

URSS 2023

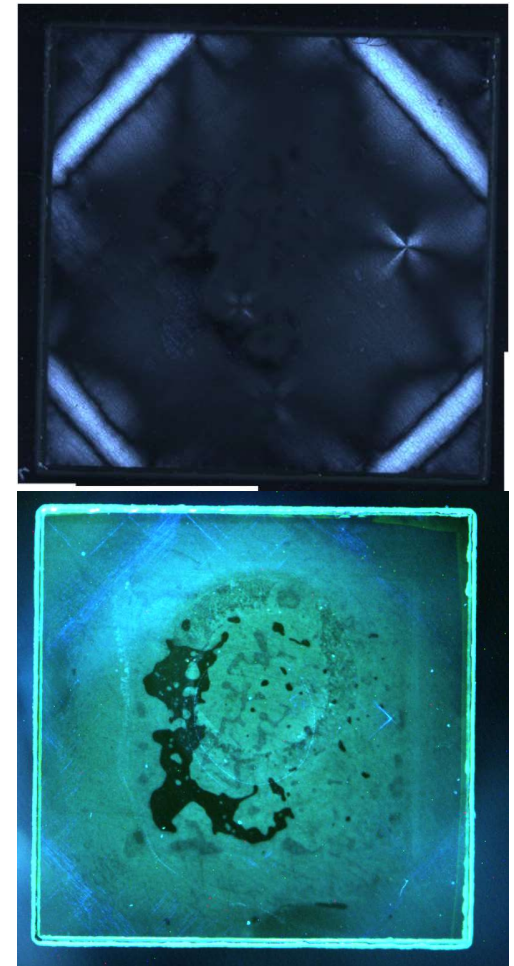
Ethan Dommett

What was my URSS project?

- I was looking at defects in CVD-Grown Diamond.
- I had to image Diamond samples with Diamond view and Birefringence to determine if samples were worth investigating further.
- Once an interesting sample was found; this was mapped using Raman Spectroscopy to determine defect location and size
- Once mapped the data was analysed to determine where the defect originated from.
- Analysing defects in CVD-Grown Diamonds is important to find methods to make better quality Diamonds for use in industry and the jewellery sector.

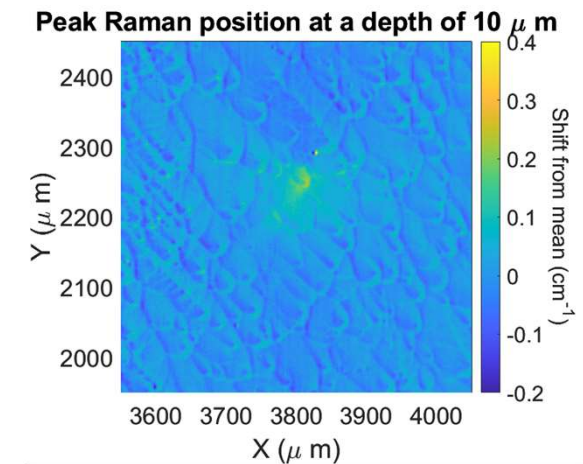
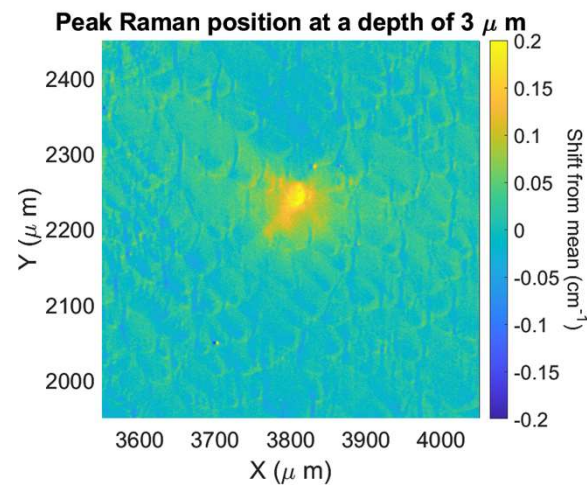
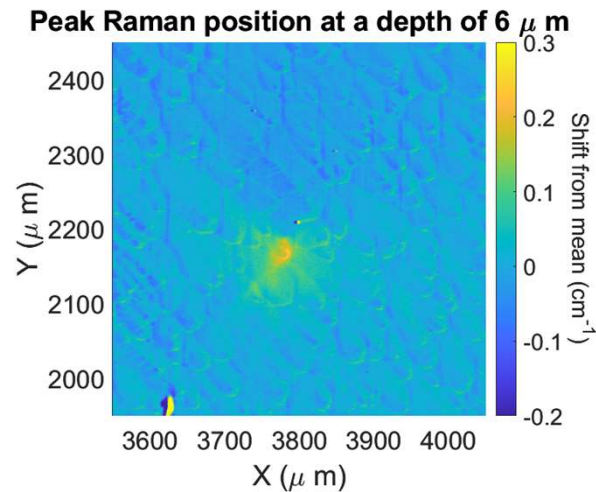
A few results

- Pictured is one of the Diamonds I investigated; the lit cross is evidence of a defect cluster within the Diamond.
- This occurs due to the defects having poorer quality of Diamond compared to the surrounding areas, resulting in Birefringence where the light is 'bent' going through the defect.
- The two images are optical, this is much easier to perform than Raman Spectroscopy so is a good way to figure out which Diamonds are worth further investigation.

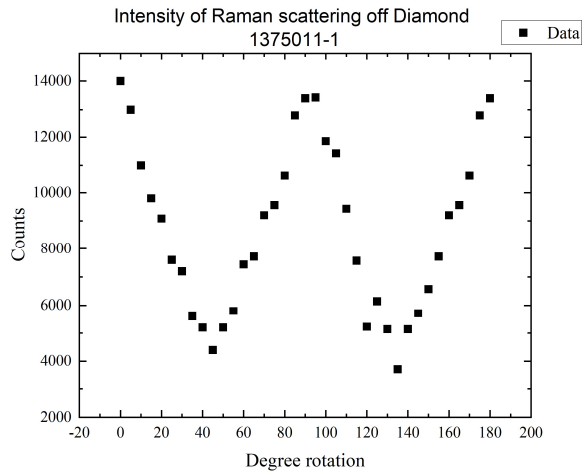


Raman mapping

- The interesting Diamond samples were mapped using Raman Spectroscopy – this involved high energy lasers being shone at the Diamond. The lasers excite the vibrational bands in the Diamond and lose energy causing a shift in wavelength. This shift can be measured and used to determine the location and magnitude of defects
- On the graphs below the yellow spots can be clearly seen – these indicate the defects

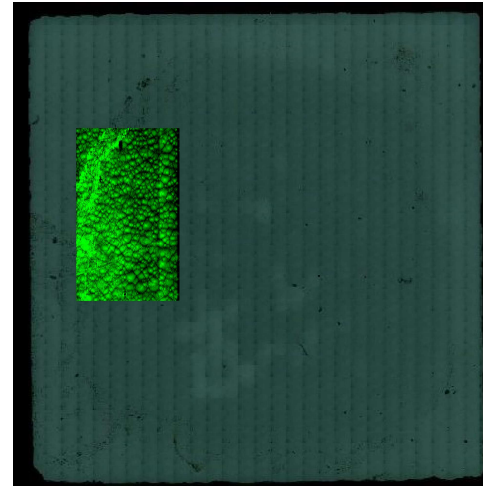


Extra stuff

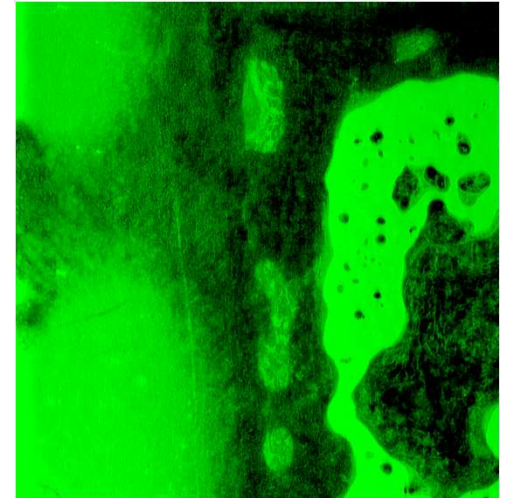


A graph showing how angle affects intensity.

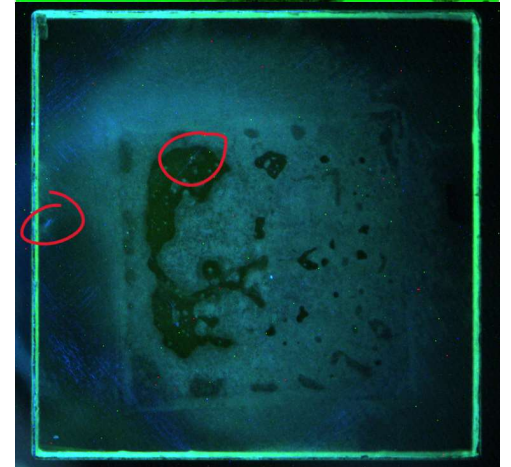
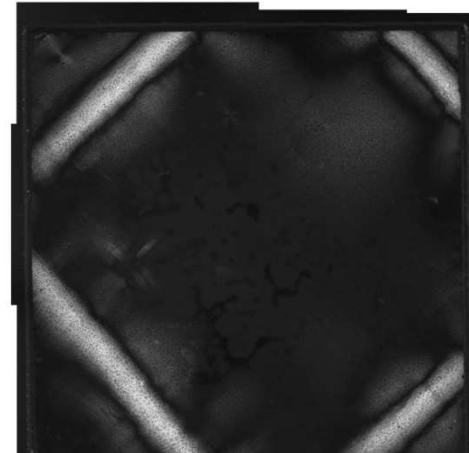
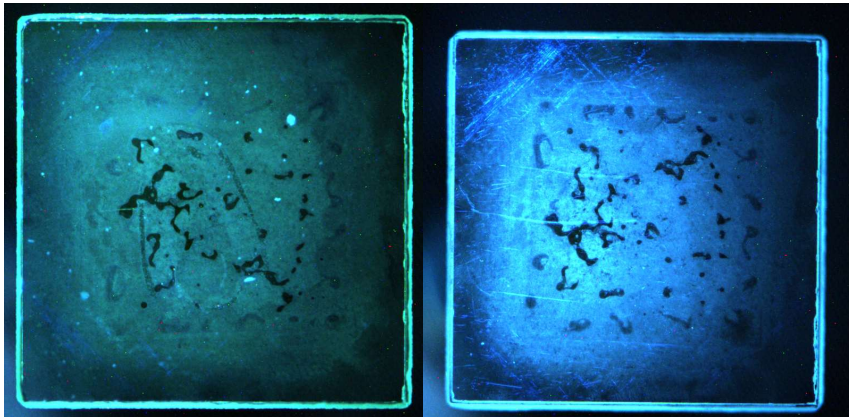
A comparison of optical imaging and an overlaid Raman map



Some dirty samples which produced not the best results



Some bright coloured pictures of Diamonds



My thoughts on URSS

- I was very fortunate to participate in the URSS scheme and it was fascinating being able to apply the skills and knowledge I learnt in my undergraduate degree to a research project.
- It was amazing working alongside professors and being able to contribute to the research going on at Warwick.
- By doing a summer project, there was enough time to learn new skills and get a feel for the department whilst not affecting my degree studies which worked perfect for me.
- I would recommend the URSS scheme to anyone who is interested in science and wants to pursue research outside their degree!