



All-Plastic Lab-on-a-chip demonstration

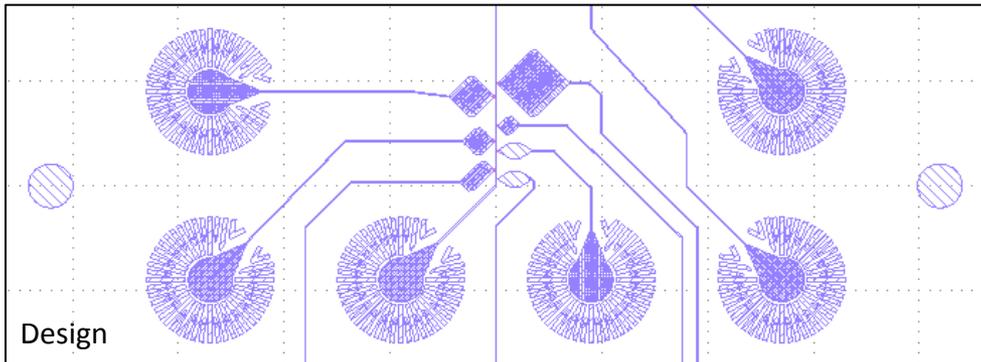
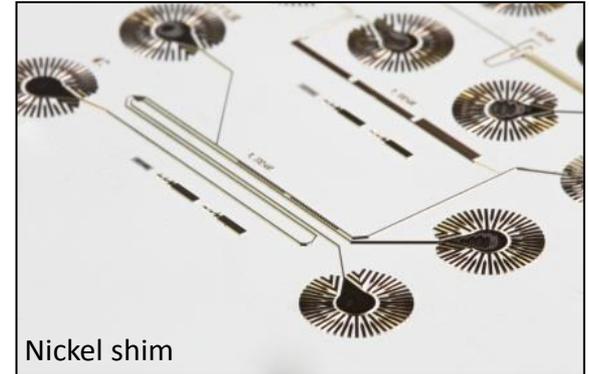
PolyNano event

-- Technical description --



We are making all-plastic lab-on-a-chip using injection moulding.

- Nickel shims with the opposite polarity of the chip is used inside injection moulding cavity to create the chips
- Nickel shims can have line widths from sub-100 nm to hundreds of μm and the structures can have different heights
- Bonding of lids or sealing of channels are performed

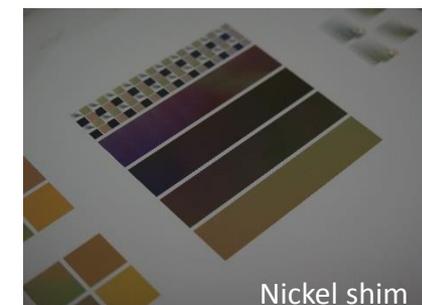
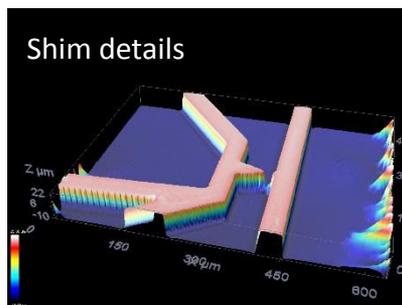
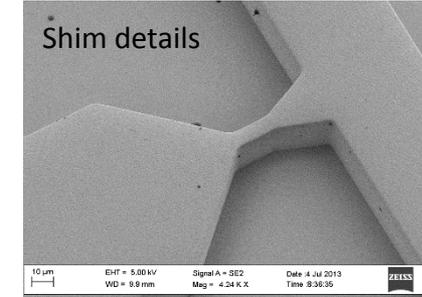
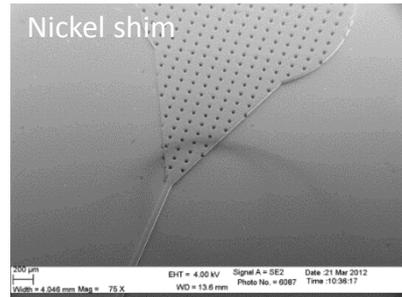
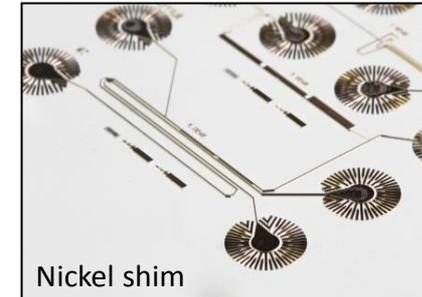
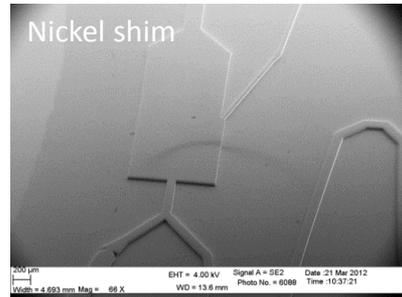


Key technologies:

- Electron beam lithography
- DUV lithography
- UV lithography
- Dry etching (ICP, RIE, IBE)
- Nanoimprint lithography
- Hot-embossing
- Bonding (anodic, fusion, thermal, polymer)
- Nickel electroplating
- Injection molding

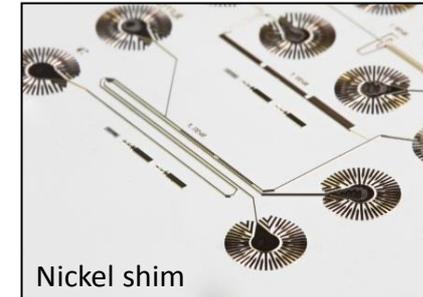
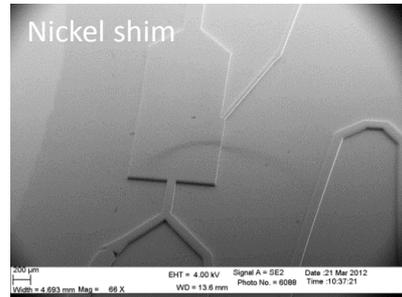
Nickel shims for LOC and microfluidics devices. **Nickel shims have the opposite polarity of the plastic chip.** The nickel shims are used for injection moulding or nanoimprint/hot embossing.

- The design can contain up to 3 lithography layers
- The minimum lateral dimensions on each layer is 60 nm made with EBL (electron beam lithography) layers and 3 μm made with UVL (UV lithography) layers
- The maximum aspect ratio on individual layers are 1:3 (width:height)
- Maximum height 125 μm
- Seed Layer: NiV
- Shim thickness 330 μm +/- 30 μm



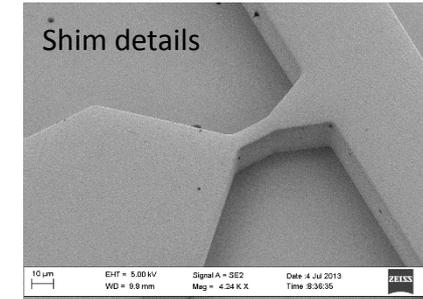
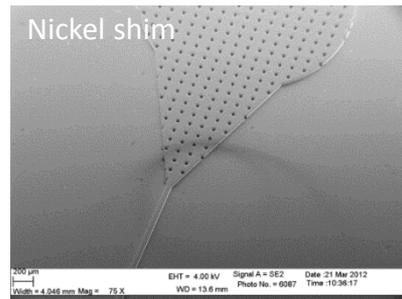
We are working with three different formats. You can download gds files at

www.polynano.org/proofofconcept



Formats:

- Ø50 mm flat disc with thickness of 2 mm
- Ø50 mm disc with 12 Luer connectors and thickness of 2 mm
- Microscope slide of 21 mm x 76 mm and thickness of 1 mm

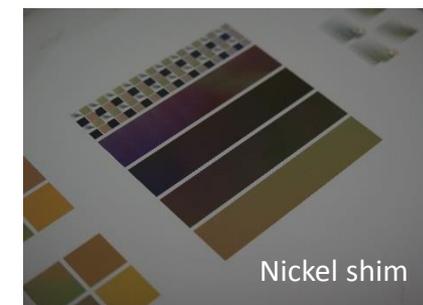
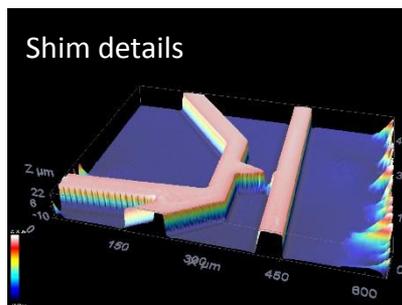


Polymers:

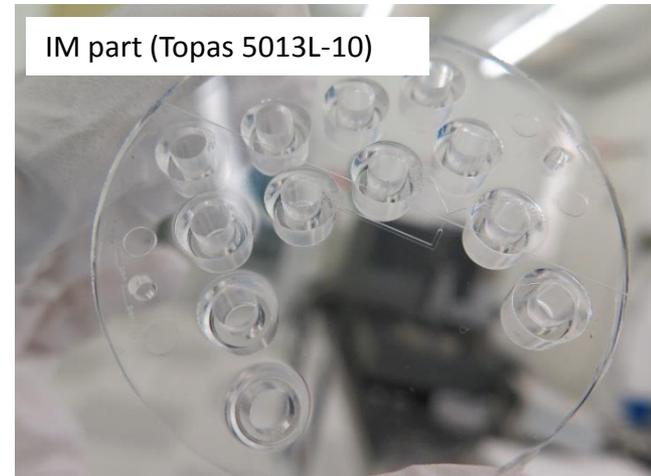
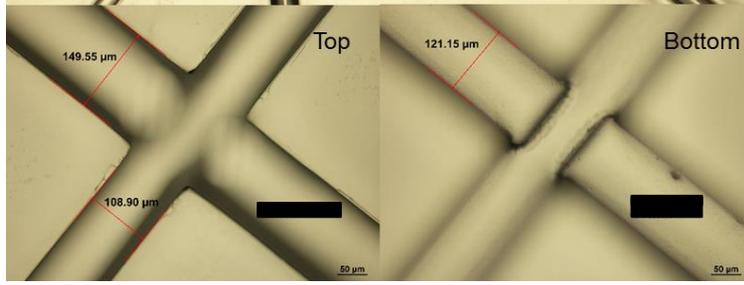
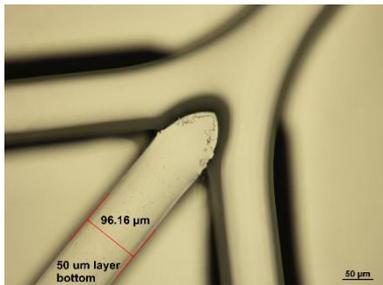
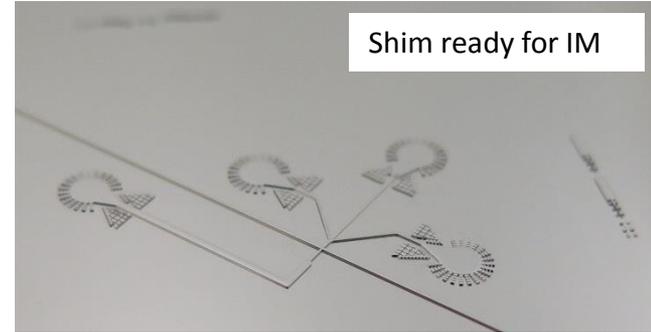
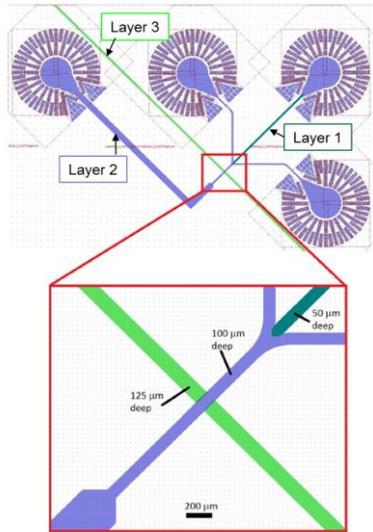
- Topas, PS, PP, PE, PC, PMMA

Lid/sealing of channels

- Choice of technology depending on need

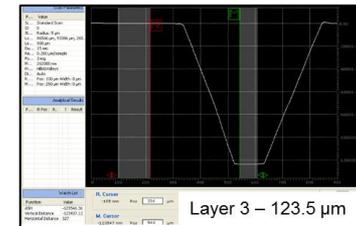
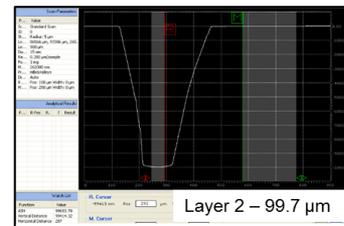
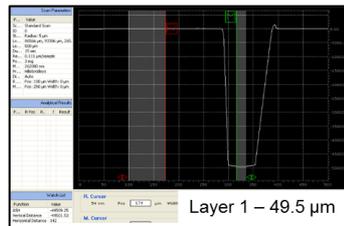


EXAMPLE: ALL-PLASTIC LAB-ON-A-CHIP BY INJECTION MOULDING



Lab-on-a-chip fabricated by injection moulding using nickel shim. Three layers.

Layer 1: 100 μm wide and 50 μm deep
 Layer 2: 100 μm wide and 100 μm deep
 Layer 3: 150 μm wide and 125 μm deep





PolyNano



PolyNano Partners



復旦大學



InMold Biosystems A/S



Danish Agency for Science
Technology and Innovation
Ministry of Science
Technology and Innovation



PolyNano



CONTACT INFORMATION



NIL Technology (NILT) is the responsible partner for making the lab-on-a-chip prototypes

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