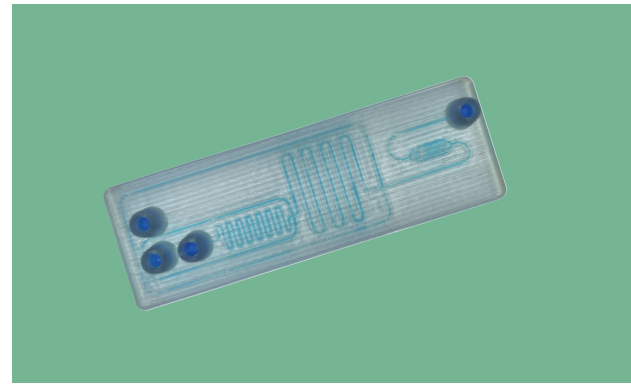


From CAD to Chip in One Simple, Reliable Step

PEN Natural makes biocompatible clear parts with precise dimensions and low particle adsorption.

Chips are ready to use straight from the printer.

From prototype to production, microfluidic manufacturing is as simple as design, & click "print".



Biocompatibility

- USP 88 Class VI
- USP 87
- ISO 10993-4, -10
- ADCF



One Step Fabrication

Enables out-of-the-cleanroom fabrication of robust, affordable microfluidic and millifluidic chips with:

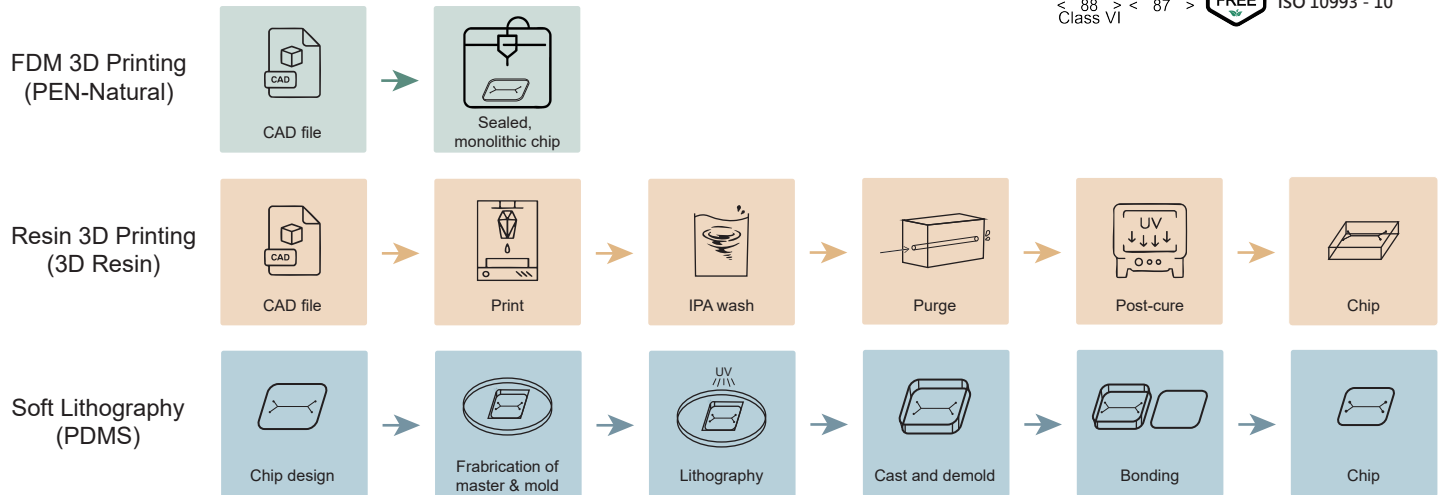
- **Burr-free channels**
- **Liquid-tight devices**, tested to 5 bars
- **No post-processing**



Reliable & Resilient

- The most chemically resistant, translucent 3D printing material on the market
- Able to incorporate PVDF membranes into chips

Production Steps Comparison



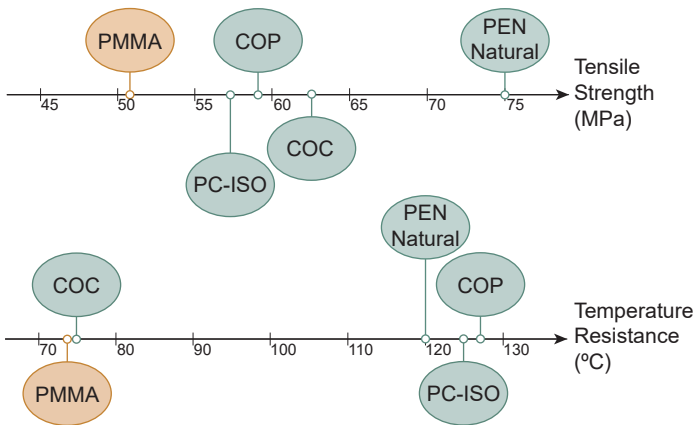
	FDM 3D Printing (PEN-Natural)	FDM 3D Printing (COC)	Resin 3D Printing (PMMA)	Soft Lithography (PDMS)
Steps	1: CAD→Chip	1: CAD→Chip	4: CAD→Print→Cleaning→UV Cure→Chip	4~8: CAD→Mask→Mold→Lithography→Cast→Demold→Bonding→Chip
Processing Challenges	Solved: • Solvent-tight prints up to 5 bar • Channel resolution down to 150 µm (width)	• Weak interlayer sealing • Poor bed adhesion • Hard to achieve liquid-tight	• Resin can block the channels • Warping after UV cure • Brittle	• Alignment and bound failures • PDMS swelling • Requires cleanroom
Feature Size (Channel Width)	150 - 200 µm	300 - 500 µm	100 - 200 µm	20 - 100 µm
Labor	Minimal (Prints easily)	Minimal (Hard to dial in)	Moderate (Needs multiple post-processing steps)	Very high (Multiple complex steps required)
Transparency	Moderate (Visibly clear; slight distortion due to FDM layer lines)		Excellent (Optical clarity)	Excellent (Brightfield) (Potential issue: Autofluorescence)
Temperature Range	-20°C - 120°C	-20°C - 75°C	5°C - 60°C	-50°C - 100°C
Chemical Resistance	Excellent (Resistant to alcohols, organic solvent, acids, bases)	Good (Resistant to alcohols, acids, bases; may swell in polar organics and aromatics)	Moderate (Resistant to water, alcohols; swell or cracks in some organics)	Poor-moderate (Swells in organics and leaches uncured material)

Applications

PEN-Natural microfluidic chips combine high chemical and thermal resistance with sufficient clarity, enabling:

- Chemistry**
Inert reaction channels for reliable analytical and synthetic processes.
- Drug Discovery & Microreactors**
Continuous-flow and microscale batch reactions for rapid screening and synthesis.
- Diagnostics**
Devices for water testing, pathogen detection, and biochemical assays with sufficient channel visibility.
- Electrochemistry**
Stable platforms for electrode integration in sensors, corrosion testing, and electrosynthesis.

Material Properties Comparison



Printing Services & Quality

- Flexible runs from 6 to 10,000 chips
- Multi-material 3D printing available
- PVDF membrane integration available
- Non-destructive ultrasound leak tests
- Packaging with traceability

Chemical Resistance Chart

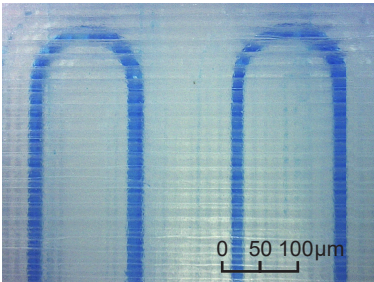
Organic Solvent	PEN	Inorganic Solvent	PEN
Acetic acid (20%)	A	Ammonium chloride (25%)	A
Acetone	B	Ammonia aq. (28%)	C
Alcohols	A	Hydrochloric acid (37%)	A
Chloroform	C	Hydrogen peroxide (30%)	A
Dimethyl sulfoxide (DMSO)	C	KOH (30%)	B
Ethers	A	NaCl sat. solution	A
Ethyl acetate	A	NaHCO3 sat. solution	A
Gasoline	A	NaOCl	A
Hexane	A	NaOH (30%)	A
Methyl ethyl ketone (MEK)	A	Nitric acid (20%)	A
Toluene	A	Sulfuric acid (10%)	A

Resistance at 23°C, immersed for 30 days.
A : weight change < 1%, tensile > 95%
B : weight change > 10%, tensile < 75%
C : weight change > 10%, tensile < 75%
D : dissolved or swelled

Ranking definition:
B : weight change between 1~10%, tensile > 75%
D : dissolved or swelled

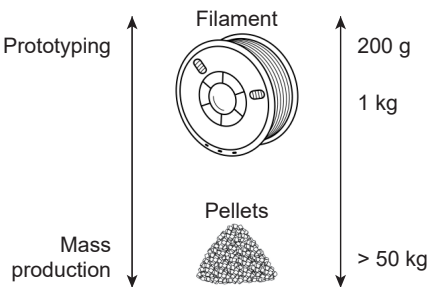
Printing Parameters

Nozzle size:	0.2 - 0.4 mm
Layer height:	0.05 - 0.2 mm
Nozzle temperature:	270 - 285 °C
Bed temperature:	70 - 100 °C
Printing speed:	35 - 100 mm/s
Part cooling fan:	0 - 30 %
Min. channel width:	150 µm
Min. channel depth:	100 µm
Surface roughness:	Ra < 5 µm



▲ Fluid channel at 12X magnification

Material Format



We're here to accompany you on your scientific journey by providing materials you can trust.
If you need assistance, simply reach out at hello@flxr.engineering.



FLXR Engineering Co., Ltd.

1 & 2F, No. 11-1, Wuquan 1st Road, Xinzhuang District, New Taipei City 24892, Taiwan

t +886-2-22901122
f +886-2-22995222

www <https://www.flxr.engineering>
@ hello@flxr.engineering

盈豐材料股份有限公司 24892新北市新莊區五權一路11-1號1、2樓

Disclaimer

All technical information provided in herein is offered 'as-is' and at your own risk. FLXR Eng makes no warranty—express or implied—regarding its accuracy or completeness. It is your responsibility to assess whether this information meets your needs. We have organized the data to offer you a honest, unbiased overview of available products for your selection.

MADE IN TAIWAN

