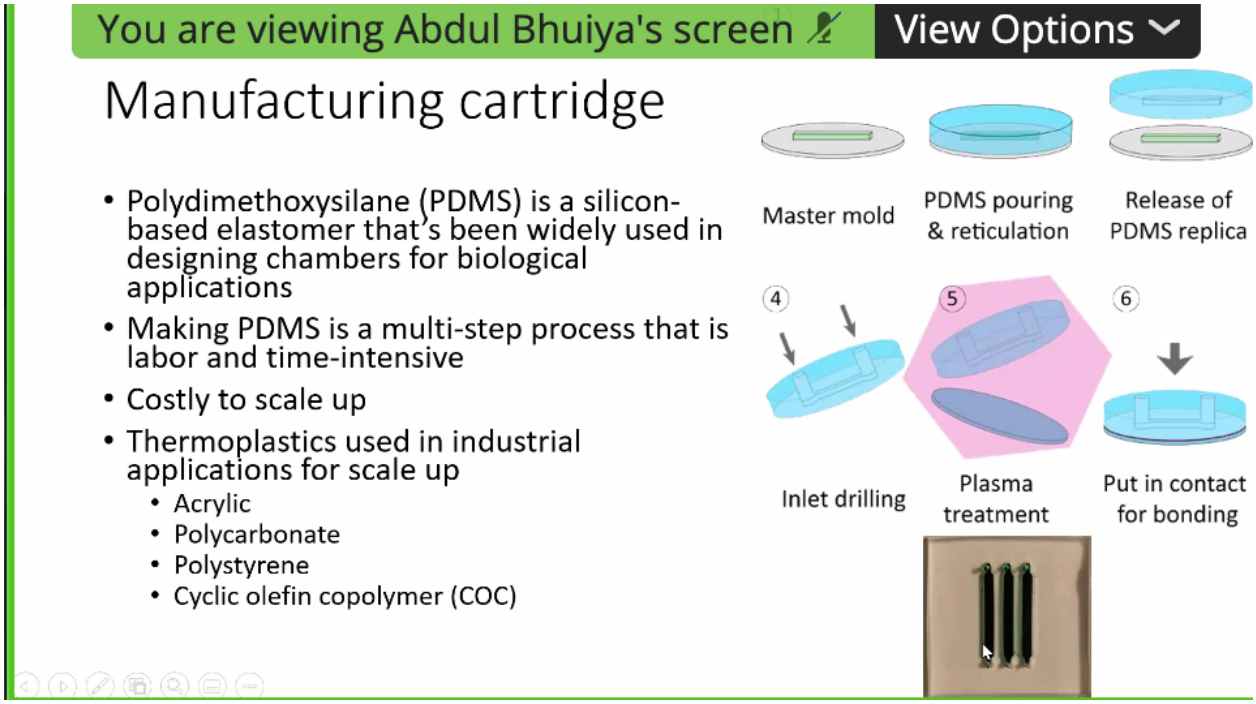
Making cartridges has relevance and the final goal is to make them to be used in an exhibit in San Francisco in october. Collaboration called exploritoram provides mobile phone microscopes and plastic chambers/cartilage where you can load environmental samples and directly put it under the microscope and image what's inside it. The users will use the capillary and mobile phone to image things and incorporate in their own data.
Different methods to make the capillaries:

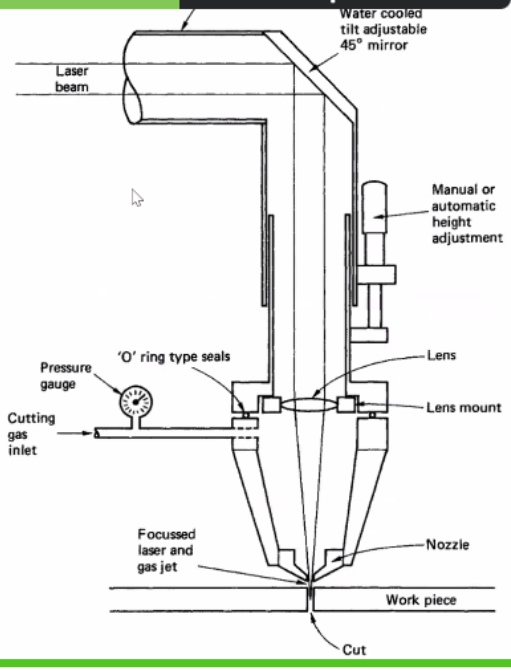
Cas13a the thing overlooked is what you put the reaction in. Need to prove the assay is readily available where you put in tues and simply demonstrate that the chemistry in the assay works.



-In imaging, you need to place the reaction in some chambers.
-Problem: multistep process→ have to make a mold, PDMS is a liquid thing and after heating it becomes more of a solid, then you have to punch holes to inject the reaction into it, plasma treatment which is a machine that shoots oxygen atoms. Once you pour te solution, you have to let it heat up for 12-16 hours
-For the timesack, engineers usually use thermoplastics where you can change properties of the plastic to your own type of plastic.
-Plan: To make the device a widespread thing on campus, we need to make disposable cartridges that are cost efficient.
-We will use plastic, we want to make something easy to use and doesn't involve PDMS.

Laser cutter

1. A high intensity beam of infrared light is generated by a CO2 laser
2. Beam is focused onto surface of material with a lens
3. The focused beam heats the material and establishes a very localised melt (generally smaller than 0.5 mm diameter) throughout the depth of the material
4. The molten material is ejected from the area by a pressurised gas jet acting coaxially with the laser beam
5. This localized area of material removal is moved across the surface of the sheet thus generating a cut



Powell, John. *CO2 laser cutting*. Vol. 214. London: Springer-Verlag, 1993.

-laser is about 1 kilowatt, it's about 6 yellow bulbs in power
-you can engrave on the material without cutting through it (don by using a low power laser when you don't stay at on palace for a long time)

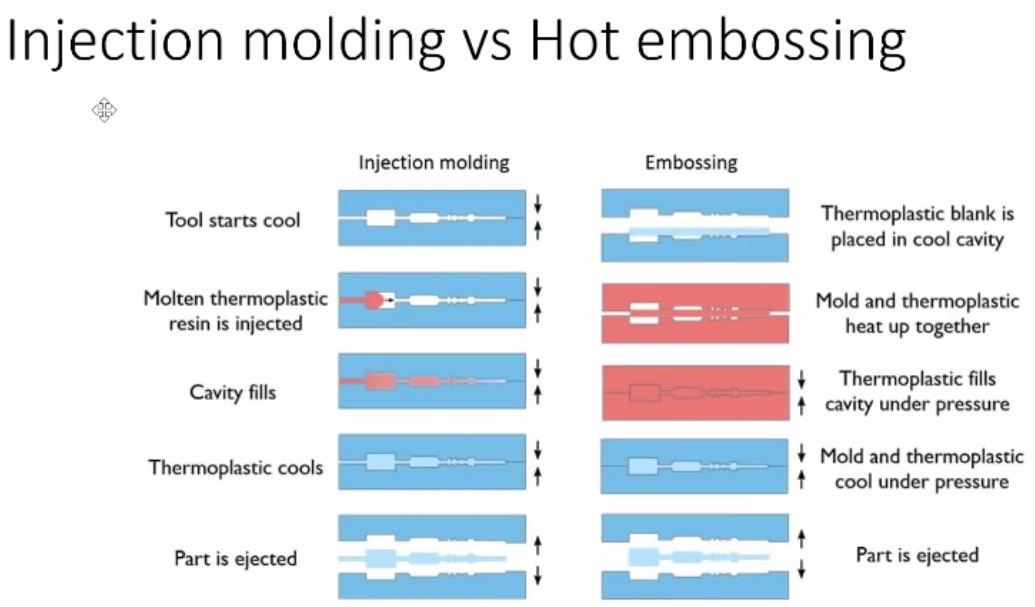
- There are parameters for different material: speed and power
- Som metals reflect the metal: laser must be absorbed
    - Copper is hard to cut bc its reflective

Advantages of laser cutting

- It is a non-contact process which means that material needs only to be lightly clamped or merely positioned under the beam
- The cut width (kerf width) is extremely narrow (typically 0.1 to 1.0 mm) and so very detailed work can be carried out
- The process is fully CNC controlled
- Actual area heated by the laser is very small and most of this heated material is removed during cutting. Thus, the thermal input to the bulk of the material is very low, heat affected zones are minimized and thermal distortion is generally avoided
- The process cuts at high speed
- In most cases the cut components will be ready for service immediately after cutting without any subsequent cleaning operation.
- Components can be arranged to "nest" very close together which reduces wastage of material to a minimum
- Although the capital cost of a laser cutting machine is substantial, the running costs are generally very low
- The process is relativelyquiet and safe to use

-laser cutters ar pretty clean and pressurized gas cleans everything it cuts
-standard is the co2 laser cutter

-when laser too intense it usually melts or oxides it when you don't clean the laser



-you can make patterns in 2-d but not 3-d, not entirely ideal
3d printing:
-special material in laser cutting
CNC milling
-different technique that is a form similar to laser cutting, where its not cutting necessarily
-rotate and sink into the material: creates a pattern

Presentation:
40 to 45 min, look up cnc milling
Put confusing things on the slide
Specific things: principles behind how it works, what types of materials it can cut, how long it takes for it to cut a piece, how much does it cost, hare examples or videos or other research papers by using cnc or 3d printing, examples with other chips
-"3d printed microfluidic"

3 topic:
-3d printing
-CNC milling
-Injection molding
Orders:
3D printing- Trisha
CNC milling- Kavin
Injection molding and hot embossing- Siddharth