After getting settled down back in the lab in Bronwell our group was able to pick up where we left off last semester. My main goals for the first three weeks included designing and creating micro channels that would eventually be used for flow, ultrasound, and gate testing. The first week back myself and Michael Lali were able to go over to professor Tai-Hsi Fan’s micro fluidics laboratory in the Engineering II building. Unfortunately Dr. Fan did not want undergraduates working without graduate supervision. In order to overcome this we needed to bring Sterling, a Ph.D student working in Dr. Kotha’s lab, along with us for any visit. Dr. Fan approached our group telling us that he didn’t want us using his lab on a regular basis. Our group had agreed to two more visits to his lab during the course of the semester. Regardless, our group was able to work with the micro fluidics equipment to create an SU-8 wafer mold during the time we had that visit. After the wafer SU-8 process was finished it was cleaned. During cleaning with isopropyl alcohol the fragile wafer broke into two pieces. The pieces were still able to be used for PDMS curing. This initial test was simply a way to see if micro channels could be created for our purposes. The incorporation of the silicon on the mold did in fact prove that micro channels could be made using the techniques followed.

Nemish’s goal during this project is to design the gate mechanism and find the correct materials. Expanding hydro-gels were the answer to our initial designs. In order to incorporate hydro-gels into the PDMS micro channel we first needed to test if hydro gels could be cured on a pattern that may act as a micro channel. This test was carried out this week and will be described by Nemish in his paper. Our idea is to use the hydro-gel as part of the channel that will hopefully close on the channel preventing flow for the gate rather than having a hydro-gel assembly above the gate that would close a PDMS channel.

After the first wafer pattern was produced by our group I designed more micro channels with different thicknesses in order to be used for ultrasound testing. The process to get a micro channel design to become a mold first involves creating a pattern usually using the Paint program. Once the pattern is created it is printed out on a transparency sheet and cut out. This cut out is used during the photo lithography period for the SU-8 coated wafer.

In order to use the different patterns that I made I needed to get back into Dr. Fan’s micro fluidics lab. I asked Dr. Kotha if I could take Sterling away from his work for a few hours and go to the lab but Dr. Kotha did not want Sterling to use his time that way. It was at this point that Dr. Kotha said our group could simply test flow through channels by using wires and other objects as our molds, rather than the SU-8 coated wafer patterns. After being told that two more PDMS coating were created using wires. One was an H-Gate using uncovered wires and the other PDMS layer was created with two separate wires. This pattern is going to be tested Friday the 12th to see if ultrasound waves can be isolated between the two different channels each on their own glass slide.

Since Dr. Kotha didn’t want Sterling to use his time dealing with undergraduates he assigned me to look into finding a suitable spin coating machine that he could buy to be used in his lab. The price range given to me was approximately $3,000 to $4,000. I contacted Spin Coating Systems for information regarding their models. After reviewing the models in the brochures initially given to me Dr. Kotha wanted the price to be lower. I called the company searching for cheaper alternatives. I shortly received brochures with slightly cheaper models that will be further reviewed for potential purchasing within the coming days. Dr. Kotha is currently working on getting our group access to a spin coating machine that is located on the third floor of Bronwell.