

XTPL Delta Printing System

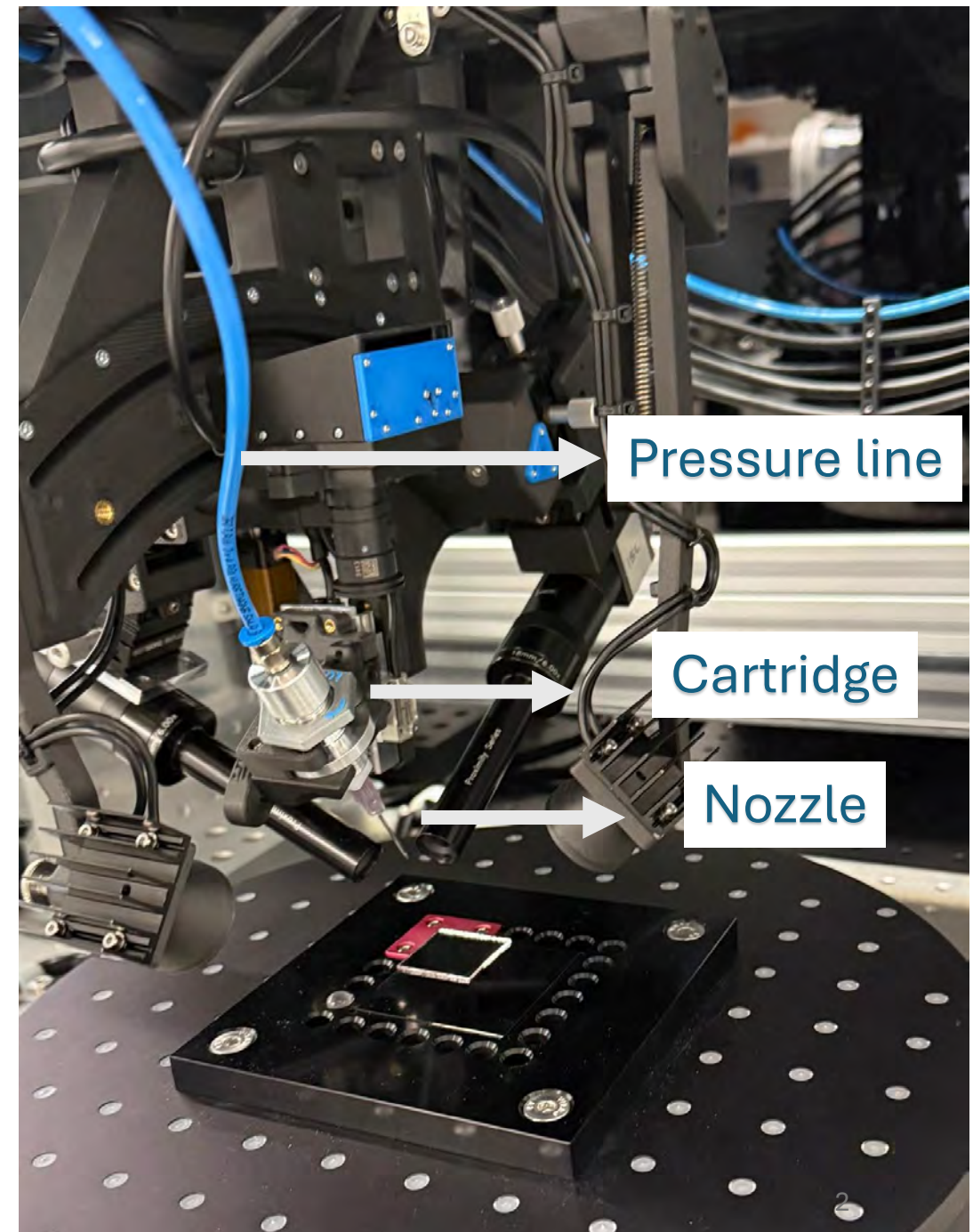
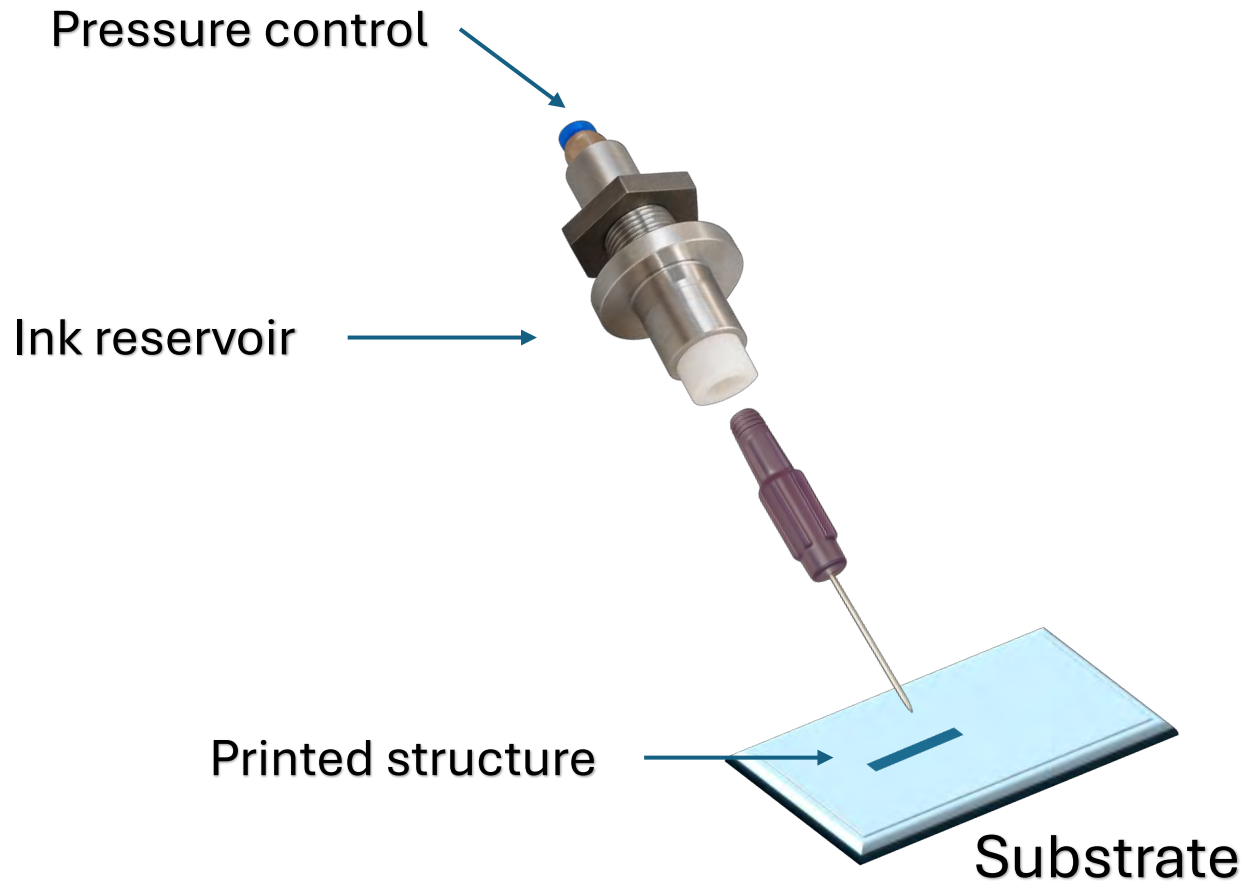
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Printing mechanism

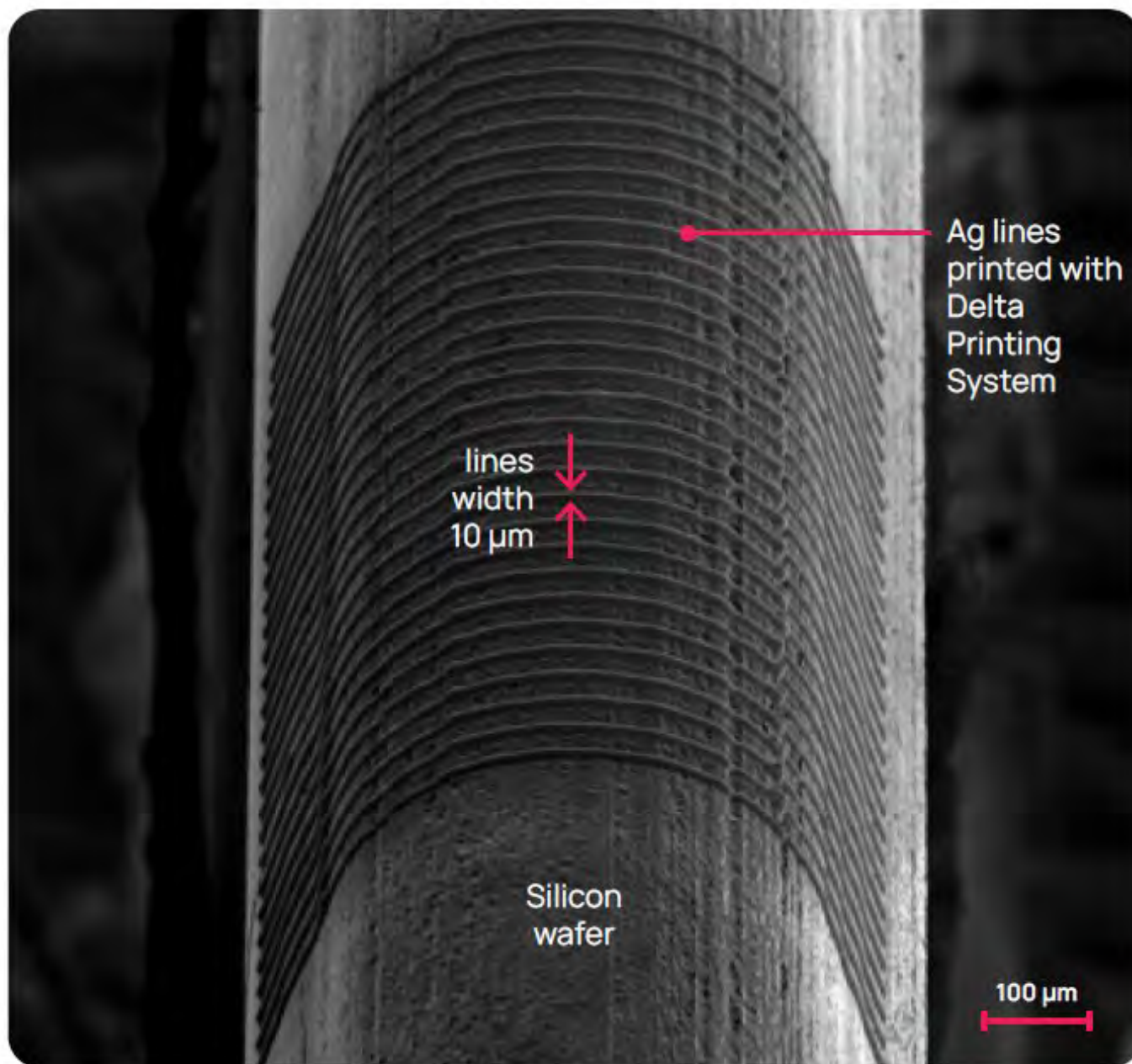
- A pressure-driven micro-dispensing method using a micron-scale nozzle.



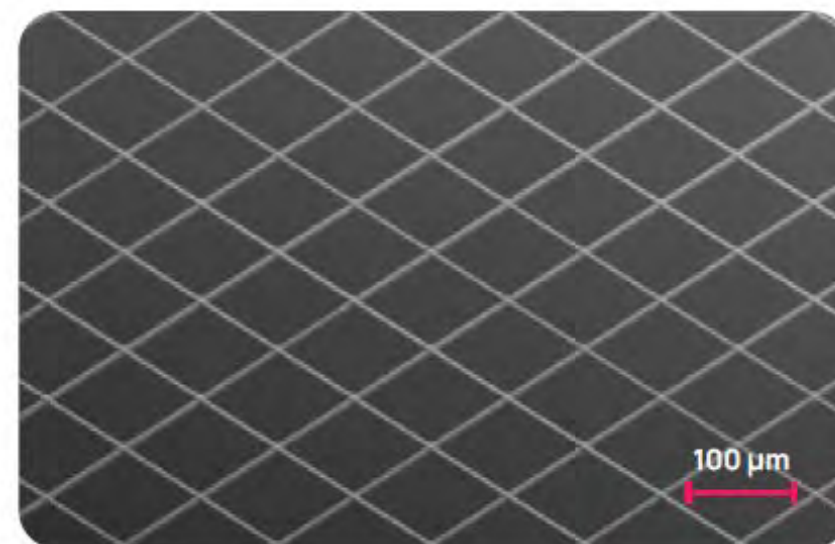
Ultra-Precise Dispensing (UPD) technology

- Wide range of printable materials: metallic nanoparticle inks and pastes, quantum dot inks, dielectrics, polymers, photoresists, organic, liquid metal alloys and more
- Feature sizes down to (sub)micron scale
- 3D Printing on heterogeneous substrate
- Uniform and clean feature geometries: no overspray, high linewidth homogeneity
- Fast and easy exchange of cartridges and nozzles
- Only 100 µl of ink required to start printing

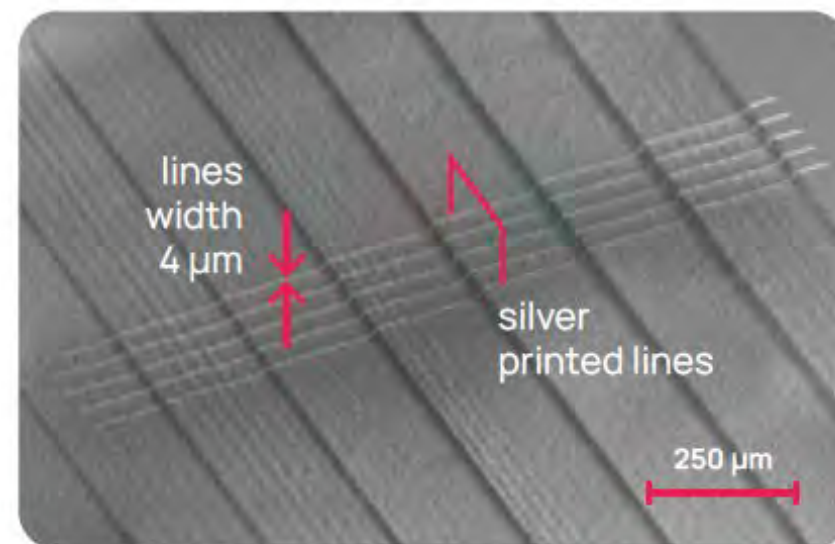
Silicon wafer printed on the edge with silver nanopaste CL85



on the glass substrate



Silver lines printed with silver nanopaste CL85



XTPL specifications

Item	Value
Feature size range	ultra-high resolution from 0.5 μm to 1 μm
	high resolution from 1 μm to 10 μm
	medium resolution from 10 μm to 50 μm
Viscosity	from 10 to over 1 000 000 cP
Substrate alignment	3-point levelling table with rotation error correction
Printing area	200 mm x 200 mm
Maximum printing speed	10 mm/s
Process preview	Video feedback from 2 high-resolution and 1 top view cameras
XY motor movement accuracy / repeatability	2 μm / 0.5 μm
Z motor movement accuracy / repeatability (vertical adjustment)	0.5 μm / 0.5 μm

XTPL Consumable Price List

Item	Code	MOQ	Net price EUR
Empty cartridge	XT_C00	1	225
Cartridge with silver nano-ink CL85	XT_C05	1	390
Package with 50 reservoirs for stand-by station	XT_S50	1	14
Nozzle with diameter of 1.5 µm	XT_N15	5	170
Nozzle with diameter of 3.5 µm	XT_N35	5	170
Nozzle with diameter of 5.0 µm	XT_N50	5	170
Nozzle with diameter of 8.0 µm	XT_N80	5	160
Nozzle with diameter of 10.0 µm	XT_N100	5	160
Nozzle with diameter of 20.0 µm	XT_N200	5	190
Cartridge with gold nano-paste Au 90*	XT_C06	1	4,740

Nozzle sizes

* Product under development. The price of the product is a dynamic price and can change depending on the quotations of the raw material.

Item	Code	MOQ	Net price EUR
Ag Nanopaste CL85	XT_CL85	20 g	28
Ag Nanoink CL60	XT_CL60	10 ml	45
Ag Nanoink CL34	XT_CL34	25 ml	20
Ag Nanoink IJ36	XT_IJ36	25 ml	18
Au Nanopaste 90	XT_AU90	1 ml	4,498**
CuEx Nanopaste	XT_CUEX	20 g	Tbc**

Important Notes



Approximately 5-10 nozzles are required to train each student.



1.5 μm nozzles are single use (Larger nozzles can last 30 days after filling).



After printing, the substrates were thermally sintered at 250 °C for 30 min (Ag) and 350 °C for 20 min (Au).



The Ag, Au ink maintain initial quality for up to two months. (But it's printable with larger nozzles even after a year.)



Nozzle cleaning is basically impossible for higher viscosity inks.

Printing options (ink):

1. Cartridge from XTPL (Ag, Au)
2. Loading an empty cartridge (own materials)



3. Filling the nozzle (own materials)

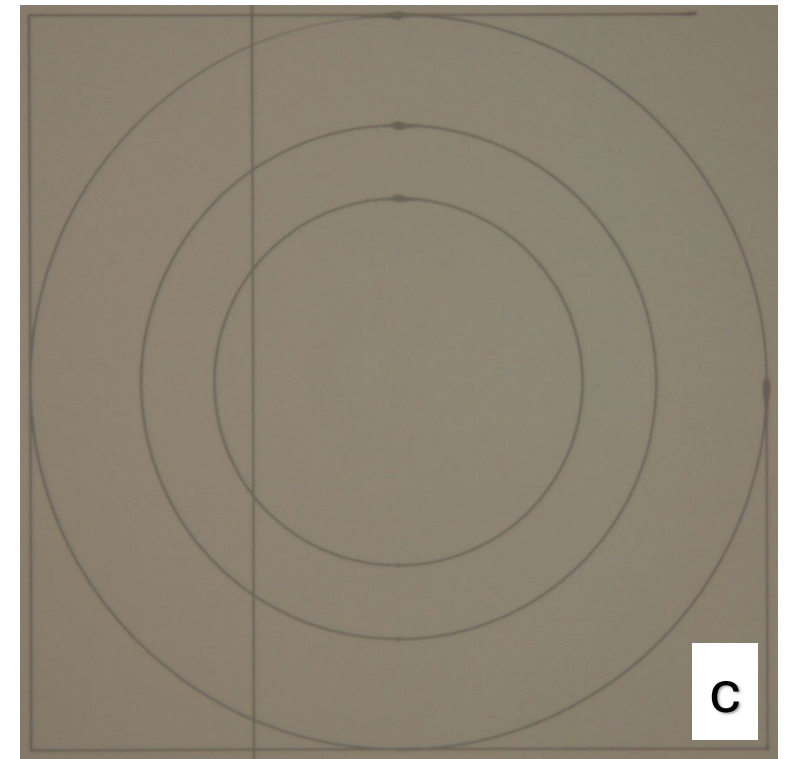
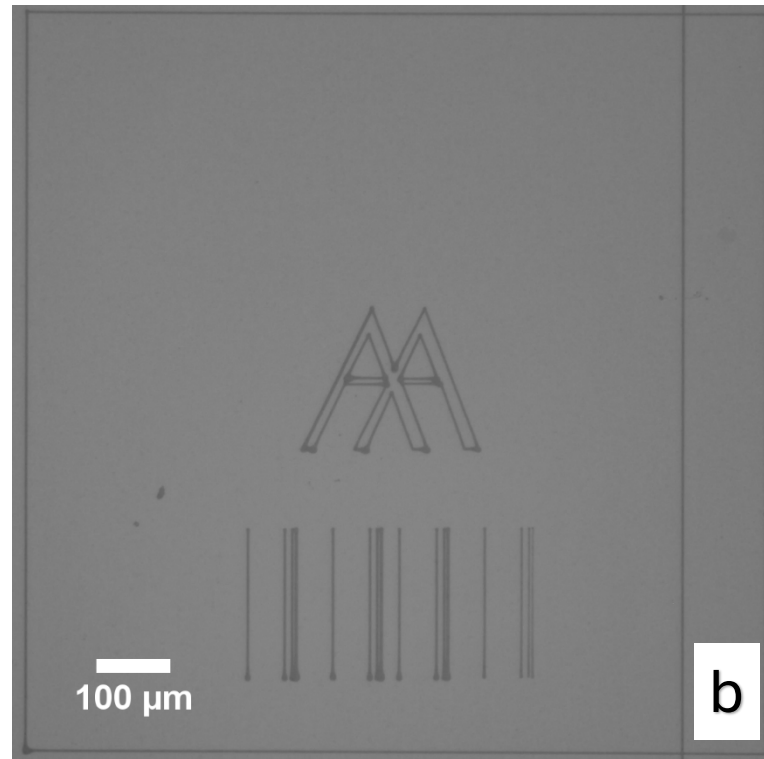
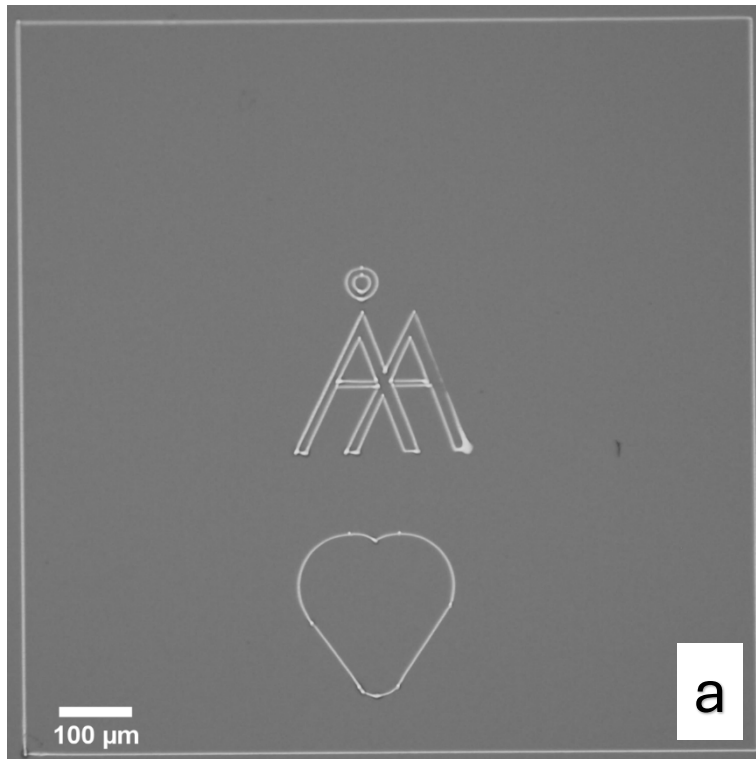


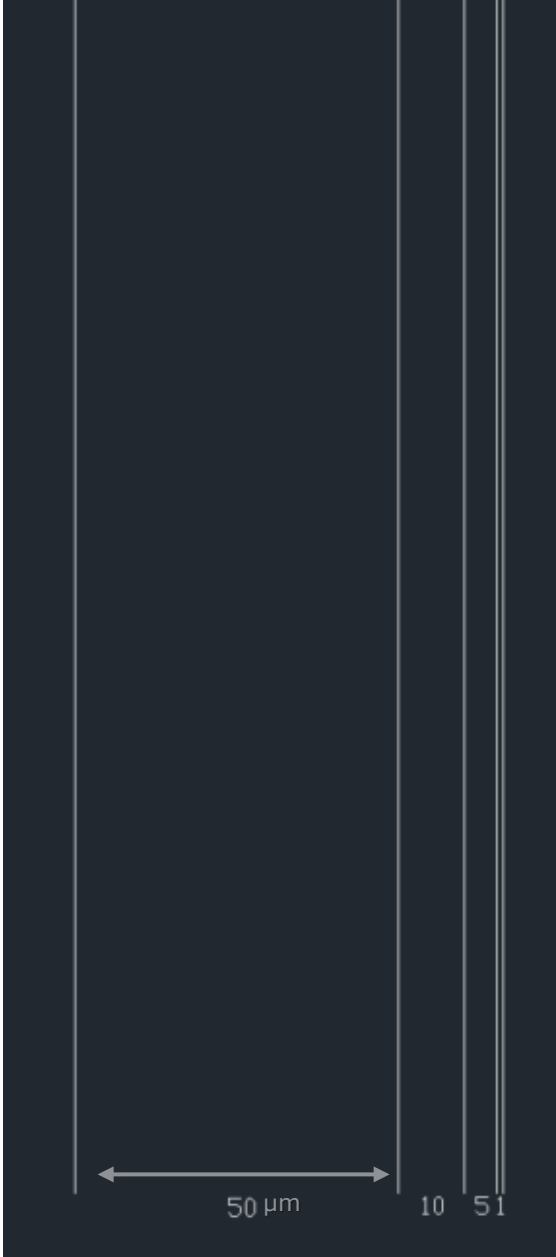
4. Adapter, syringe (own materials and needles)



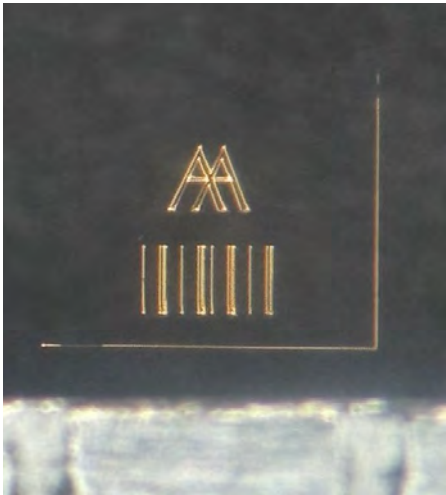
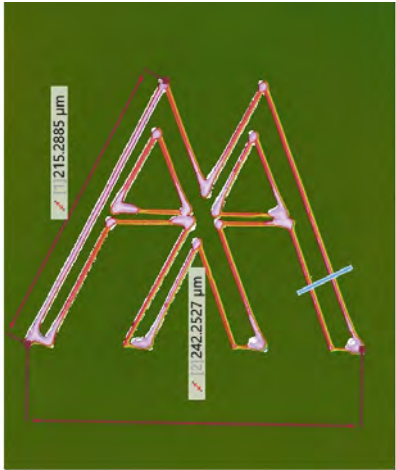
Examples:

Structure name	Size	Nozzle size	Ink
a, b, c	1mm × 1mm	3.5 μ m	Silver

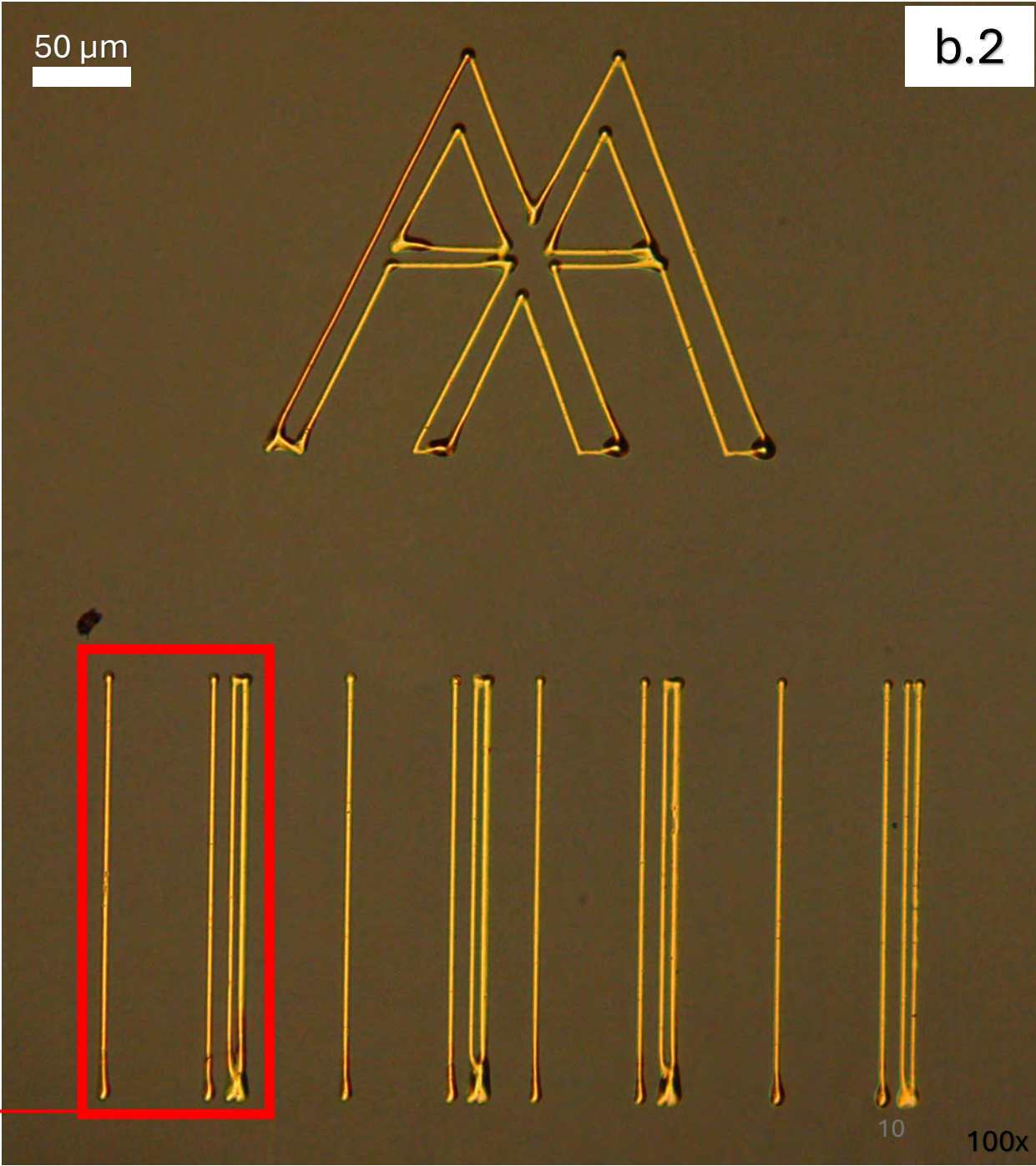


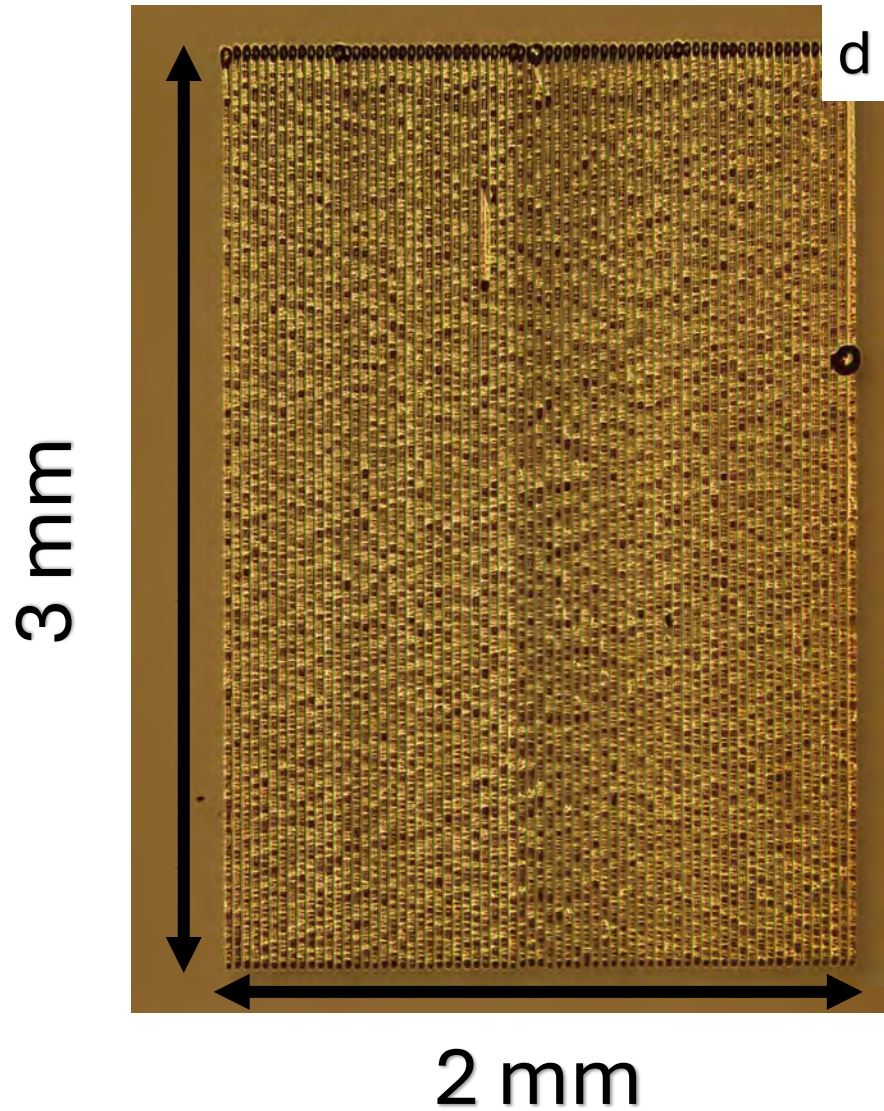


Nozzle size	Ink
1.5 μm	Gold



CAD



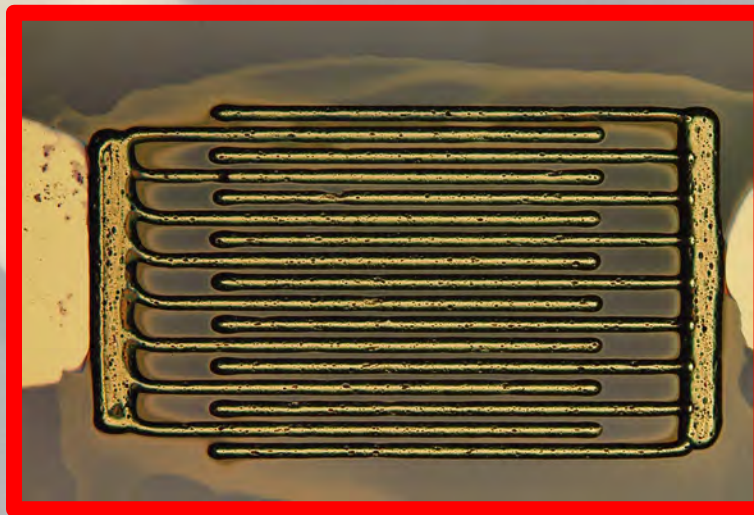


Structure name	Size	Nozzle size	Ink
d	3 mm × 2mm (70 lines, 30 μm gap)	20 μm	Gold



e

Interdigitated Electrodes:



Printed part



Nozzle size

Ink

1.5 μm

Silver

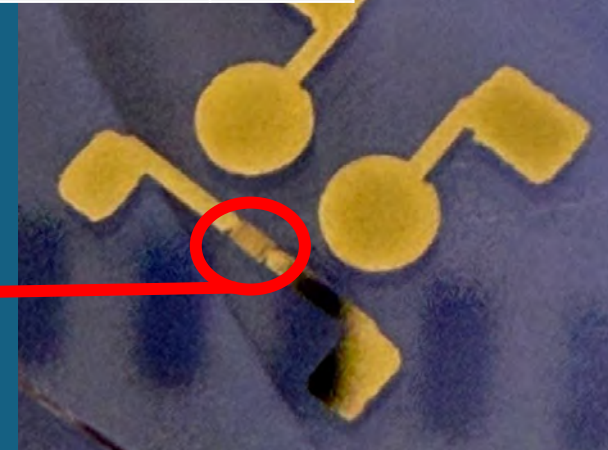
Nozzle size

Ink

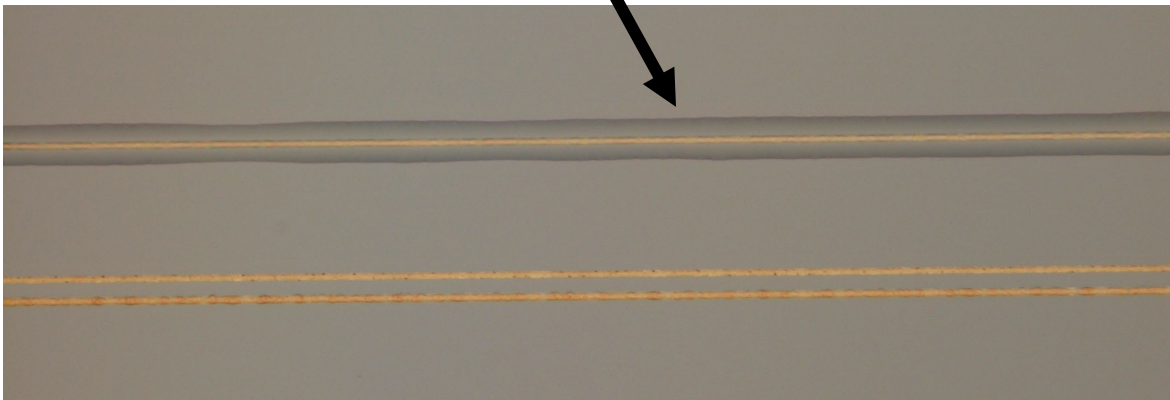
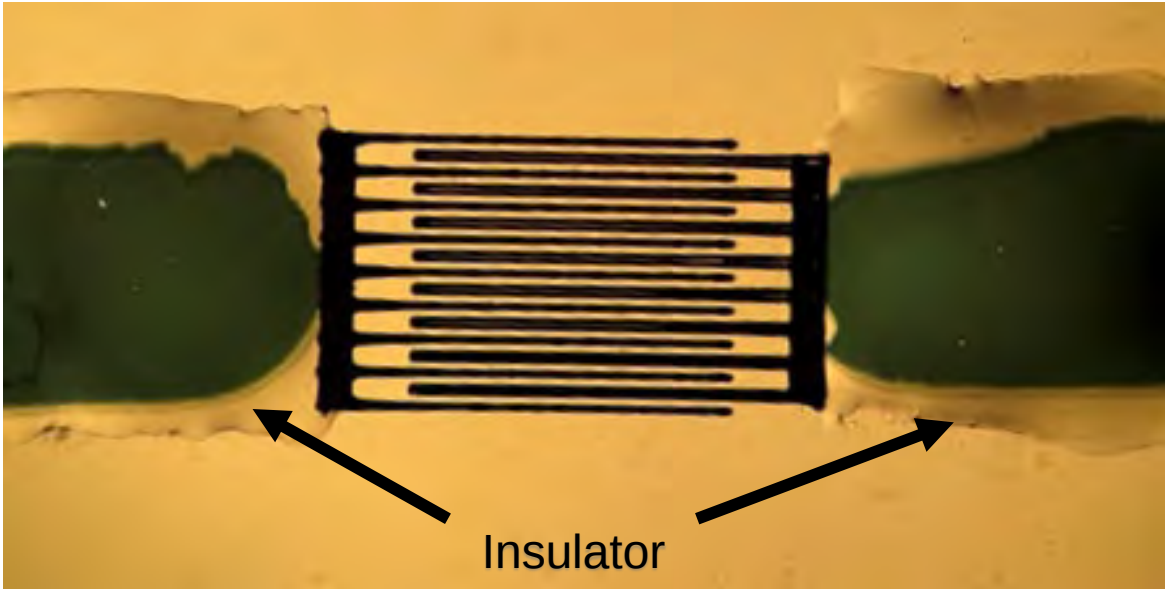
20 μm

Gold

f



Printing of insulators:



Norland Optical Adhesive NOA 81

General				
	Size (oz):	16	Norland Number:	81
	Shelf Life:	4 months	Type:	Bottle
	Typical Applications:	Extra fast curing adhesive for tacking Spot bonding or centering		
Optical Properties				
	Index of Refraction (n _d):	1.56 @ 589nm	Absorption Range (nm):	320 – 380
Material Properties				
	Glass Bonding:	Excellent	Metal Bonding:	Excellent
	Plastic Bonding:	Fair	Viscosity (cps):	300
	Bonding Type:	Glass to Glass/Metal	Energy for Full Cure (J/cm ²):	2

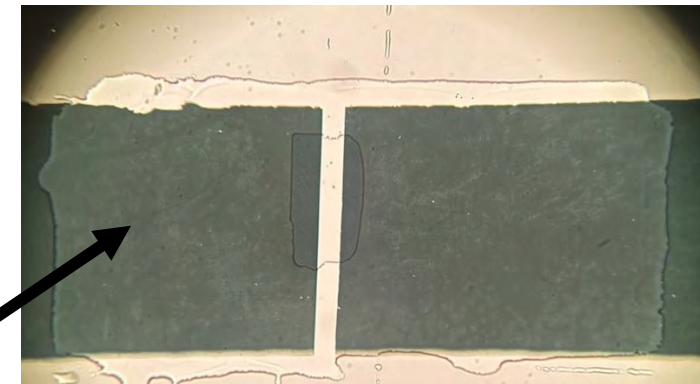
Nozzle size

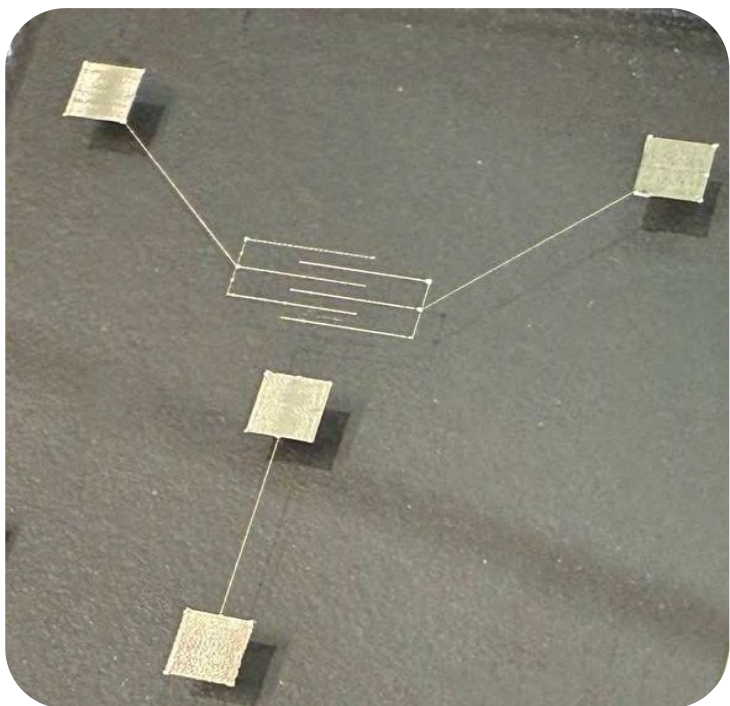
Ink

5 and 8 μm

NOA81

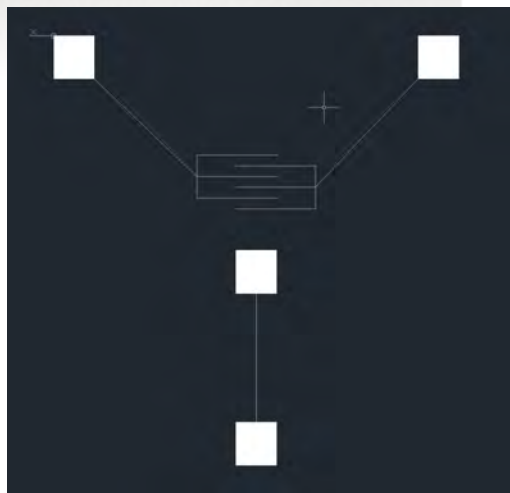
Insulator



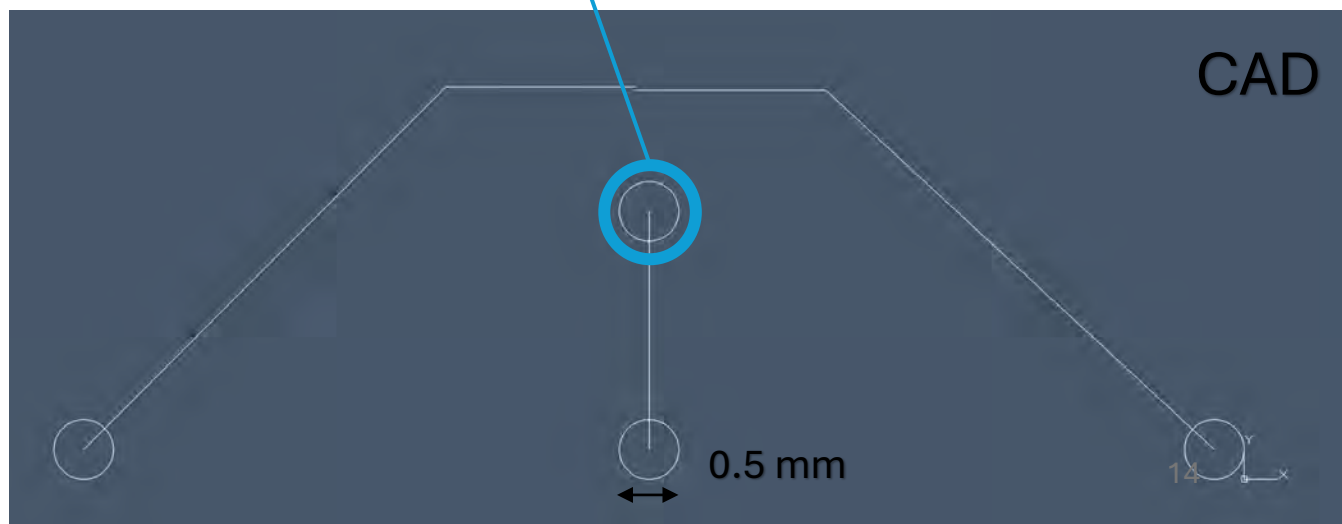


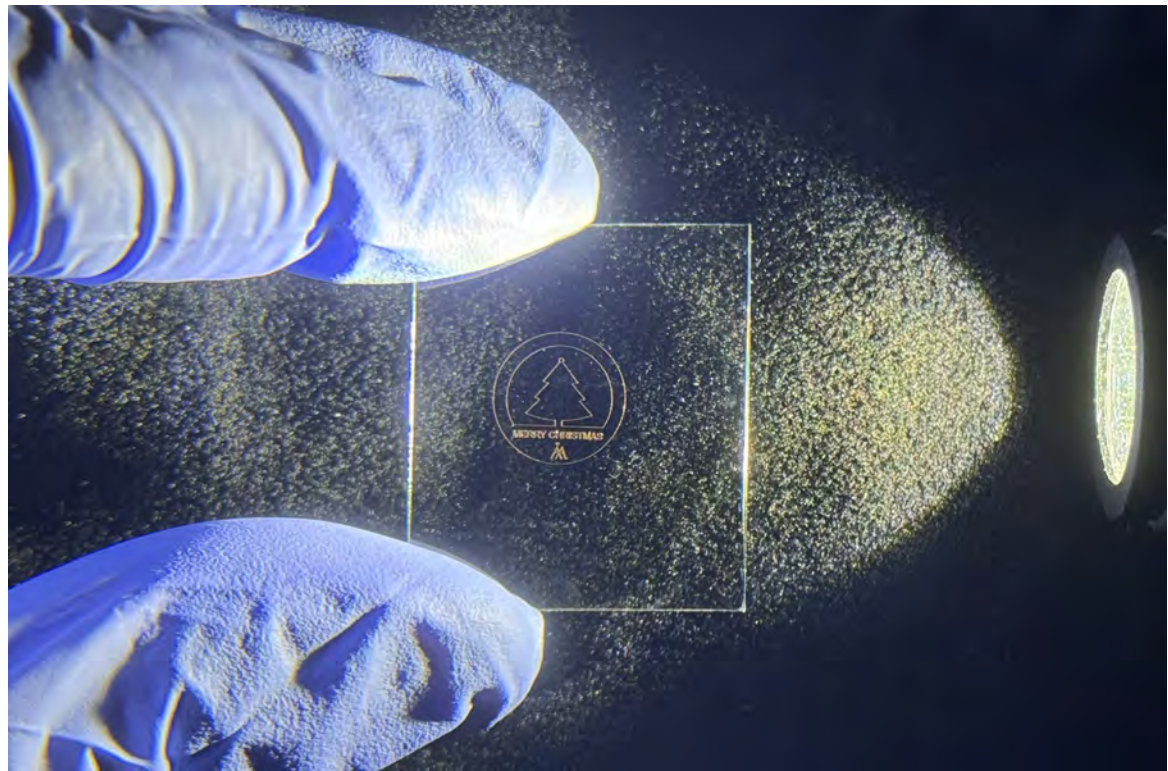
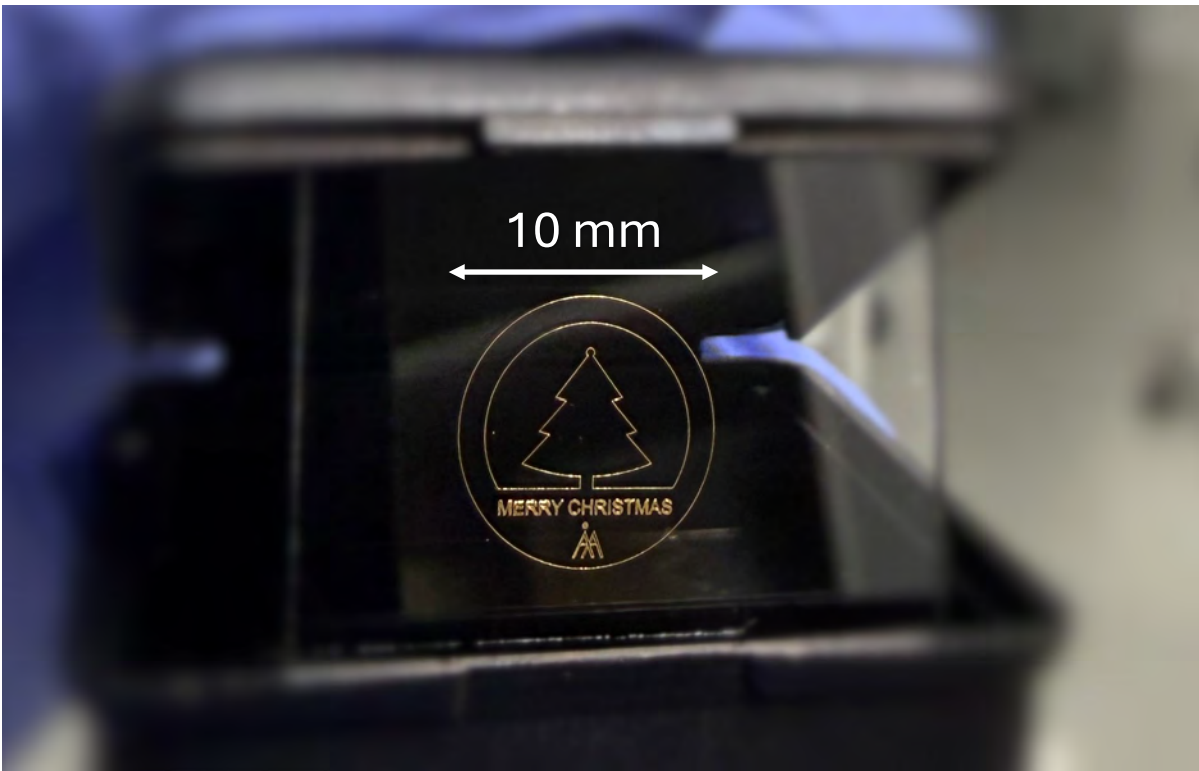
1 cm

Nozzle size	Ink
20 μm	Silver



Nozzle size	Ink
20 μm	Gold





Nozzle size	Ink
20 μm	Gold