Ferrofluid-Team 3 Photo

12/2/2015
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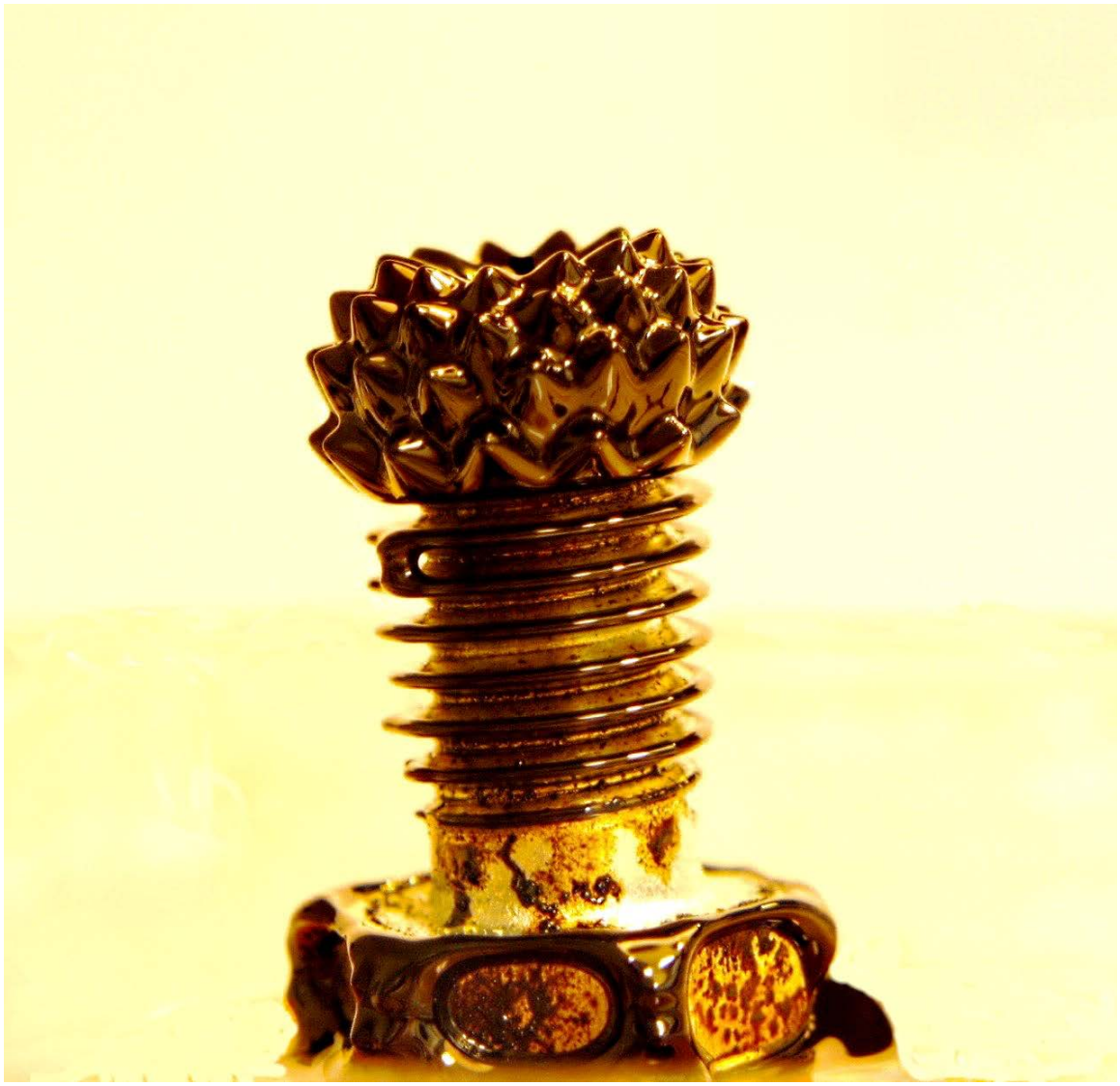

Introduction

The purpose of the third team project was to experiment with ferrofluid, a magnetic fluid. My team and I decided to work on ferrofluid, but were unable to meet so I performed this experiment individually. The ferrofluid initially proved to have many problems and became very messy. It took about an hour to get a hang of the fluid and understand how it would act with different magnets. Once I was able to relatively contain the fluid, I tried several different bolts and steel scraps to see how the ferrofluid would act on them. My final image is of a 1 inch ¼-20 bolt. The bolt had a magnet touching the bottom of it.

Flow Details

In order to contain the flow of the ferrofluid, I used a large syringe to drop the fluid where I wanted it to go. In the final image, there is a stack of several neodymium magnets below a piece of plastic. The plastic was about 1/16 of an inch thick. It was originally the packaging for the magnets. It worked as a tray. The bolt was put upside down on the tray and the ferrofluid was slowly dropped, several drops at a time, onto the top of the bolt. It initially traveled down the bolt. It followed the threads closely. Once the threads were covered in the fluid, it began to form spikes on the top of the bolt. If the bolt was completely covered in ferrofluid, it would be entirely covered in these “spikes”. I enjoyed the photo with just the end of the bolt spiked. It also displays the fluid that followed the threads down to the head of the bolt.

Ferrofluid is a fluid that is filled with many tiny magnetic particles within the fluid. When a magnetic field is applied next to the fluid, the particles immediately form in the lines of the field, and will disperse as soon as the field is removed[1]. The magnetic field was being held at the bottom of the bolt in my image. The steel bolt became magnetized and the ferrofluid originally traveled down the threads of the bolt. Once the bolt was covered, the field began to form because there were enough particles to form the lines in the magnetic field.

Visual Details

The background of the photo is a large sheet of white paper. It acted as both a non-distracting background and a protection for the counter tops from the ferrofluid. Removing any distracting aspects from the background of my image was important so that I captured only the ferrofluid and no other information. The lighting was also important when capturing the image. The fluorescent ceiling lighting in the kitchen was on, but I also placed a fluorescent table lamp directly above the experiment. This lighting gave the golden touch to the edges of the ferrofluid in the image. I did not use a flash on the camera.

Photographic Technique

The camera that I used to take my image was a SONY Alpha Series NEX-5. The lens was six inches from the bolt with the ferrofluid. The shutter speed of the camera was ¼ of a second. The ISO was 200 and the aperture was set at f/8. This aperture provided the optimum depth of field in order to best see the "spikes" formed by the ferrofluid. The focal length of the lens was 55 mm. The size of the raw and final photos was 1275 x 1234 pixels. Final processing was minimal. I adjusted contrast lines and slightly saturated the photo in order to make the spikes more visible. I then cloned out some distracting yellow elements from the background of the photo. The original and raw images can be seen below in Figure 1 and Figure 2.

Figure 1: Raw Photo

Figure 2: Final Photo

Conclusion

I enjoyed learning about ferrofluid through this process. I attempted to create the affect with several different objects, but found that the bolt captured it the best. The ferrofluid made quite a mess as each magnet was drawn the each other through piles of it. It took a learning process to figure out how to contain the fluid. After about an hour, I tried the bolt with the plastic tray below and was able to capture a great image. Though the background is more yellow than I would have liked, I believe that final processing using GIMP made the image much more clear. Metallic silver looking photos of ferrofluid can be taken with the right lighting, and I would have liked to capture that in my image. However, I was unable to capture the proper lighting. I was still able to capture a metallic gold color on the image.

References

1 "Ferrofluid: Magnetic Liquid Technology." *Ferrofluid: Magnetic Liquid Technology*. FerroTec, n.d. Web. 08 Dec. 2015.