

# Imagine TF TECH BRIEF

# Disk Filter Technology

*Imagine TF has invented, developed, and is licensing technology for use in filtration*

## Enabling the Future

Hippocrates invented the porous cloth filter over 2400 years ago. Imagine TF's approach is the first new concept since then!

## Nano Pores and Precision

Pores can be from 100nm to mm in size. By using semiconductor processing equipment for tooling the accuracy and repeatability of pores can be less than 100nm.

## Simulation

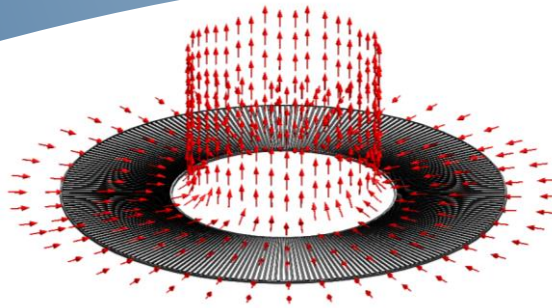
Patterned architecture and geometric structures enable CFD and multiphysic simulations

## Particle Collection

Walls collect different sized particles for greater collection capacity.

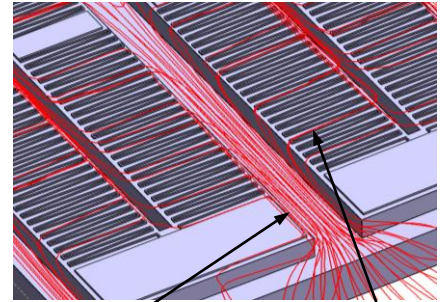
## Disk Stack

Stack the thin disks on top of one another for increased flow and reduced pressure drop.



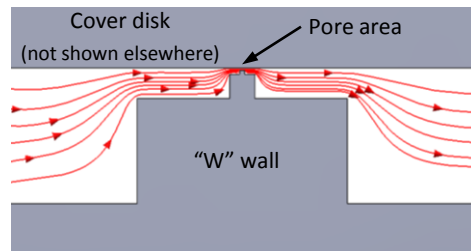
### Fluids Flow Over the Surface of a Disk

The disk surface is populated with microstructures and or nanostructures. A cover disk with a flat bottom surface is mated on top (not shown).



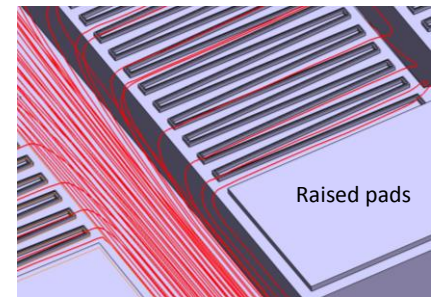
### Disk Closeup

Macro channels deliver fluids to the "W" walls that create micro channels. (see below for greater magnification)



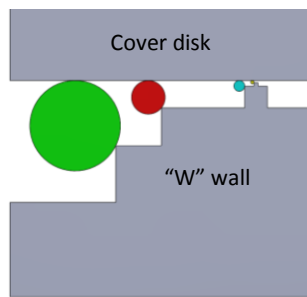
### Channel Section View

Fluid flowing to and from the micro channels and over the "W" walls. Pores are created by a micro or nano gap between the cover disk and the top of the walls. The walls are stepped so that there is only a small length at the restrictive pore area.



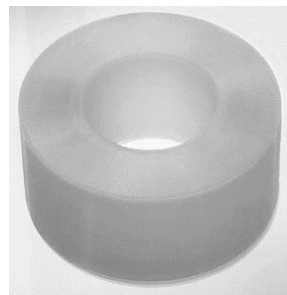
### Magnified Closeup

The raised pad creates a precise gap between the "W" shaped walls and the cover disk above (not shown).



### Particle Collection

Walls at different elevations can be deployed to collect different sized particles and increase collection capacity.



### Stack Disks

Stack the thin disks for greater flow. Disks can be as thin as 200 microns (0.08"). A stack of 1000 would be 200mm (8") tall



### Example Disk Stack

500 disks with 200nm pores flows 5 gpm ( 20 lpm) at 2 psi ( 14 kPa) 120mm diameter x 100mm tall



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# Imagine TF TECH BRIEF

page 2

## Application

The technology can be applied to almost any filter application:

1. Lower initial cost
2. Lower operating cost
3. Can be backwashed over and over
4. Recyclable
5. Can be fabricated from almost any material
6. Longer service life
7. Nanometer scale accuracy

## Manufacturing

Roll to roll or DVD/CD molding equipment can be deployed to manufacture disks a low cost.

## Tooling

Semiconductor processing equipment is used to create tooling masters.

## Materials and coatings

Almost any material or coating can be deployed for durability and hostile applications.

## Examples

Examples, from nanometer scale to full scale

# Applications, Manufacturing & Examples

*The applications are endless*



### Industrial Filtration

Reusable



### Pool Filters

Lower cost and can be backwashed



### Water Supply

Low cost reusable and can be backwashed



### Oil Filters

Longer life and recyclable



### Consumer Water

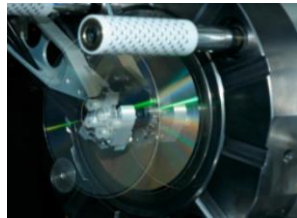
Recyclable



### Waste Water

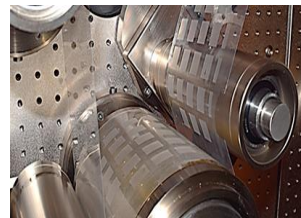
Reusable and can be backwashed

*The technology can be applied to all types of filters*



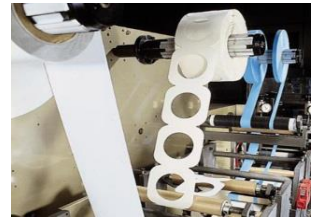
### CD/DVD molded

For low production volume. Quick to tool up and plenty of manufacturing capacity.



### Roll to Roll Manufacturing

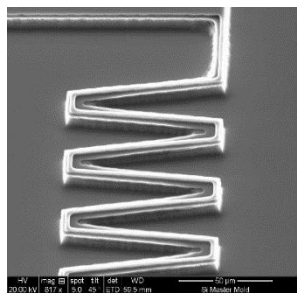
With roll to roll embossing disks cost pennies. For high volume production.



### Roll to Roll Die Cutting

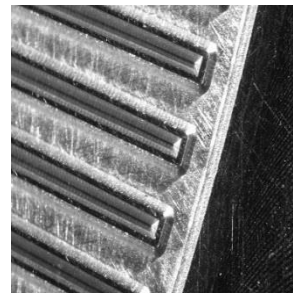
Sheet film can be cut into disks with conventional equipment.

*Conventional processing equipment can be deployed to manufacture the filter disks for a low cost and at high volume, no need to invent or develop equipment*



### SEM of "W's

An SEM of the W shaped walls. These create 200nm pores. The smallest feature is 2 microns wide



### V Grooves

A microscope picture of macroscopic channels on a disk



### Disks in Action

5 micron disks being backwashed at a wastewater treatment facility



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