resonance to sense hydrogen gas by employing a magnetic/non-magnetic metal bilayer system. Upon hydrogenation of the non-magnetic material, the magnetic properties of the magnetic material changes which can be seen in FMR spectra.

Because of the interdisciplinary nature of this project and its environmental value, I was highly motivated to be part of this project. I investigated higher order modes in Ta/Co/Pd trilayer structures and how they react when exposed to hydrogen. For this I produced my own samples with magnetron sputtering, where the (Block-) courses from the Nanoscience Bachelor helped understanding the fabrication process. I learned to handle the sputtering machine, how a FMR setup works and how to tune it to gain the best results. For the evaluation of the data, I could again count on the knowledge gained in various Block-courses.



The iconic Winthrop Hall of the University of Western Australia

The possibility to do the Master project in Australia led also to precious experiences outside of the lab. I met the local fauna and I could do my first attempts at surfing. I was even lucky enough to once pet baby Kangaroos (locally called Joeys) and see wild Dolphins, right at the river flowing through Perth. On the other hand, it gave me the chance to experience what makes two countries so distinctive. I could for example not believe that I would miss Swiss forests, but on the other hand would miss the call of the Australian parrots and Kookaburras once back in Switzerland

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