DESIGN MATRIX: Microscope cell culture incubator

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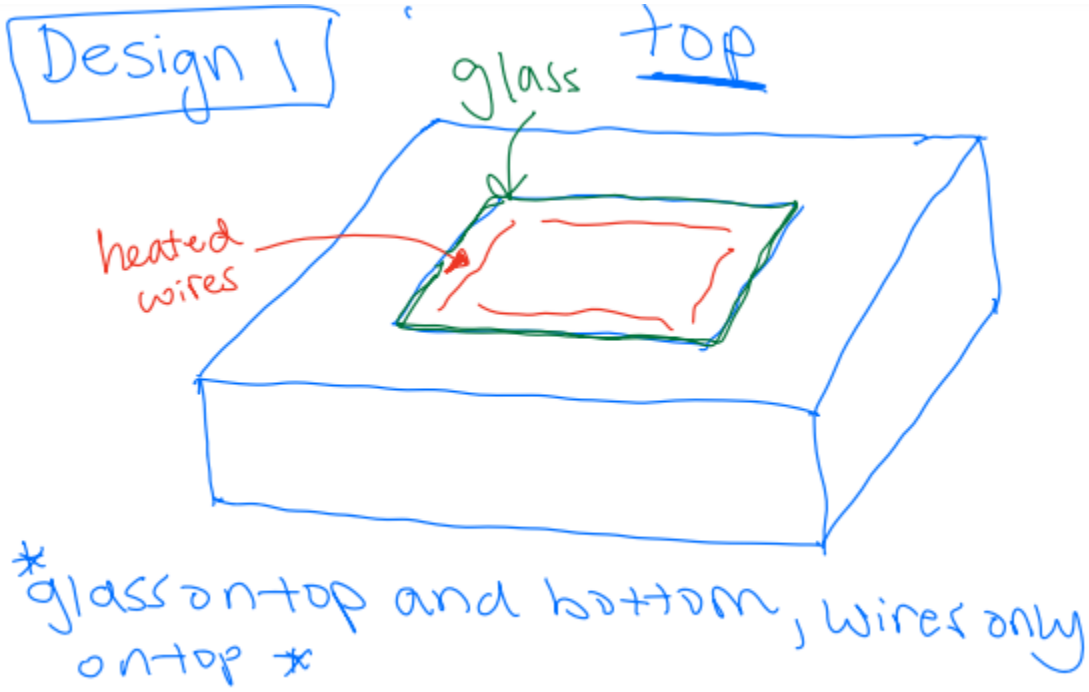
Design Matrix Criteria

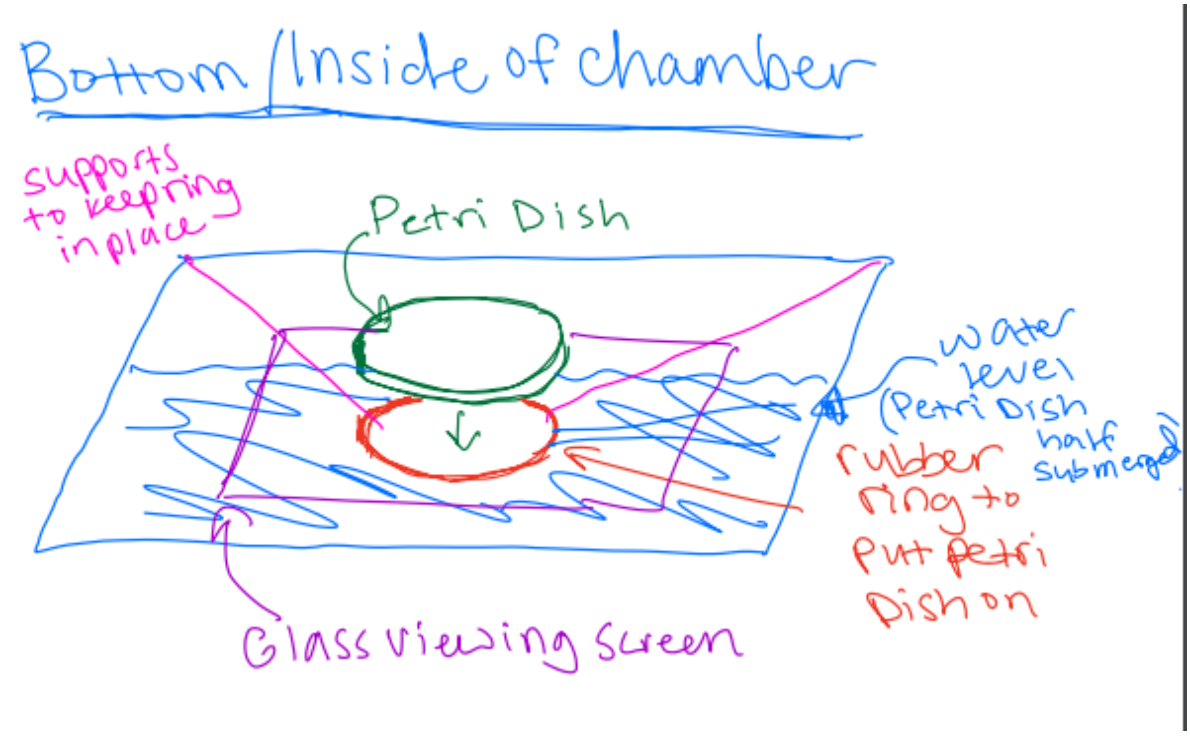
- *Durability*: Considers how long the parts of the design could be expected to last with consistent use. A higher score represents a design that would not be expected to break even with long-term use. A low score means that the design would likely be prone to breaking down.
- *Reliability*: Considers how consistently and to what standard the design would fulfill its intended purpose of defogging the glass, A higher score means that the design is expected to consistently and totally solve the fogging issue. A low score means that the design is expected to infrequently or poorly solve the fogging issue.
- *Ease of Fabrication*: Considers which designs would require the least amount of effort and strenuousness to fabricate correctly. A higher score indicates a design that can be fabricated with less effort while lower scores represent higher effort.
- *Cost*: Considers the amount of money needed to fabricate and maintain each design. Low scores indicate a higher cost and higher scores indicate a lower cost.
- *Safety:* Consider how safe each design is to use. Low scores indicate a less safe design and higher scores indicate a safer design.
- *Ease of Use*: Considers how easily the client will be able to use each design. Low scores indicate a design that will be harder to use (involve more moving parts) and higher scores indicate a design that will be easier to use.

Design Matrix Table

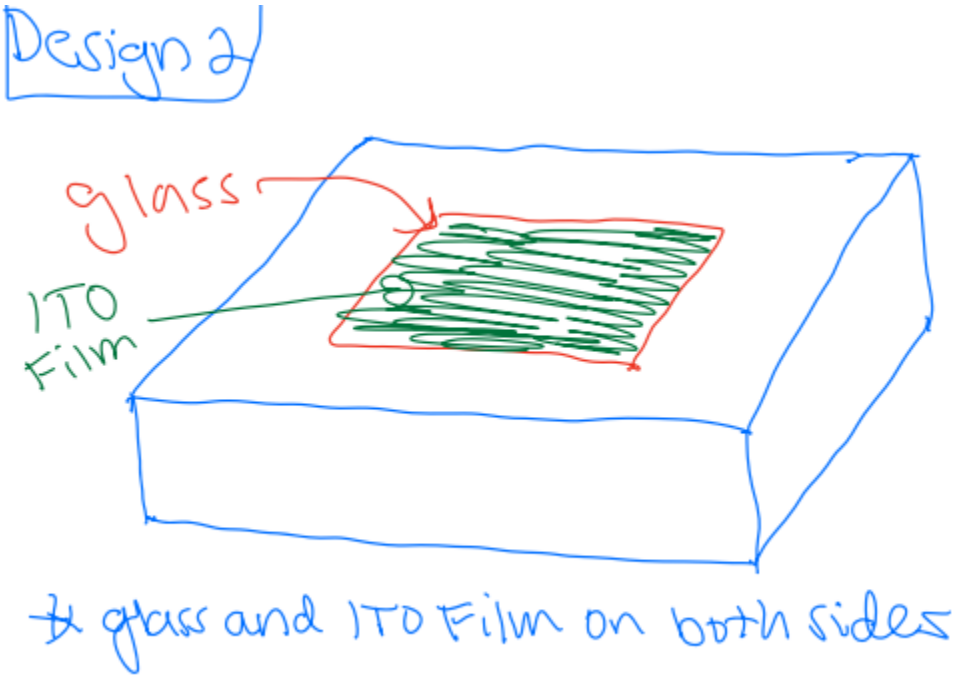
Criteria	Weight	Design 1 Layer of water + glass on bottom, heating element on top		Design 2 ITO Film + Glass (maintain constant temp) link		Design 3 Heated Wire Design + glass on both sides	
Durability	10	3/5	6	3/5	6	2/5	4
Reliability	40	4/5	32	5/5	40	2/5	16
Ease Of Fabrication	10	3/5	6	3/5	6	5/5	10
Cost	25	4/5	20	2/5	10	5/5	20
Safety	5	5/5	5	4/5	4	3/5	3
Ease of Use	10	3/5	6	4/5	8	5/5	10
Total	100	75		74		63	

Design 1

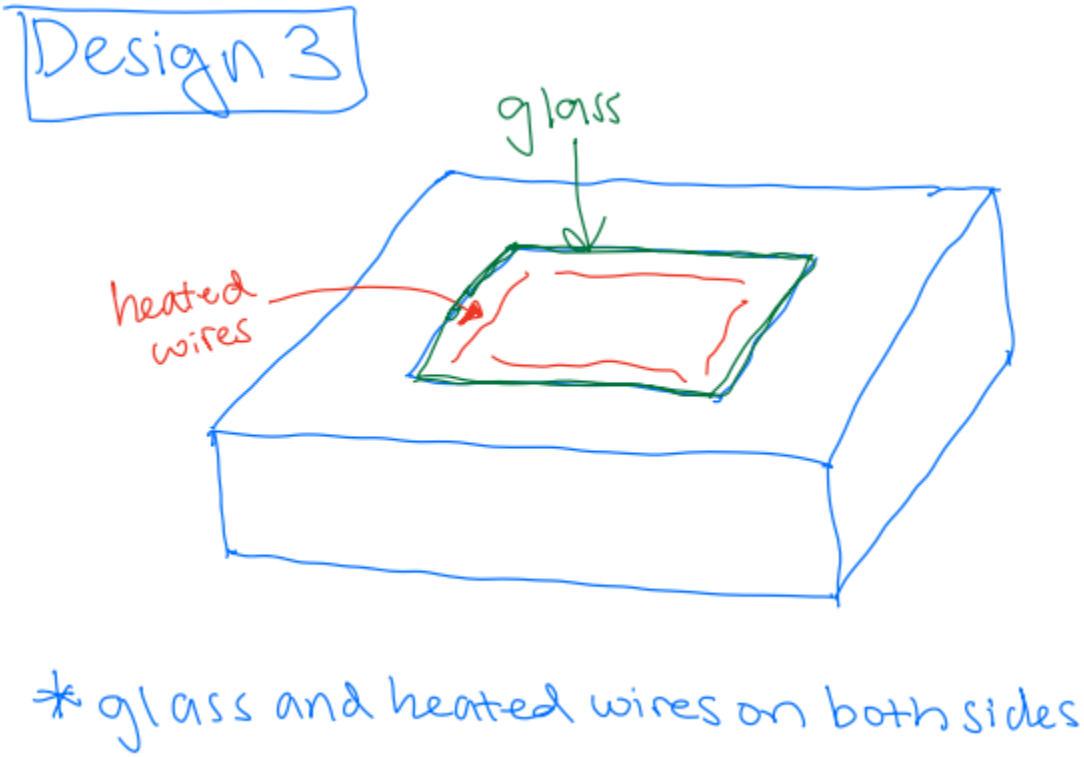

Design 1
top
glass
heated wires
*glass on top and bottom, wires only on top *


Bottom/Inside of chamber
supports to keep ring in place
Petri Dish
water level (Petri Dish half submerged)
rubber ring to put petri dish on
Glass viewing screen

Design 2



Design 3



Design Matrix Discussion

- *Durability*: Design 3 has the worst score because of the chance that the glass could crack due to the unequal heating of the wires. Design 1 is not perfect because the first design uses water which could potentially leak out of the design over time. Design 2 is not perfect because of the lower but still present risk that the glass could crack.
- *Reliability*: Design 2 has the greatest reliability due to the fact that it will maintain the most temperature uniformity and eliminate condensation all under through the use of a microcontroller that will accurately change the internal environment in order to meet the required values. The other designs primarily lack the thermal uniformity in order to achieve adequate phase contrast
- *Safety*: Design 1 is completely safe since it just uses distilled water. Design 2 is one lower since the ITO will be actively heated. Design three is the lowest because the wires would have the most concentrated heat.
- *Ease of Fabrication*: Design 3 has the greatest ease of fabrication as it simply involves putting wires around the viewing window. Design 1 and 2 are slightly more difficult as there are problems involving securing the partially submerged petri dish in design 1, and design 3 requires the film to be clipped on and programmed as it is essentially a resistor.
- *Cost*: Design 3 has the highest cost score because using wires as a heating element is extremely cheap. Design 1 is the second highest score because water is also a cost effective way to reduce condensation. Design 2 has the lowest cost score due to ITO and Glass being expensive
- *Ease of Use:* Design 1 has the lowest ease of use because the petri dish must be put at the right place and not be disturbed. Design 2 has slightly better ease of use but the film still needs to be hooked up, and there are more wires and connectors that need to be worked around. Design 3 has the highest ease of use due to its simplicity, nothing other than the wires need to be added.