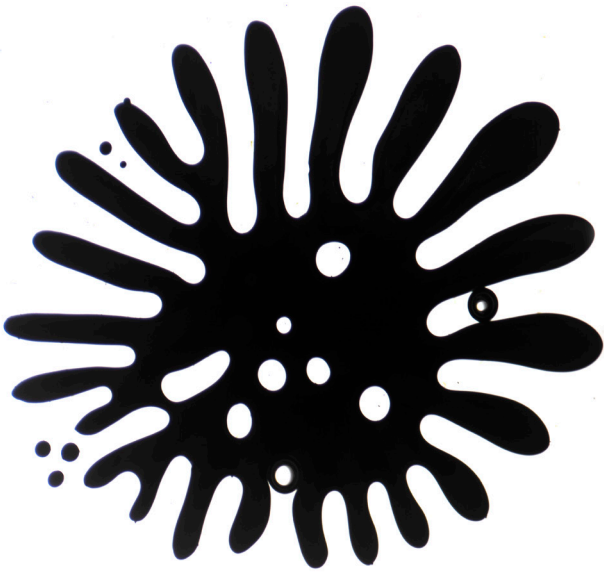
Findings in Ferrofluids

By Lydia Dye

A visual study on ferrofluid,
a unqiue liquid magnet

Introduction



Magnets can be overlooked as mundane objects that vary in roles from holding up the week's grocery shopping list on the refrigerator to protecting us from cosmic rays, or even polishing lens to perfection. However, by peering in closer one can observe the extraordinary beauty that can be created within a magnetic field.

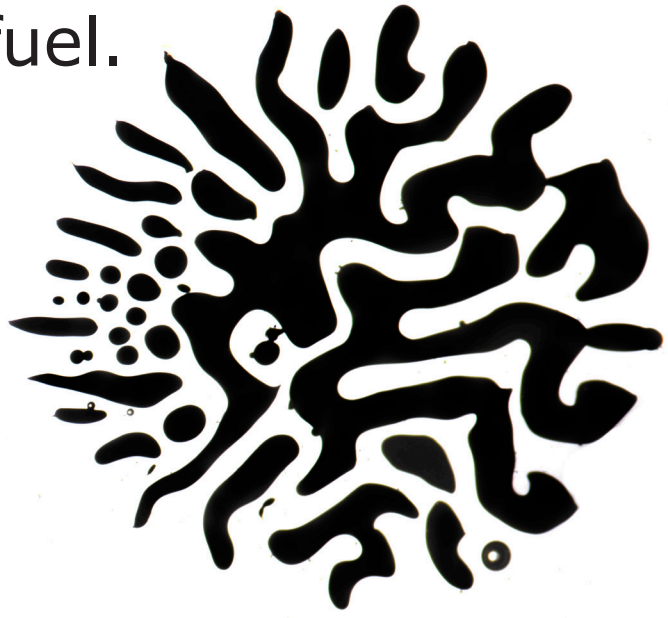
The unique properties of ferrofluid allow for a close visual study of the magnetic field and makes the unseen visible. With the aid of photography, the demonstration of various magnetic field shifts and how it shapes the ferrofluid end with entrancing images of that represent the invisible world.

What is Ferrofluid

Ferrofluid's can be defined as a liquid that suspends very small particles magnetic. When these magnetic particles are placed within a magnetic field, it essentiallybecomes a liquid magnet. It is also made up of three essential components

- Iron oxide particles
- Surfactant coating to prevent sticking
- Carrier fluid

In the 1960's Steve Papell invented of ferrofluid for NASA while exploring options for liquid rocket fuel.



The Photographic Process

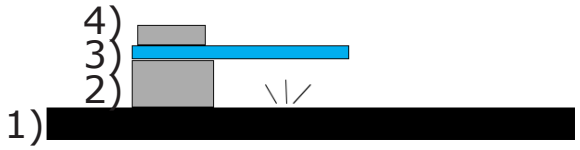
The Method Behind The Magnetic Madness

Imaging ferrofluid will require a mixture of patients, meticulous tidiness, dishwashing soap, and of course the right materials. Provided below is a list of equipment that I specifically used along with recommendations to help make the process smoother:

- Nikon D850
- Stereo Microscope
- Extension tube
- Adobe Lightroom
- USB 3.0 cord (tethering)
- Glass microscope slides
- Bottle of ferrofluid
- Strong earth magnets
- Clear dishwashing soap
- Syringe or eye dropper
- White paper
- Lab jack
- Gloves

This imaging process does involve handling ferrofluid, which is a compound that can cause irritation to the eye, temporary staining of the skin, and possibly permeant stains to clothing.

The lighting set up is dependent on the stereoscope. When setting up the stereoscope, ensure that there is enough light that is being produced to have an even white background.



1) Stage of stereoscope, lines indicating light source
2) Lab jack
3) Glass slide
4) Small weight

The Photographic Process

Continued

Setting up the work space into three different sections can help ease the work flow pattern from left to right.

Section one contained slide preparation. I double layered white paper on the working table to ensure an easier clean up as well a clean surface to place glass slides. Placing a few drops of soap on a slide, smear it slowly as to not cause any bubbles. With the syringe or eyedropper, place a small drop of ferrofluid into the center of the soap smear. The ferrofluid should sit on top of the soap rather than inside.

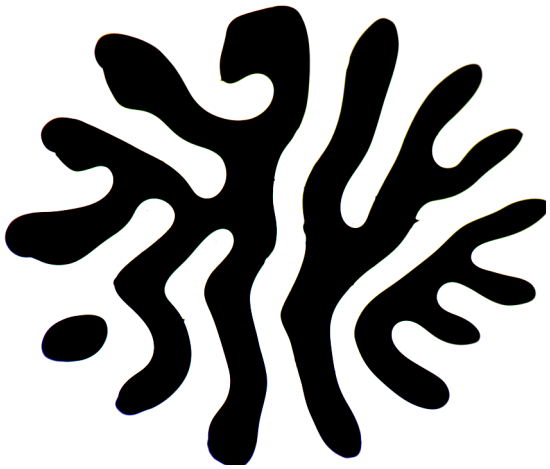
Second section of the work stations contained the imaging portion of the work flow. I placed the lab jack at the edge of the reflected light source, placed the slide on top and secured it with a small weight.

I found that using small controllable earth magnets that were placed under the slide were the best for creating patterns and shapes with the ferrofluids. The most crucial part to getting the patterns is to not have the magnet come in direct contact with the glass slide as it pulls the fer-

The Photographic Process

Continued

rofluid into the dish soap rather than allow it to remain on top. This section also included my tethered camera that fed into Adobe Lightroom. By tethering I ensured that the images were in focus and that the background was evenly illuminated. The camera exposure time was about 1/50 with the ISO set at 100.



The third section is disposing of the glass slides. Glass should be placed in a sturdy container that will prevent any hazard when disposing of the materials.

The post-processing on this images included some contrast adjustments in Adobe Lightroom as well as a decent amount of spot removal any unwanted debris.

Work Cited

For More On Ferrofluids

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About Me

Currently in my 3rd year of study working towards a double major in Advertising Photography and Photographic Technologies, concentrated in Biomedical Photographic Communications from Rochester Institute of Technology.

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