

## BIOMEDICAL ENGINEERING

Nanoscribe's Photonic Professional *GT2* offers full design freedom, high precision for microfabrication of customized biomedical devices up to the millimeter scale. The high resolution of the printers is especially favorable for mimicking natural environments at sub-cellular scale for lab-on-a-chip applications. Also, the printer is used to develop precision instruments needed in minimally invasive operations. Biocompatibility of multiple 3D-printed parts has been demonstrated in contact with living cells and tissue. The printable materials range from photoresins to biodegradable hydrogels and functional resins containing nanoparticles.

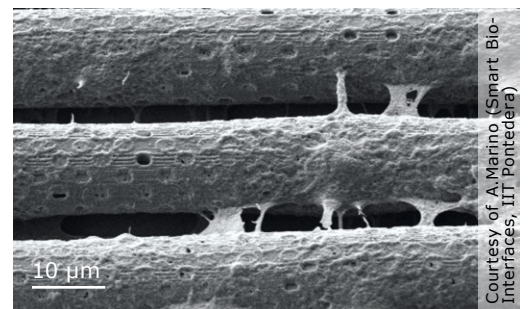


### BLOOD-BRAIN BARRIER MODEL

**Challenge:** Fabricating a real-scale biohybrid model of the blood-brain barrier for drug screening. This model requires tubular structures of 10  $\mu\text{m}$  diameter and pores of 1  $\mu\text{m}$  diameter as supporting scaffold for endothelial cells.

**Solution:** A millimeter-long system of porous cylindrical channels is 3D printed. The cells cultivated on this scaffold build a biological barrier mimicking the blood-brain barrier.

**Source:** DOI: 10.1002/sml.201702959

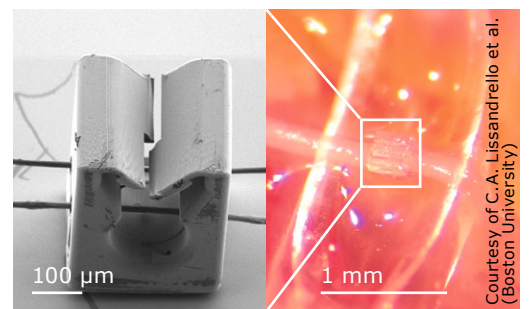


### NERVE INTERFACE IMPLANTS

**Challenge:** Producing micro-scale implants to stimulate and track nerve responses.

**Solution:** Nanoclips with trapdoors for fixing nerves, slots for placing electrodes and through-holes for surgical handling are 3D printed. Transplanted into zebra finches they show healthy nerve activity post implant.

**Source:** DOI: 10.1088/1741-2552/aa5a5b

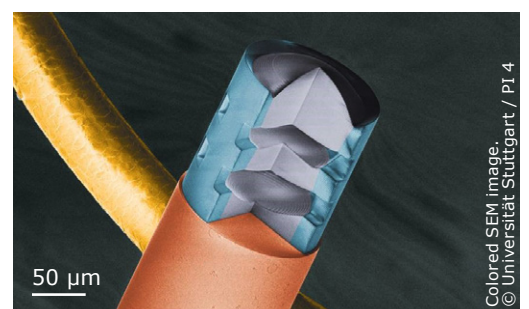


### MULTI-LENS OPTICS ON A FIBER

**Challenge:** Fabrication of a compound lens system consisting of three objectives stacked on the tip of 125  $\mu\text{m}$  diameter optical fiber. The device can find applications in endoscopy.

**Solution:** A triplet lens system is fabricated in one printing step without the need of further assembly nor alignment of the lenses. Printing is done in situ on top of the fiber.

**Source:** DOI: 10.1038/nphoton.2016.121

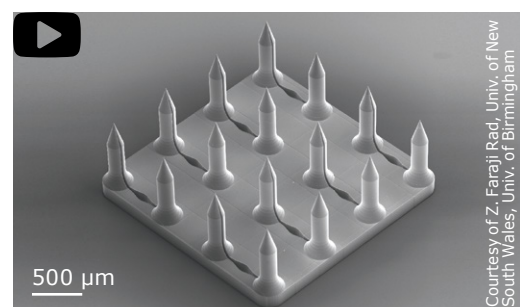


### REPLICATED HOLLOW MICRONEEDLES

**Challenge:** Replication of hollow microneedle arrays with microfluidic channels and sharp tips. The replicas aim to be used for point-of-care collection of blood or drug delivery.

**Solution:** Needles are additively manufactured from a CAD model. The needles' master is cast in a negative mold. The mold is replicated by soft embossing into a thermoplastic cycloolefin polymer that shows agent delivery into a rabbit's ear.

**Source:** DOI: 10.1038/micronano.2017.34



Learn more about the world's  
highest resolution 3D printer  
Photonic Professional *GT2*

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