
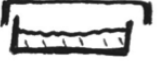


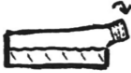
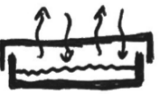

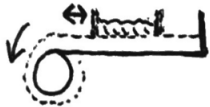
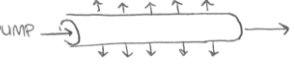



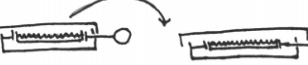
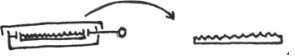
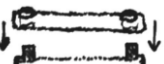
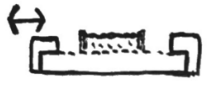
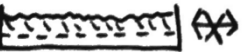
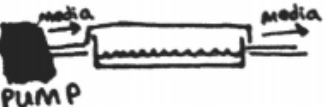


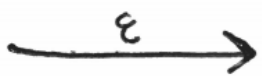

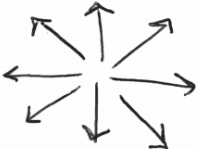



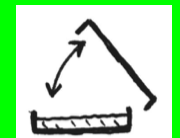

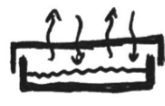
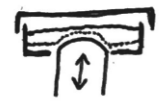
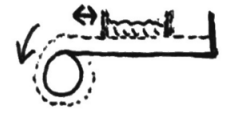
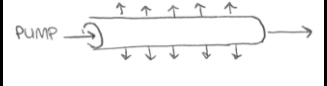
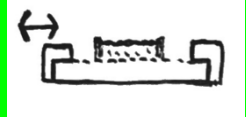
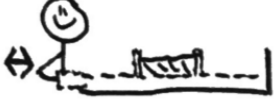
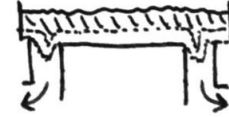
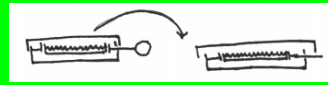
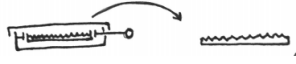
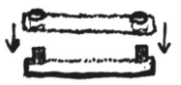
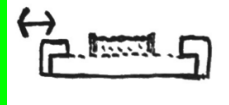
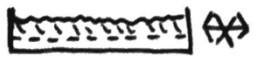
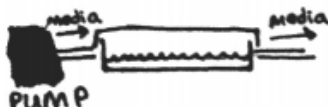


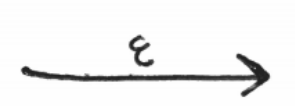

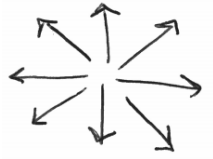


Morphological Chart:



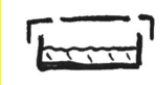


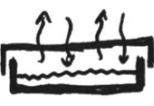

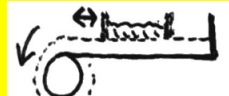
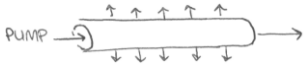


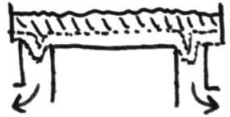
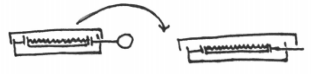
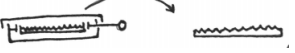
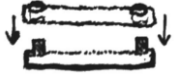
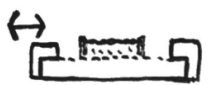
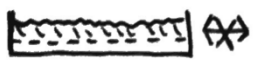
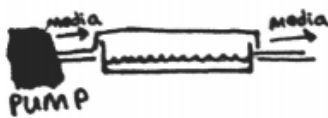
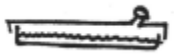

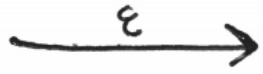

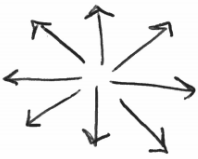
Function	Solution 1	Solution 2	Solution 3	Solution 4	Solution 5	Solution 6	Solution 7	Solution 8	Solution 9
Access to Incubator	 Completely Open	 Clearance between Membrane	 Breather Holes	 Removable Lid	 Screw on Cap (like the T25flask)	Filter (HEPA)	 Permeable Material for Chamber	Flow of Media (if chamber is airtight)	
Supply Strain Input	 Probes	 Roller in X-Direction	 Pumps	 Metal Clamps	 Manual Stretching	 Vacuum			
Receive/Display Outputs	myDaq	LabVIEW	LED Display	Manual Dotting	Video Recording	Arduino	Image J	Strain Gauge	Sensor for Deformation
Cell Viewing Compatibility	Clear Container	Window	Removable Top	Remove Substrate	Build Our Own Custom Microscope				
Sterilization	Ethanol	Autoclave	Wipes	Boil	UV light				
Power	Electric	Battery	Manual	Cranking	Computer	Hydraulics	Magnetics		
Transport	 Detachable Chamber	Transport Entire System	 Detach and Move Membrane						
Membrane Attachment	 Hole and Peg	 Clamp Membrane	 Adhesion to Plate						
Media Change	 Pump/Vacuum Media	 Port	 Pipette						
Strain/Stress Direction	 Uniaxial	 Biaxial	 Equibiaxial						
Membrane Material	Flexible Plastic	Thin Metal	PDMS	Silicone	Polymer	Composite	Rubber	Woven Polymer	Fabric
Membrane Treatment	None	Fibronectin	Collagen						

Concept Generation:


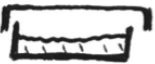



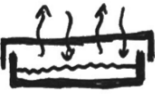
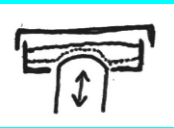
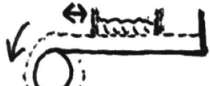
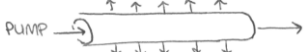




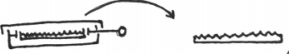
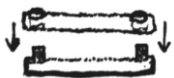
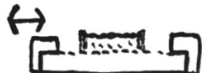
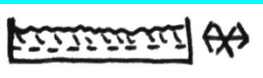
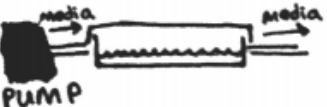
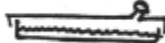

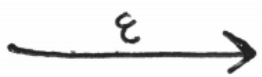

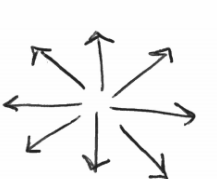
(Alternative 1)

Function	Solution 1	Solution 2	Solution 3	Solution 4	Solution 5	Solution 6	Solution 7	Solution 8	Solution 9
Access to Incubator	 Completely Open	 Clearance between Membrane	 Breather Holes	 Removable Lid	 Screw on Cap (like the T25flask)	Filter (HEPA)	 Permeable Material for Chamber	Flow of Media (if chamber is airtight)	
Supply Strain Input	 Probes	 Roller in X-Direction	 Pumps	 Metal Clamps	 Manual Stretching	 Vacuum			
Receive/Display Outputs	myDaq	LabVIEW	LED Display	Manual Dotting	Video Recording	Arduino	Image J	Strain Gauge	Sensor for Deformation
Cell Viewing Compatibility	Clear Container	Window	Removable Top	Remove Substrate	Build Our Own Custom Microscope				
Sterilization	Ethanol	Autoclave	Wipes	Boil	UV light				
Power	Electric	Battery	Manual	Cranking	Computer	Hydraulics	Magnetics		
Transport	 Detachable Chamber	Transport Entire System	 Detach and Move Membrane						
Membrane Attachment	 Hole and Peg	 Clamp Membrane	 Adhesion to Plate						
Media Change	 Pump/Vacuum Media	 Port	 Pipette						
Strain/Stress Direction	 Uniaxial	 Biaxial	 Equibiaxial						
Membrane Material	Flexible Plastic	Thin Metal	PDMS	Silicone	Polymer	Composite	Rubber	Woven Polymer	Fabric
Membrane Treatment	None	Fibronectin	Collagen						



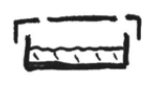


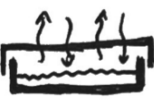
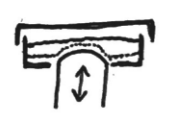
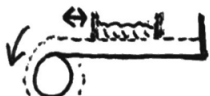
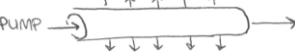


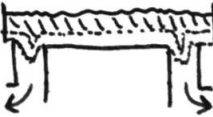
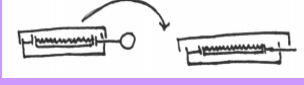
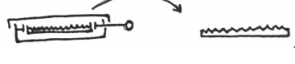
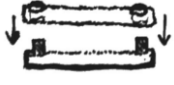
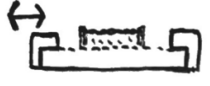
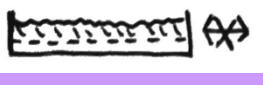

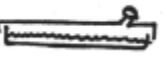

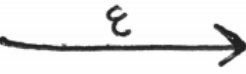

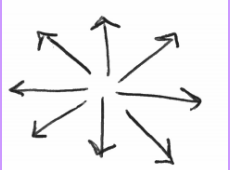
(Alternative 2)

Function	Solution 1	Solution 2	Solution 3	Solution 4	Solution 5	Solution 6	Solution 7	Solution 8	Solution 9
Access to Incubator	 Completely Open	 Clearance between Membrane	 Breather Holes	 Removable Lid	 Screw on Cap (like the T25flask)	Filter (HEPA)	 Permeable Material for Chamber	Flow of Media (if chamber is airtight)	
Supply Strain Input	 Probes	 Roller in X-Direction	 Pumps	 Metal Clamps	 Manual Stretching	 Vacuum			
Receive/Display Outputs	myDaq	LabVIEW	LED Display	Manual Dotting	Video Recording	Arduino	Image J	Strain Gauge	Sensor for Deformation
Cell Viewing Compatibility	Clear Container	Window	Removable Top	Remove Substrate	Build Our Own Custom Microscope				
Sterilization	Ethanol	Autoclave	Wipes	Boil	UV light				
Power	Electric	Battery	Manual	Cranking	Computer	Hydraulics	Magnetics		
Transport	 Detachable Chamber	Transport Entire System	 Detach and Move Membrane						
Membrane Attachment	 Hole and Peg	 Clamp Membrane	 Adhesion to Plate						
Media Change	 Pump/Vacuum Media	 Port	 Pipette						
Strain/Stress Direction	 Uniaxial	 Biaxial	 Equibiaxial						
Membrane Material	Flexible Plastic	Thin Metal	PDMS	Silicone	Polymer	Composite	Rubber	Woven Polymer	Fabric
Membrane Treatment	None	Fibronectin	Collagen						

(Alternative 3)

Function	Solution 1	Solution 2	Solution 3	Solution 4	Solution 5	Solution 6	Solution 7	Solution 8	Solution 9
Access to Incubator	 Completely Open	 Clearance between Membrane	 Breather Holes	 Removable Lid	 Screw on Cap (like the T25flask)	Filter (HEPA)	 Permeable Material for Chamber	Flow of Media (if chamber is airtight)	
Supply Strain Input	 Probes	 Roller in X-Direction	 Pumps	 Metal Clamps	 Manual Stretching	 Vacuum			
Receive/Display Outputs	myDaq	LabVIEW	LED Display	Manual Dotting	Video Recording	Arduino	Image J	Strain Gauge	Sensor for Deformation
Cell Viewing Compatibility	Clear Container	Window	Removable Top	Remove Substrate	Build Our Own Custom Microscope				
Sterilization	Ethanol	Autoclave	Wipes	Boil	UV light				
Power	Electric	Battery	Manual	Cranking	Computer	Hydraulics	Magnetics		
Transport	 Detachable Chamber	Transport Entire System	 Detach and Move Membrane						
Membrane Attachment	 Hole and Peg	 Clamp Membrane	 Adhesion to Plate						
Media Change	 Pump/Vacuum Media	 Port	 Pipette						
Strain/Stress Direction	 Uniaxial	 Biaxial	 Equibiaxial						
Membrane Material	Flexible Plastic	Thin Metal	PDMS	Silicone	Polymer	Composite	Rubber	Woven Polymer	Fabric
Membrane Treatment	None	Fibronectin	Collagen						

(Alternative 4)

Function	Solution 1	Solution 2	Solution 3	Solution 4	Solution 5	Solution 6	Solution 7	Solution 8	Solution 9
Access to Incubator	 Completely Open	 Clearance between Membrane	 Breather Holes	 Removable Lid	 Screw on Cap (like the T25flask)	Filter (HEPA)	 Permeable Material for Chamber	Flow of Media (if chamber is airtight)	
Supply Strain Input	 Probes	 Roller in X-Direction	 Pumps	 Metal Clamps	 Manual Stretching	 Vacuum			
Receive/Display Outputs	myDaq	LabVIEW	LED display	Manual Dotting	Video Recording	Arduino	Image J	Strain Gauge	Sensor for Deformation
Cell Viewing Compatibility	Clear Container	Window	Removable Top	Remove Substrate	Build Our Own Custom Microscope				
Sterilization	Ethanol	Autoclave	Wipes	Boil	UV light				
Power	Electric	Battery	Manual	Cranking	Computer	Hydraulics	Magnetics		
Transport	 Detachable Chamber	Transport Entire System	 Detach and Move Membrane						
Membrane Attachment	 Hole and Peg	 Clamp Membrane	 Adhesion to Plate						
Media Change	 Pump/Vacuum Media	 Port	 Pipette						
Strain/Stress Direction	 Uniaxial	 Biaxial	 Equibiaxial						
Membrane Material	Flexible Plastic	Thin Metal	PDMS	Silicone	Polymer	Composite	Rubber	Woven Polymer	Fabric
Membrane Treatment	None	Fibronectin	Collagen						