Sunset Vision

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Team Third MCEN 4151-001 December 14, 2019 Contributions from: Byron Pullutasig Max Armstrong Aaron Zetley Evan Blake For our team third project we decided to look at three different fluids under a microscope: coffee, human saliva, and ferrofluid. Aaron had an adapter that mounted his DSLR camera to a microscope in his lab. We were hoping to see some biological or molecular interactions, but unfortunately we were unable to produce focused images above 60x magnification. Although I was hoping to see the individual iron particles in the ferrofluid, I chose this image because it reminded me of surfing at sunset and getting spots in your vision from searching for waves and inevitably staring at the sun for too long.



To capture this image, I used a microscope with an adapter so a Nikon DSLR camera could be mounted to it. A drop of ferrofluid was sandwiched between two glass slides and placed on the proper location on the microscope. Knobs on the microscope allowed for adjustments in the x and y axis to scan the slide for areas of interest and adjustment in the z axis to adjust the focus. There was also an adjustment for the brightness of the built in light that lit the sample from behind. After determining that 60x magnification was the most magnification we were successfully going to capture, I scanned the slide of ferrofluid and found the air bubble shown in the image. It shows a very defined boundary between the air and ferrofluid. This is formed due to surface tension. The size of the air bubble becomes stable when the air pressure inside the bubble is equal to the pressure outside the bubble [1].



As mentioned above, a microscope with a 60x magnification lens was used to visualize the ferrofluid and air bubble. Since there was a lot of adjustability within the microscope, all of the adjustments were done there instead of the camera itself. The camera to microscope adapter is an AmScope CA-CAN-NIK-SLR adapter from Amazon. The photo was taken in a dark room with lighting from behind the slides.

I decided to use the automatic settings on the camera since I was already able to manually adjust the brightness and the focus with the microscope itself. The field of view is less that 0.05" and the lens of the microscope was no more than 1/8" from the glass slide. Since the camera to microscope adapter took the place of the camera lens, the metadata of the photo states a focal length of zero and an aperture of f/0. The camera used was a Nikon D5500 with a shutter speed of 1/200. Very little editing was done to this image. I played with the curves in Gimp and ended up settling on settings that were very close to the original. I wanted to maintain the orange and yellow colors typically associated with sunsets. I did not see a reason to crop the image so I left if at the original size of 6000x4000 pixels.

This image shows the interaction between pressure and surface tension. I really enjoy the colors in this image and how it looks like a sunset. This was the main reason I chose this image, as it reminds me of being home in San Diego and surfing at sunset. I wish I was able to capture the individual iron particles in the ferrofluid and I wonder how much more magnification I would need to achieve this. In the future I would find a more powerful microscope so I could focus on the interaction between the iron particles instead of an air bubble. Overall, I am happy with how the image turned out because it reminds me of good memories and puts a smile on my face.

References:

[1] "Laplace Pressure." *Laplace Pressure - an Overview* | *ScienceDirect Topics*, https://www.sciencedirect.com/topics/pharmacology-toxicology-and-pharmaceuticalscience/laplace-pressure.