

4/7/2022 - Jacob Feltman

Goals

- Get transmission and index of refraction data for our two glass samples
 - Dr. Allred will help us with the ellipsometer machine to do this
- Clean up and return all borrowed materials

Notes

Most of the time was spent watching Dr. Allred work the ellipsometer and helping him adjust it to get the data correctly. This is what we found so far:



Figure 1: The two glass samples that we used for the experiment and also got ellipsometry data for the experiment. 2mm and 9mm glass.

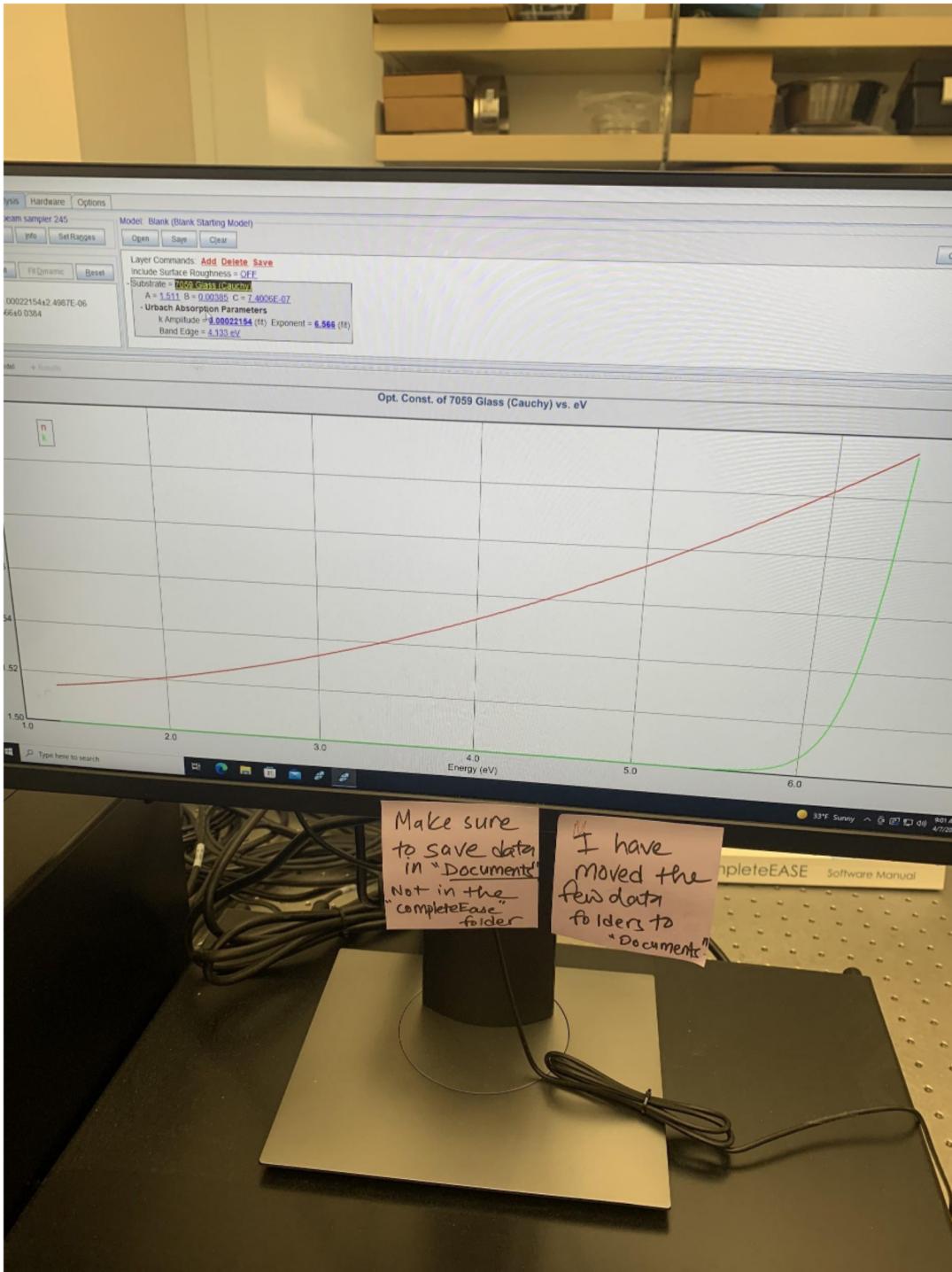


Figure 2: This shows index of refraction as a function of photon energy for the 2mm glass. Ours is on the left end ~ $n=1.51$

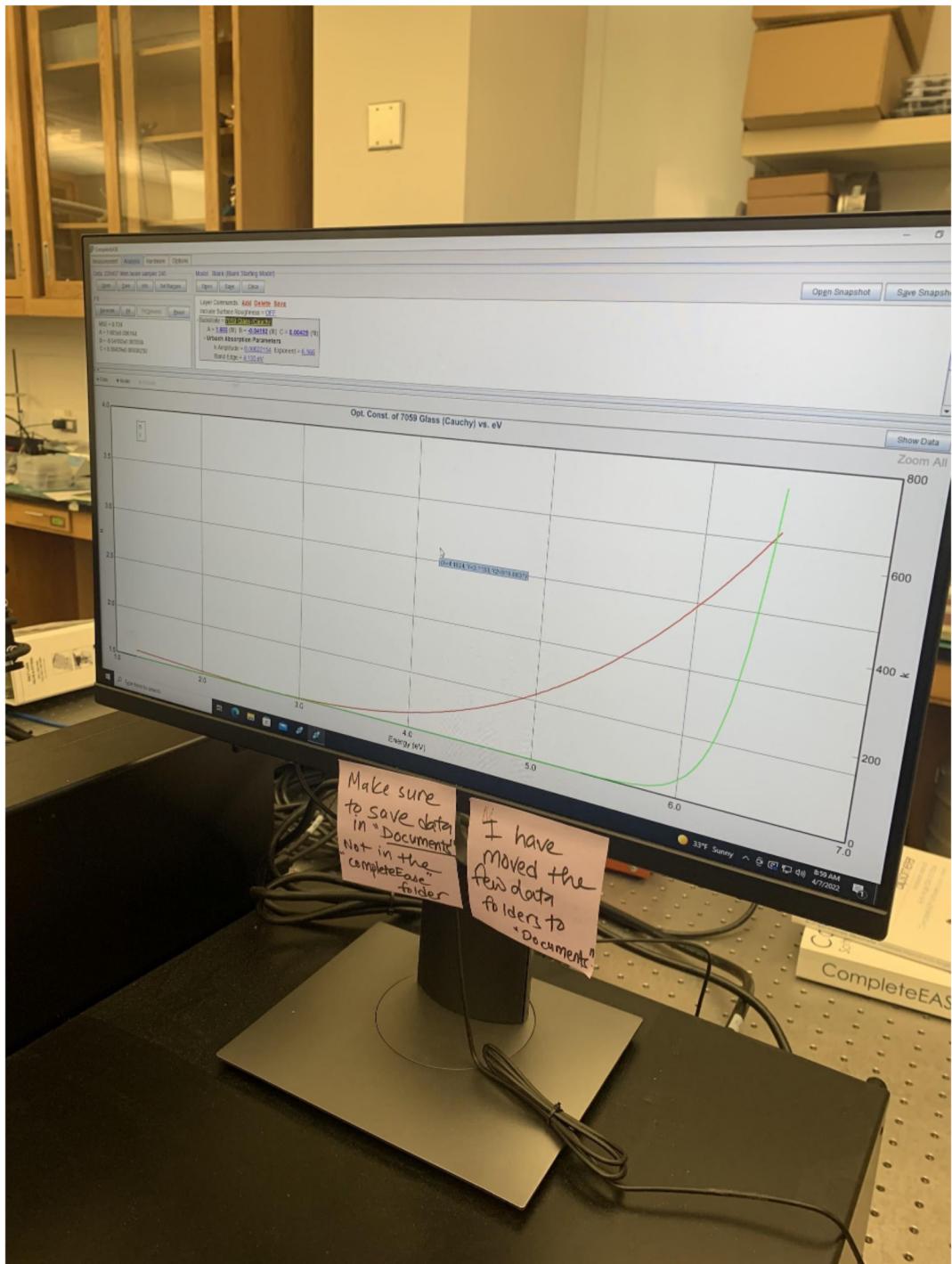


Figure 3: This shows index of refraction as a function of photon energy for the 9mm glass. Ours is on the left end $\sim n=1.50$

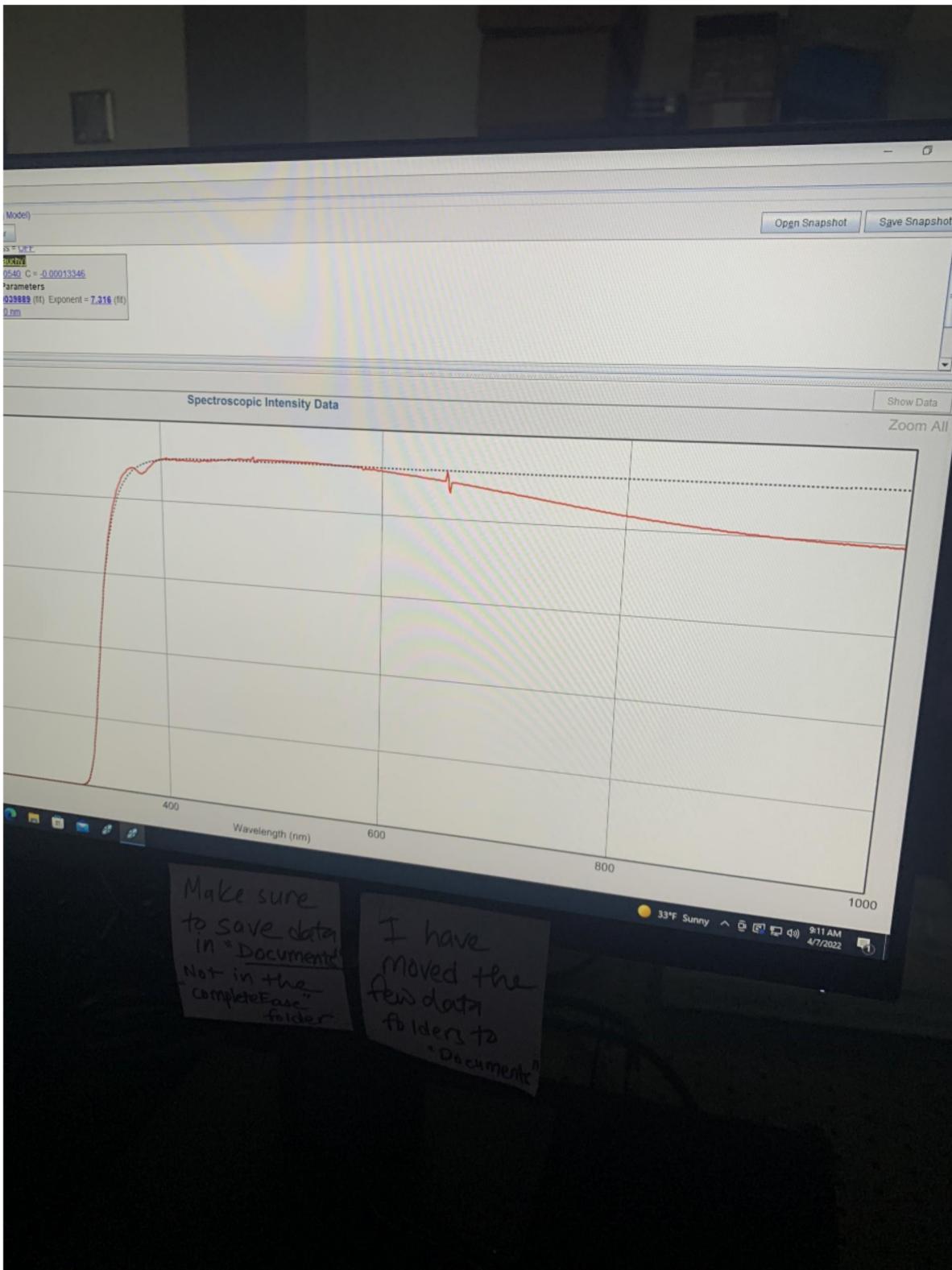


Figure 4: Shows the intensity data for the 2mm glass. The fit at the time of taking the picture was terrible.

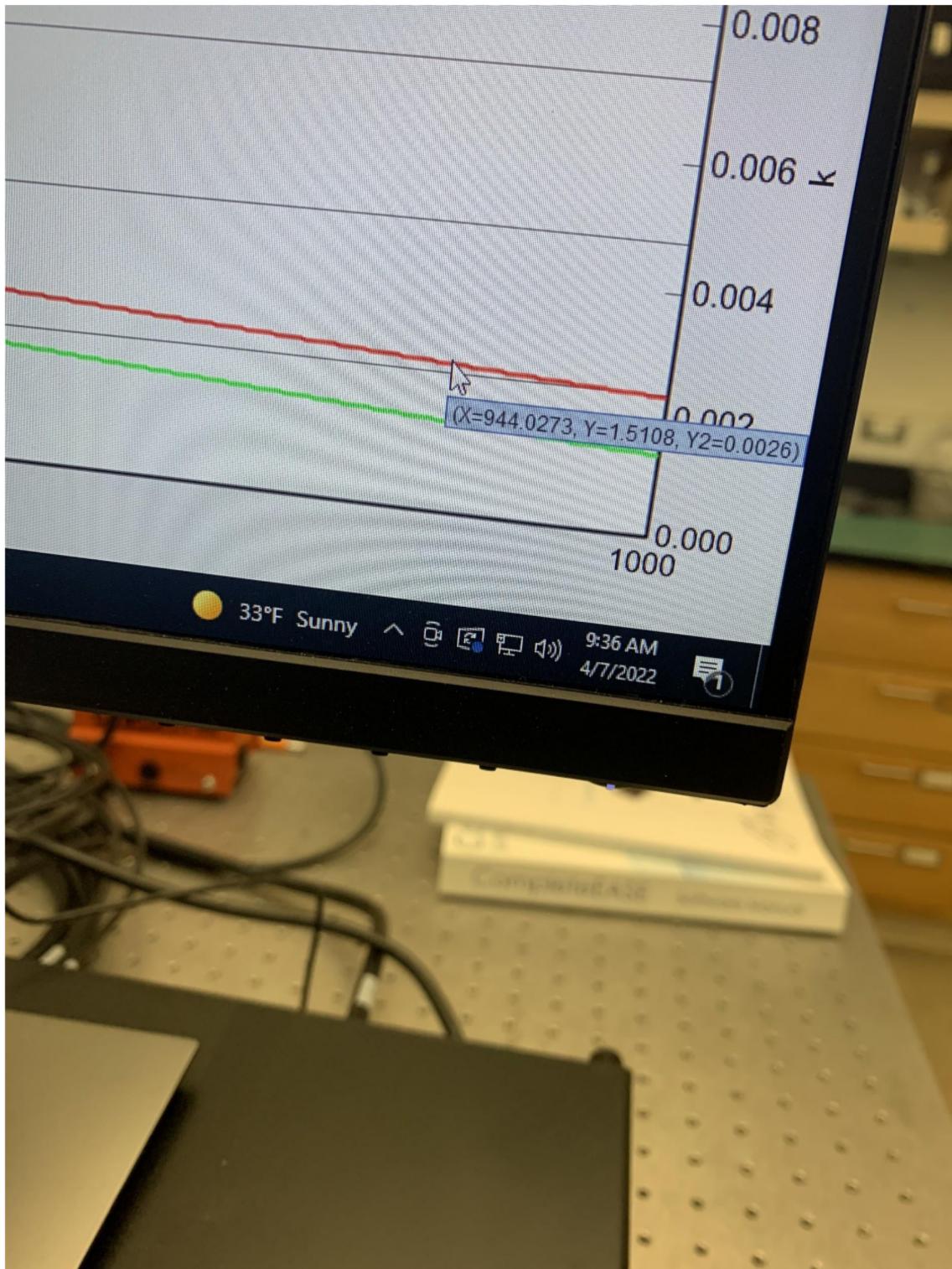


Figure 5: Coordinates for the index of refraction as a function of wavelength for 2mm glass. The approximation is good enough for our purposes.

Conclusion

Although the pictures aren't precise, we also have the data files from the ellipsometer to give us more accurate measurements for the index of refraction and the transmission/reflection data. For both pieces of glass, the index of refraction is in the range: 1.5-1.55 which is a very, very generous uncertainty (the index was measured more precise than that). Our system has about 5 degrees of uncertainty in the angle measurement which means that a 0.05 uncertainty in the index of refraction doesn't change brewster's angle enough to matter. The transmission and reflection data will be helpful to understand the data in the context of that model along with brewster's. Almost the entire time was spent helping Dr. Allred fix the ellipsometer apparatus, so not much data could be taken other than this.

I was able to clean up and return most everything that was borrowed so that we can begin to work on analyzing the LiDaR data and trying to understand it in the context of the brewsters angle model.