



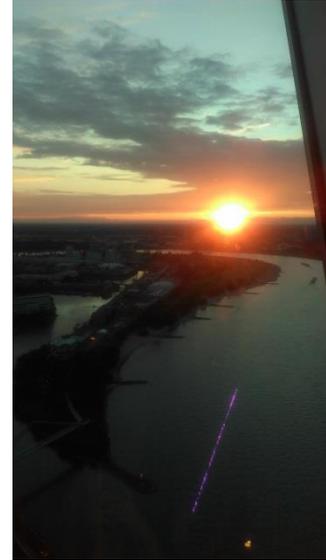
MPIE Summer Placement Non-Technical Report



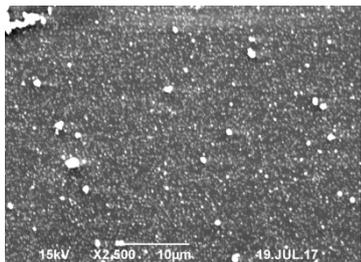
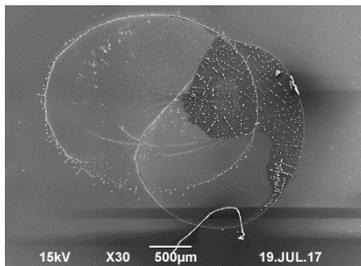
Katie Tidd, Downing College

For my last summer before I graduated, I took the opportunity to do a CAMPUS placement at MPIE in Düsseldorf. Before looking at the possible CAMPUS placements, Düsseldorf wasn't a place that I had ever looked into (or really heard of) and honestly before I went I wasn't expecting a lot from the city itself; I chose the placement because the project itself was closest to the work I want to do in the future.

Before the summer I didn't really have any idea of what working in research would be like. Now, I know that it involves a lot of delays and difficulties, but I also a lot of upsides. The people I met in the department were always welcoming and ready to help, the research project was incredibly interesting and I always felt like I was doing something worthwhile, and finally seeing the results from my weeks of hard work was amazing.



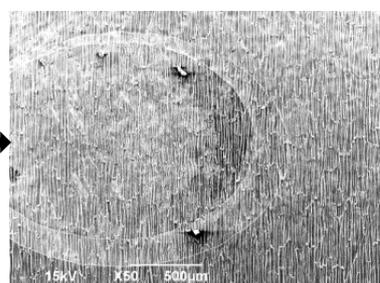
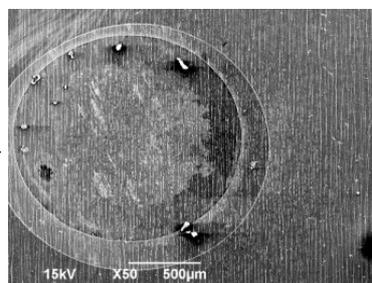
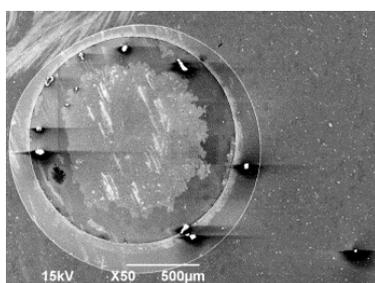
Sunset from the Rheinturm

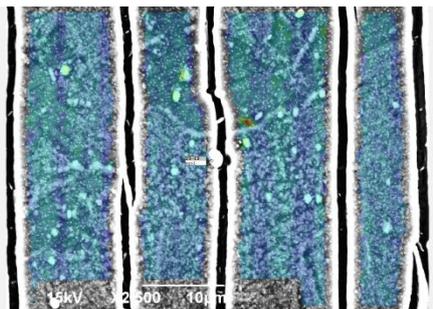


My project involved trying to microscale Digital Image Correlation in order to measure strains developed during the tensile testing of a hard coating. This led on from previous work done in the department by my supervisor and his group into investigating the fracture mechanics of hard coatings. The initial part of my project involved trying to optimise the pattern I would eventually use for the DIC, by depositing various sizes and combinations of gold nanoparticles onto silicon wafers and inspecting this under both optical microscopy and SEM, before using the DIC software to decide on the best pattern. This showed me that there was always more think about –when I found the correct pattern and density, I realised that the quality of the pattern could be affected by the surface roughness and even the brightness and contrast levels of the image, so there was always something new to be thinking about!

Gold nanoparticle deposit

The tensile tests took place over one week, and was a long week spent in the SEM, tensile testing the samples in situ and imaging at intervals, with a total of over 500 images taken in the span of one week. Needless to say, this greatly improved my SEM skills and by the end of the week I was feeling very proficient with imaging. I then had one week for the image analysis, and this was the most satisfying part of the project as I was finally able to see the results from my weeks of work! The DIC was very interesting, and raised a number of future research opportunities – though sadly at this point it was time for me to leave and hand these over to others.





An example DIC Image

I had studied German previously, but was still initially nervous of the language barrier – I knew enough to get around, but I wasn't sure how I would deal with the scientific language! Luckily the department there was extremely diverse and hence English was the primary spoken language there. If they spoke in German then it wouldn't have just been me unable

to understand it, but also the researchers from other countries such as India and China. The department even had a map in their common room to show where everyone came from and their aim was to get a flag from every continent; something they were very close to achieving.

I stayed in a shared flat with 16 people in it so there was a lot of opportunities to socialise. The majority of the people in the house were German (though there were some Polish, Swedish and French), all also



Cologne Cathedral



The Dusseldorf Kirmes (Funfair)

completing summer internships in Düsseldorf. I spent a lot of time with them at the weekends, and we had an international dinner to introduce me to home cooked German food (as well as other countries).

I spent a lot of time visiting the local area. Düsseldorf is not an exceptionally touristy city and so at the weekends Haleh (the other student from Cambridge doing an internship at MPIE) and I would often use this advantage to go and explore more of Germany, making trips to not only the surrounding Rhineland area, but also to Frankfurt and Luxembourg. The weekends were almost more tiring than the week, with us trying to fit in as much as we possibly could. In total over the two months we visited 4 countries and 11 cities! This was a real insight into German culture and we were very lucky to live in a place with great transport links.

The placement was a wonderful opportunity for me, and I loved being able to spend my summer in another country learning about their



Visiting the Grugapark in Essen

culture and customs. Germany proved to be both more and less similar to England than I thought! It has definitely made me consider research because of the opportunities it offers and has made me feel a more informed about the type of career path I want to take. I would like to thank the Armourers and Brasiers and Downing college for their generosity that enabled me to take part in this amazing scheme, as well as everyone at MPIE and in the Materials



Climbing the Frankfurt Cathedral

Department at Cambridge who helped to organise the scheme and grant me this wonderful opportunity!