



EPFL Placement- Armourers & Brasiers

Non-Technical Report

Liam Ives – Queens' College Cambridge

Materials Science was a subject I knew basically nothing about when I came to Cambridge, but soon realised how fascinating a subject it was and how it helps to explain the processes behind everything around us. Having enjoyed the Materials Science laboratory sessions from the first and second years of my degree and having a fascination with how everyday objects are made, I chose to participate in the CaMPUS scheme to gain an insight into whether I would like to continue Materials Science to academia or industry. Before beginning the scheme, I was leaning towards going into industry, but as a result it has given me a convincing argument of the benefits of continuing Materials Science to further study.



The rheometer! If the sample has a 'glass transition', it can draw into fibres (see above).

When deciding where to venture for my summer, I really wanted to go to a French-speaking area. Having studied French all the way from when I was 11 years old to A2 level, I was keen to throw myself into a French-speaking environment. In my experience, the best way to learn a language is to just immerse yourself in the country! I chose to study at the École Polytechnique Fédérale de Lausanne in Switzerland, because not only is it right in the heart



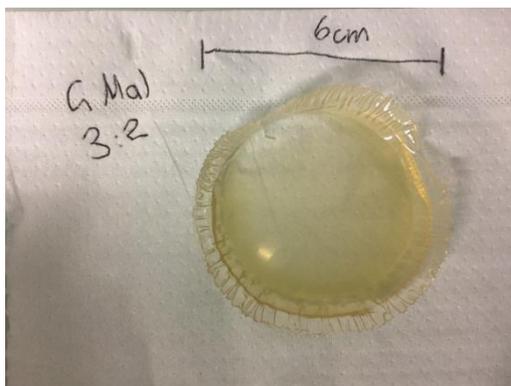
My regular reading and walking spot by Lac Léman, 5 minutes from my first room!

of French-speaking Switzerland, but it is situated right next to Lake Geneva (or Lac Léman), so I was guaranteed breath-taking walks around the lakeside!

When I first got to Switzerland I was incredibly nervous – I'd never been abroad on my own before, there was no-one from Cambridge with me, and at the lab I was the only undergraduate student! I was also worried about my ability to speak French, because I hadn't got the chance to practice since school. However, I shouldn't have been anxious at all, because all of the researchers in the laboratory group could speak English! Although this meant I couldn't try out my French in a work setting, I was able to travel all over the francophone part of Switzerland to practice. Although I don't think my French improved technically I certainly became more confident at speaking it.

The laboratory I worked with was the Supramolecular Nanomaterials and Interfaces Laboratory (SuNMIL), which intrigued me because one of my favourite modules over the last two years was the biomaterials module, and the placement involved working with protein films. Of course, I wasn't sure what to expect when working in a research environment – I was imagining I would be observing experts conducting their work – I had no idea how much independent work I would be doing.

The project I was working with involved testing the rheological properties of films based on proteins such as gelatin and casein (from bovine milk), i.e. how the materials respond to stresses. I was surprised to find that after being given a briefing of the required methods and desired properties, and an introduction to rheology, I was allowed to use whatever I wanted in the laboratory! The project was incredibly relatable, being based on 'food science', so I was working with materials very familiar to me such as gelatin, xylitol, vitamin C and corn protein.

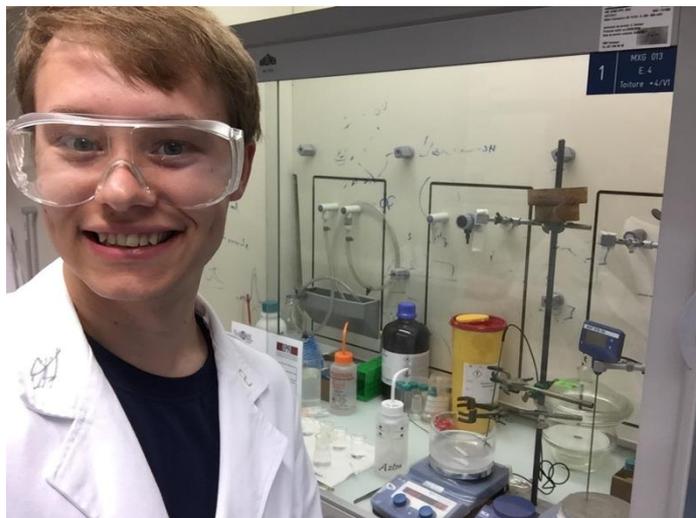


An example of one of the films I produced; this one contains gelatin and maltitol (a sugar).

What struck me was that unlike scheduled laboratory lessons there were no set instructions, no results that I was working towards to demonstrate a theory. I had to do the required research and suggest what could be happening between the molecules in the films, having to plan exactly which samples to test, anticipating results and making plans for further experiments based on results not obtained yet. Due to the fact that some samples took days (or even weeks!) to prepare, I once had around 25 experiments running at the same time! I really appreciated the freedom that the project gave me – I was able to

test out any combination of chemicals that I thought would produce good results. From examining my lab notebook, my notes became more and more detailed, and I worked out exactly which information I needed from my samples. Unlike an undergraduate laboratory session there was no guarantee of any helpful results whatsoever, which of course meant that many of the experiments I conducted felt like no significant progress had been made.

However, an important lesson to learn is that it is essential to know what doesn't work (and why) in order to find out what does!



Pleased to have my own lab space!

In the laboratory itself, I was given a part of the lab (including a fume cupboard) to work on my project and was able to talk to any of the researchers. On any given day, there were up to 10 people working together in the lab from a variety of countries including Greece, China, Italy and the UK. I was very quickly made to feel welcome in the lab: people were willing to stop what they were doing in order to help me find my way around the equipment and supplies, and they would regularly bring back food they'd obtained from travelling around the world to share with the whole lab.

Throughout the weeks of my placement, Switzerland was celebrating many events, such as the Swiss National Day on the 1st August. As part of the celebrations I got to see speeches, sing the National Anthem and watch some beautiful fireworks launched from a boat in Lake Geneva. As well as this, Lausanne opened many of its museums and art galleries for free on the first Saturday of every month.

Overall, the placement has made me more aware of how all of the aspects of science interlink as you approach research level – I was working in a chemistry lab despite not having done it since A level! Finally, I would like to wholeheartedly thank everyone at the SuNMIL laboratory at EPFL, as well as Queens' College and The Worshipful Company of Armourers and Brasiers for the invaluable funding towards the placement, without which my summer would have been far less interesting!



Me destroying a sample of cancerous red blood cells, having been examined in an Atomic Force Microscope.