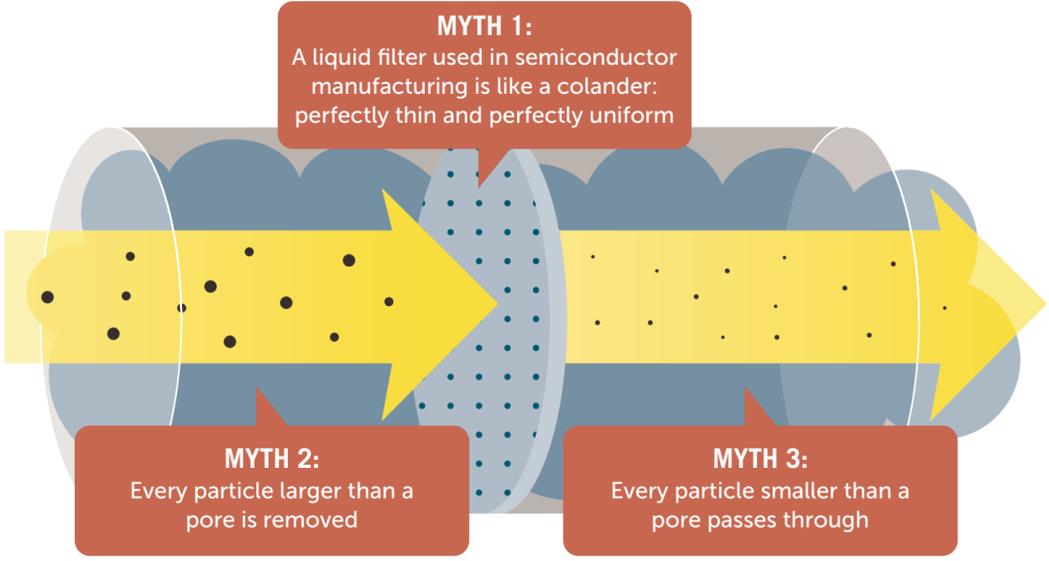


Filtration Facts and Fiction

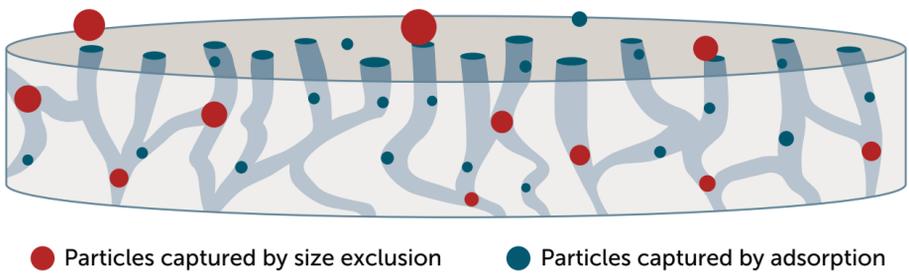
Using the “Lithographer’s Toolkit”

Filtration has an easily understood goal: remove all contaminants from a gas or fluid stream. However, there are many common myths about how filtration actually works that need to be dispelled. Entegris can help you understand the facts and how they inform the use of filtration in semiconductor manufacturing.



FACT: FILTER MEMBRANES ARE MADE FROM COMPLEX, POLYMER MATRICES

Liquid filter membranes are made of porous materials designed to guide fluids or gases through torturous paths. Two principles of retention are at work: size exclusion and adsorption.



As the industry pushes to eliminate ever smaller defects, the pressure drop through the filter must be considered.

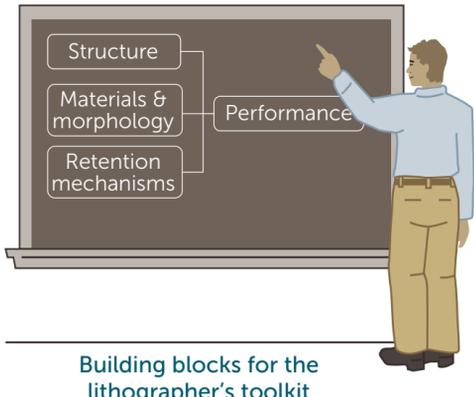
Pressure Drop

$$\Delta P = \frac{32Q\mu t}{d^n A \epsilon}$$

Q = volumetric flowrate
μ = liquid viscosity
t = membrane thickness
d = capillary equivalent pore diameter
n = an exponent between 2 and 4
A = membrane surface area
ε = membrane porosity

To increase productivity, equipment manufacturers would like to use filters designed for higher flow rate performance, but are often limited by the total pressure drop budget of their system.

FICTION: A SINGLE, UNIVERSAL FILTER CAN SOLVE EVERY PROBLEM



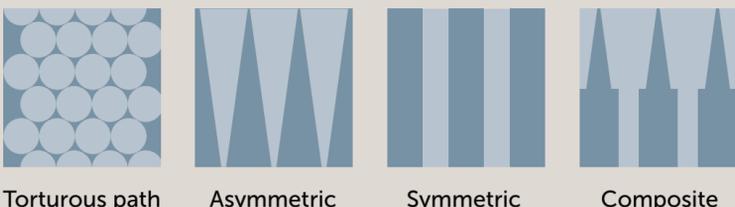
Considering the complexity of material interactions, the fact is that fab engineers must solve each contamination challenge independently. Entegris membranologists use a variety of tools, techniques, and technologies to ensure that a filter’s structure, material, retention, and ultimately performance, are tailored to address specific challenges.

SOLUTION: USING THE TOOLKIT

Filter Structure

Entegris designs a filter membrane’s physical structure to optimize the flow rate for each medium while retaining particles.

Cross sectional views



Filter Materials and Morphology

Entegris chooses filter materials based on chemical compatibility and suitability for the application in use.

	UPE	Nylon	PTFE
Organic solvent compatibility	+	+	++
Acid compatibility	+	Not recommended	++
Alkaline compatibility	+	+	++
Wettability	0	0	-



EXCLUSION:
The membrane is designed to generate pathways that can capture particles larger than the smallest opening within the depth of the membrane.



ADSORPTION:
The surface properties of a filter material are tuned to attract smaller particles using intermolecular forces.

FACT: ENTEGRIS CAN HELP

Lithography engineers should consider filtration early in the process design to address variability that negatively impacts yield. Entegris can help you select the optimal solution to reduce the variations that degrade the performance of your photolithography process.

Learn More

www.entegris.com/filters-toolkit