



# Functional Two-photon 3D Printing for Optics: Multi-materials Processing Made Easy

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EPIC TechWatch W3+ Wetzlar | 14.03.24

- Spin-off TU Dresden  
Center for Advancing Electronics  
EXIST Transfer of Research
- Incorporated            2023  
Revenue 2023            59 k€  
Pre-Seed                 490 k€  
Employees                8
- Pilot customers        4  
Systems planned        3 (Q2/2024)



MACRO



High optical quality ✓

MILLI

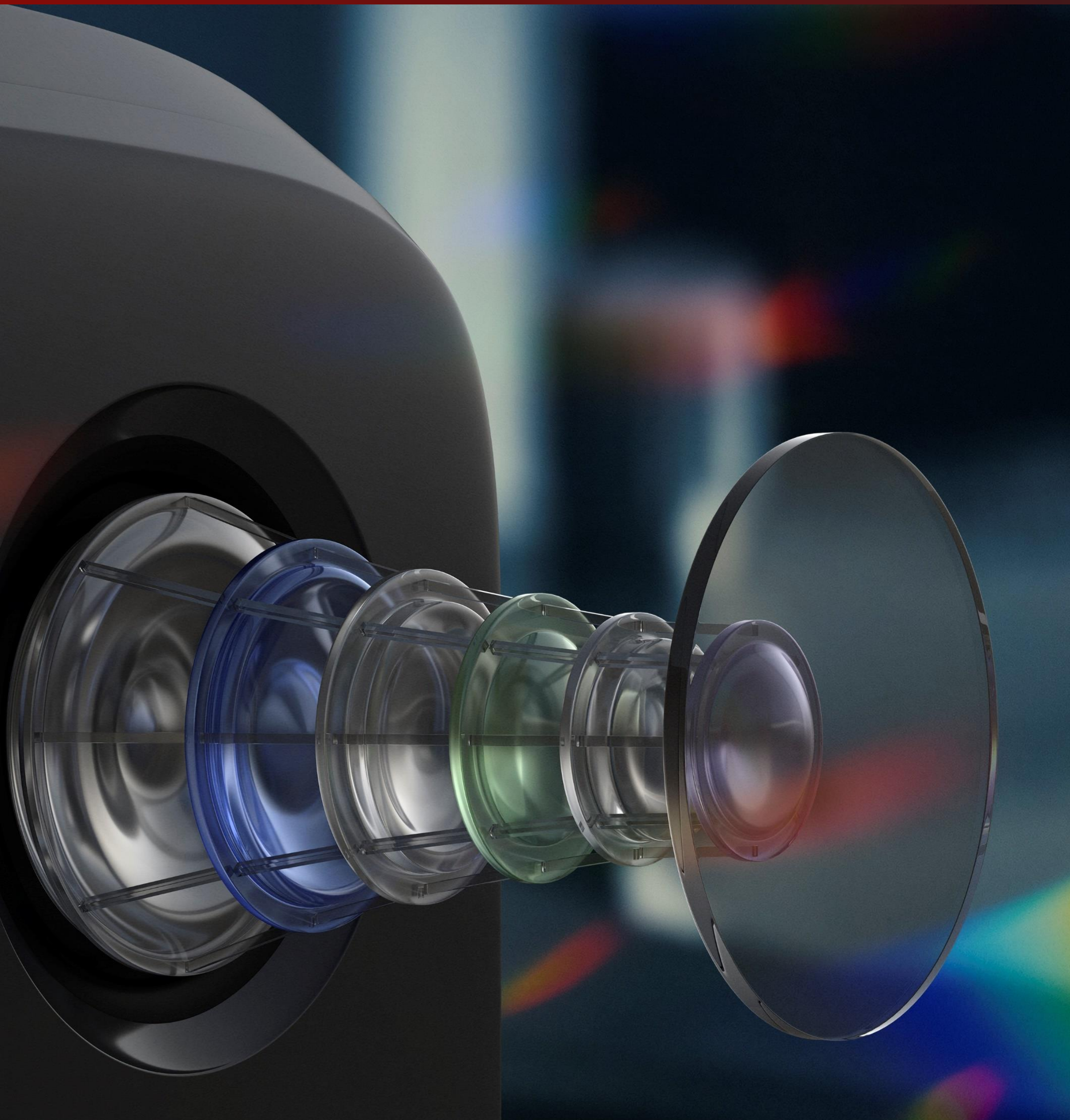


High optical quality ✓

MICRO



Low optical quality ✗



## Problem



Low optical quality

## HETEROMERGE

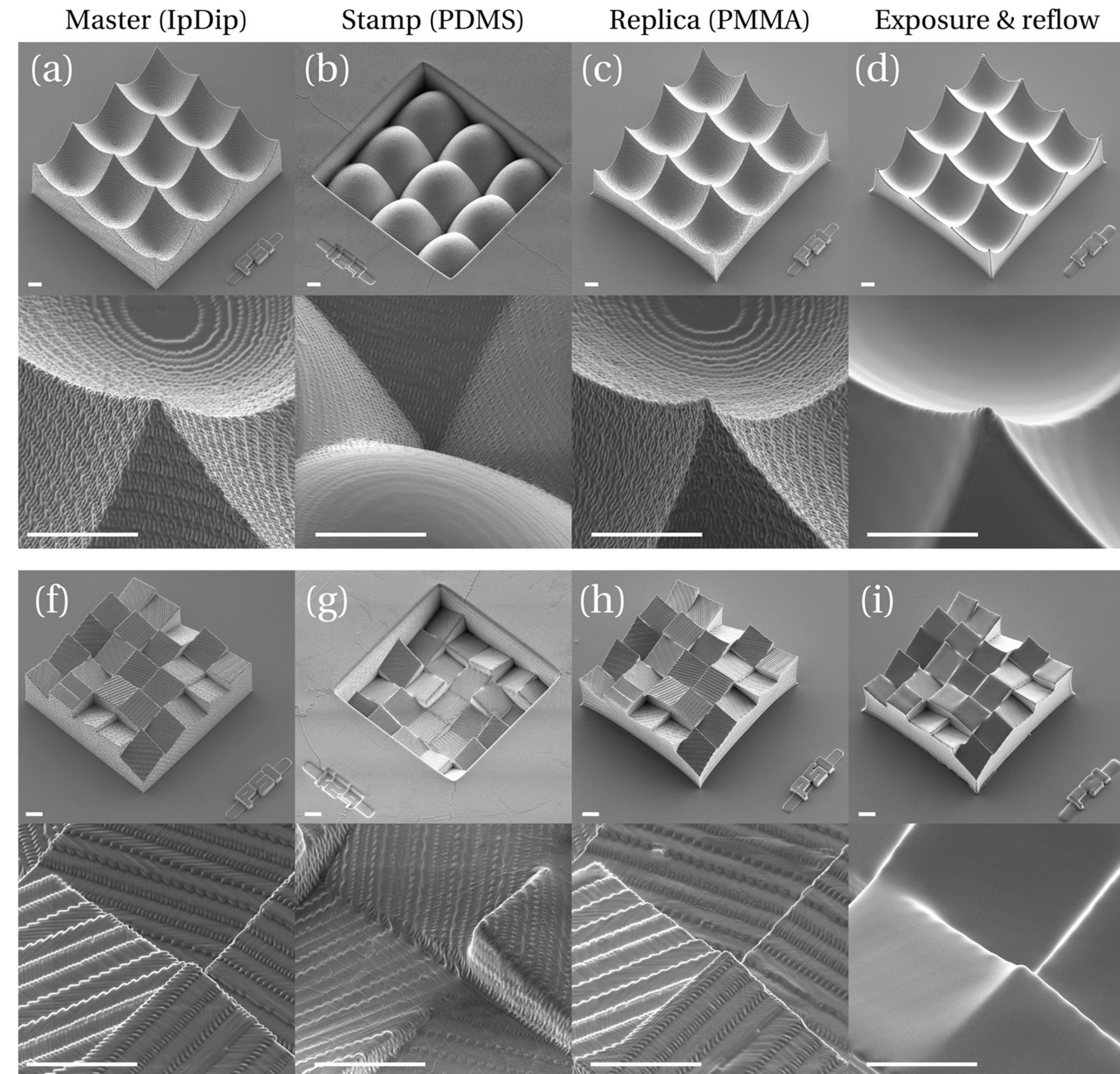
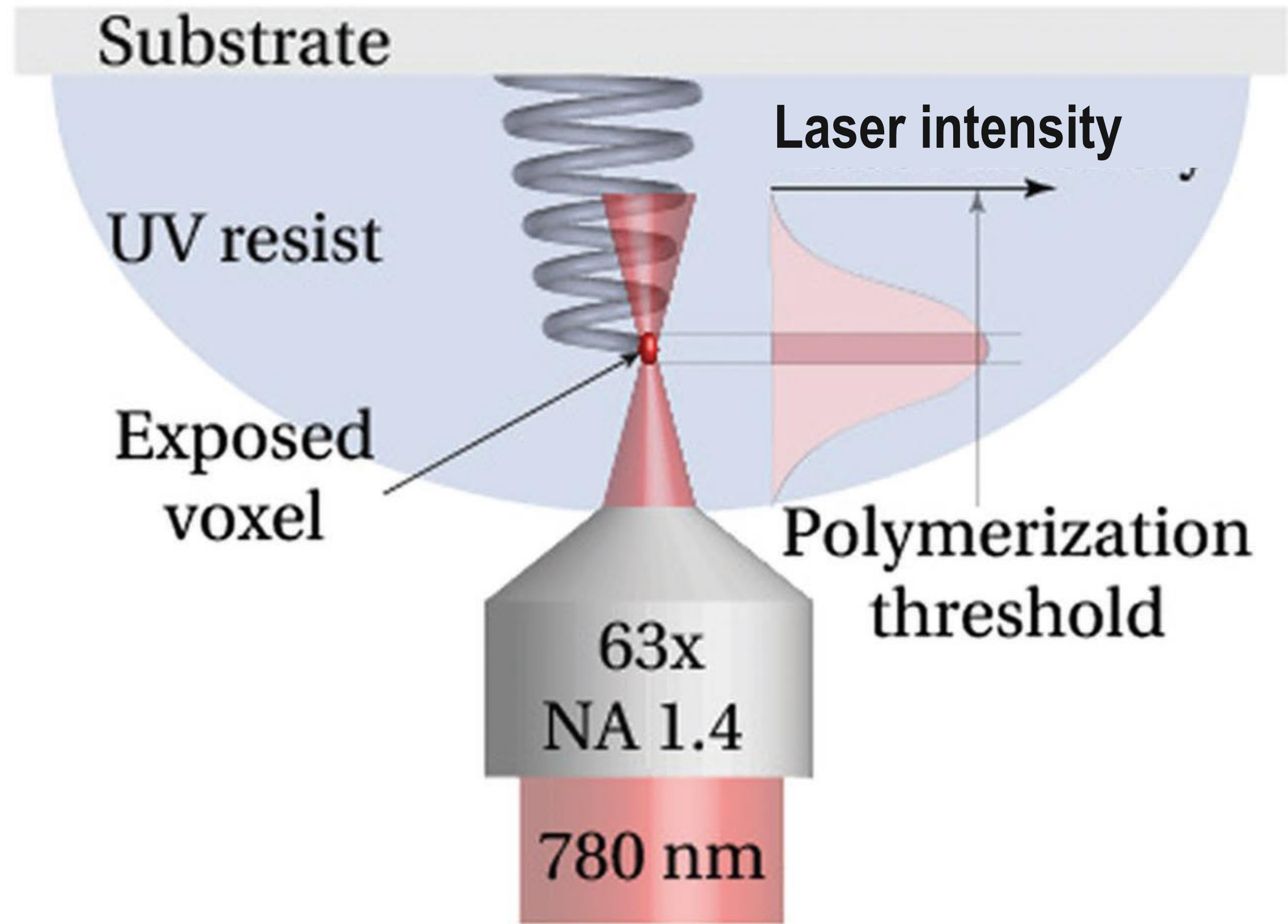


250  $\mu\text{m}$



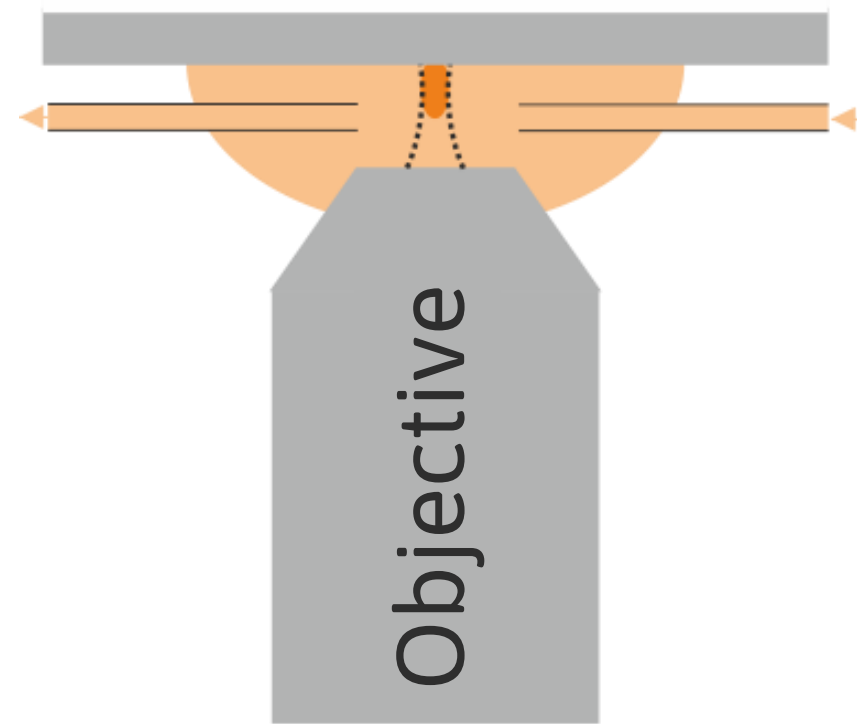
High optical quality

# 2PP: high resolution 3D printing

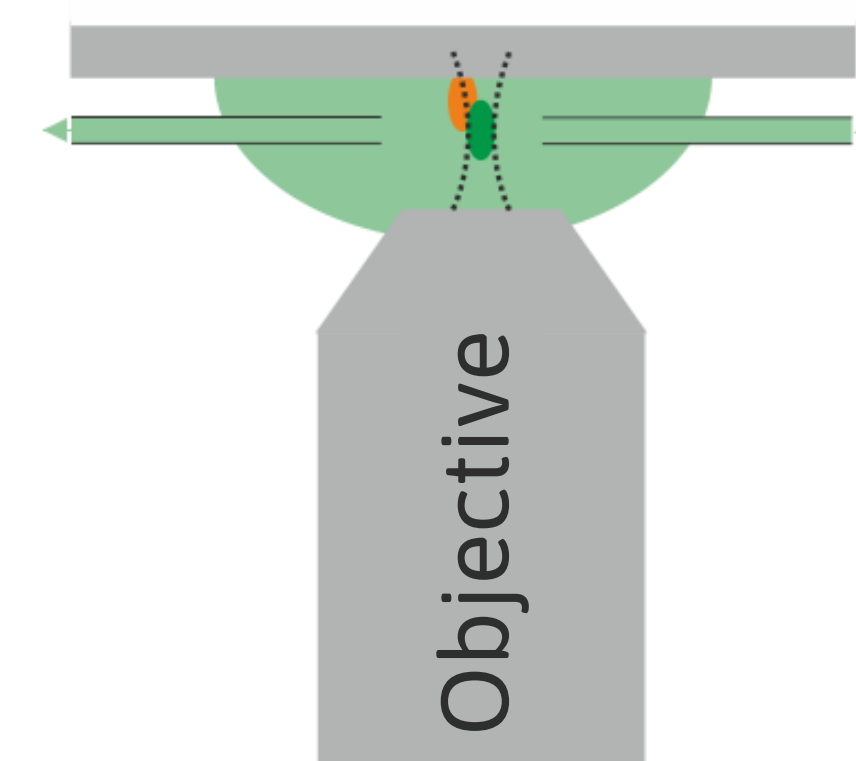


N. Chidambaram and R. Kirchner et al. Adv. Mater. Technol. 2017, 1700018 | N. Chidambaram and R. Kirchner et al. J. Vac. Sci. Technol. B 34(6), Nov/Dec 2016.

Printing Material A



Printing Material B



Material exchange

Start over

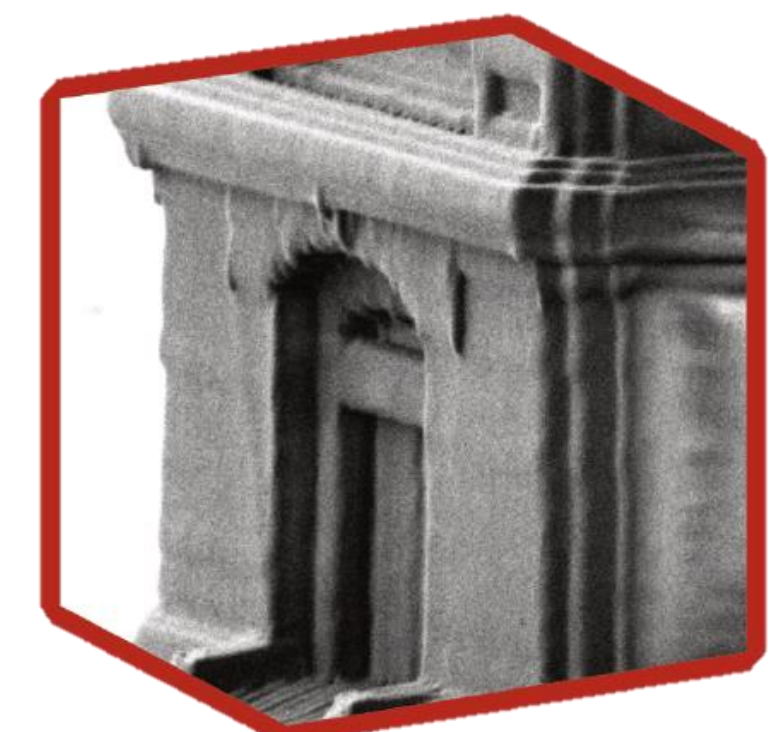
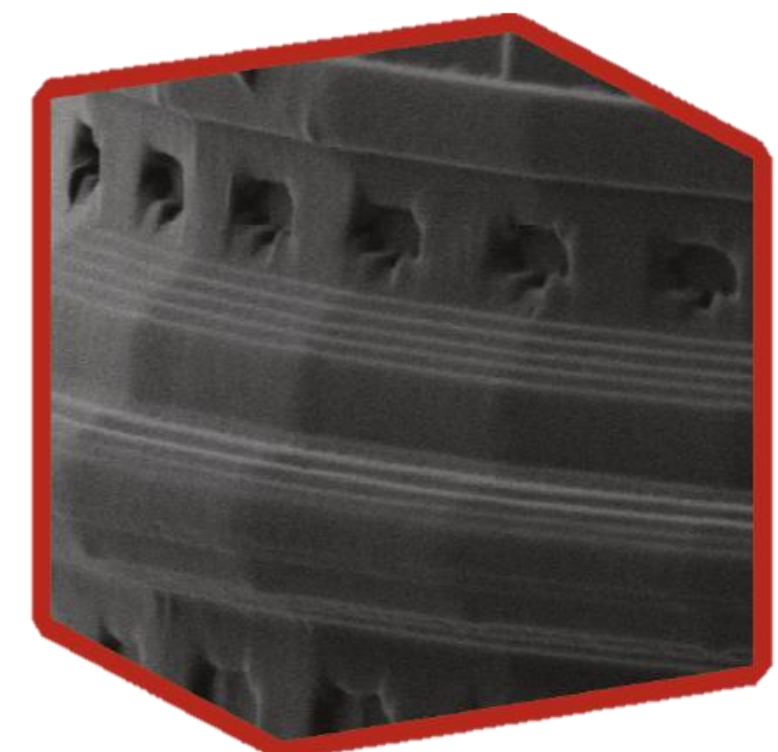


*in situ* material exchange

Patented solution

Add-on

Plug-n-Play integration



100 μm 

10x

automated and fast material exchange

20x

Perfect placement (~ 10 nm) of smallest structures

∞

Substrate independent on active devices till wafer-level





200  $\mu\text{m}$

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3D printed by

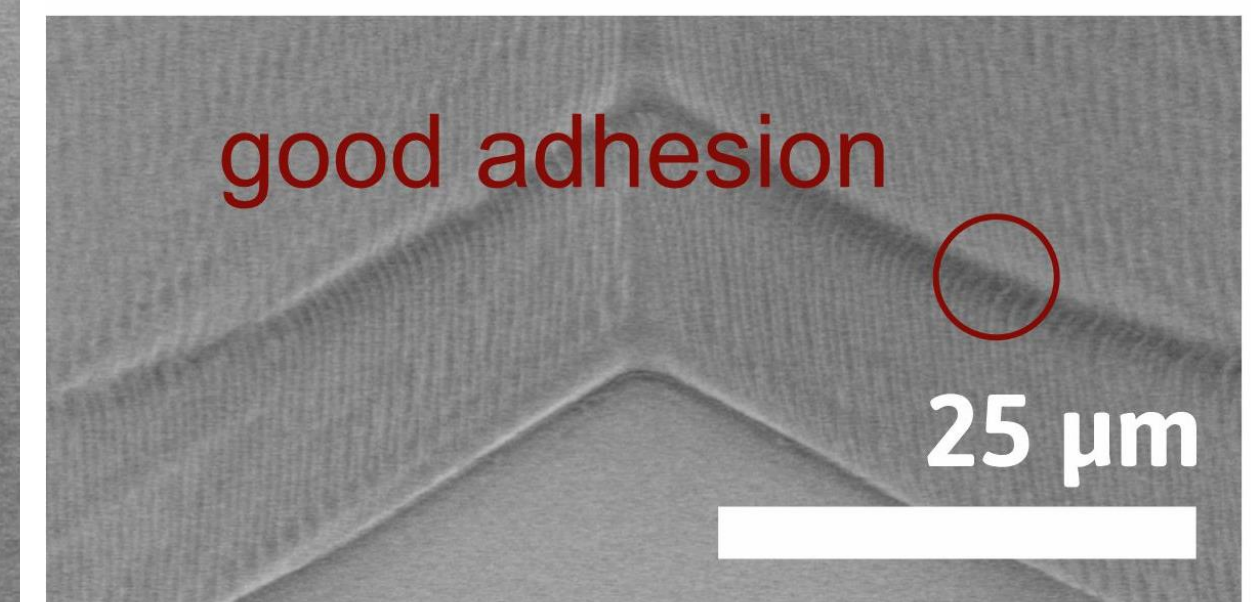
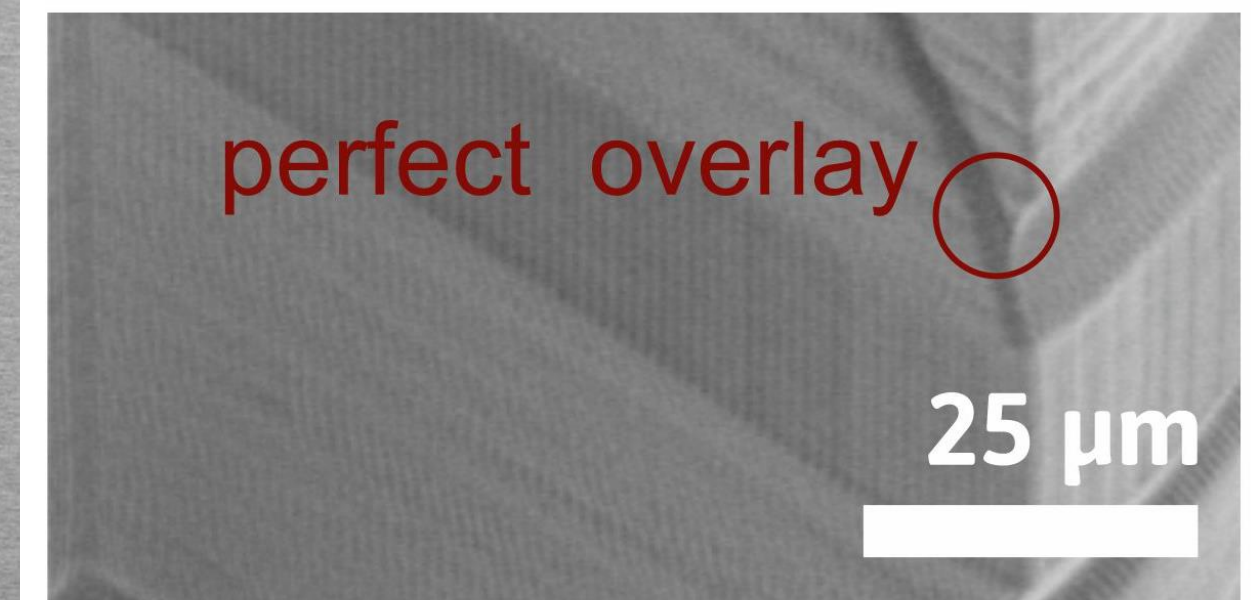
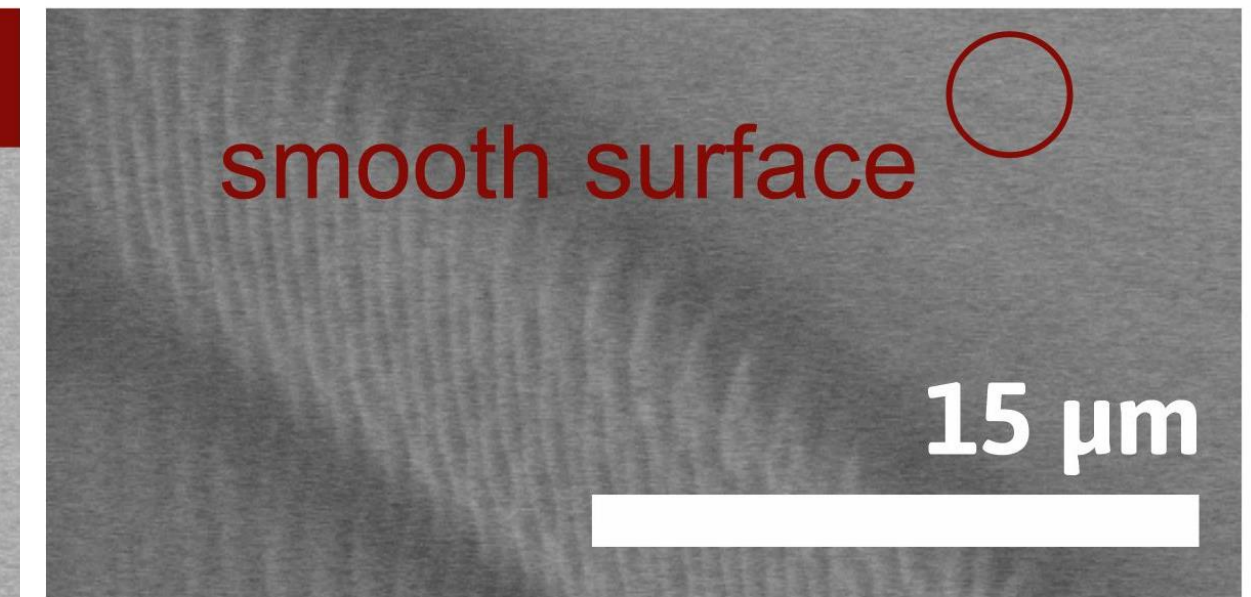
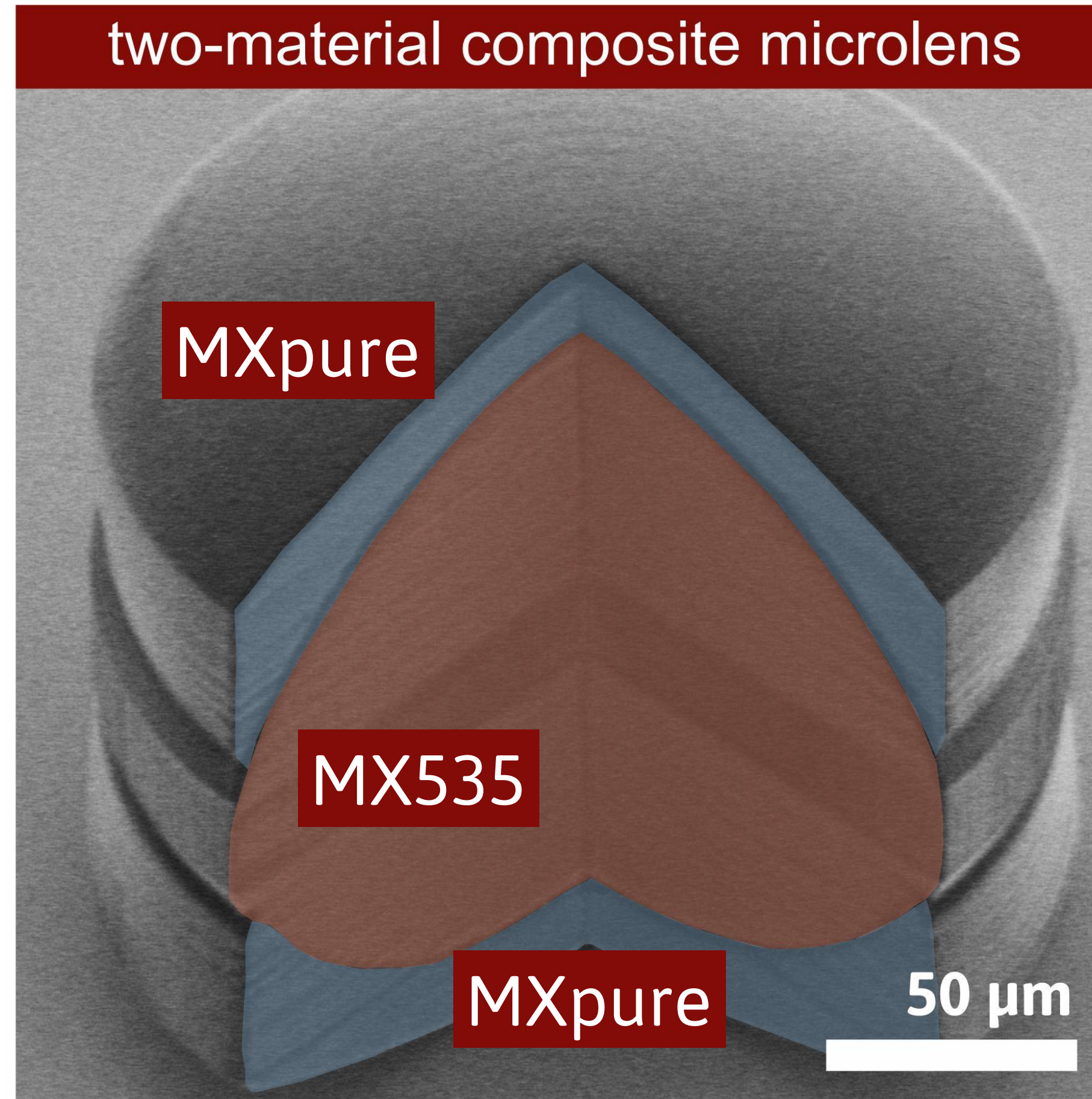
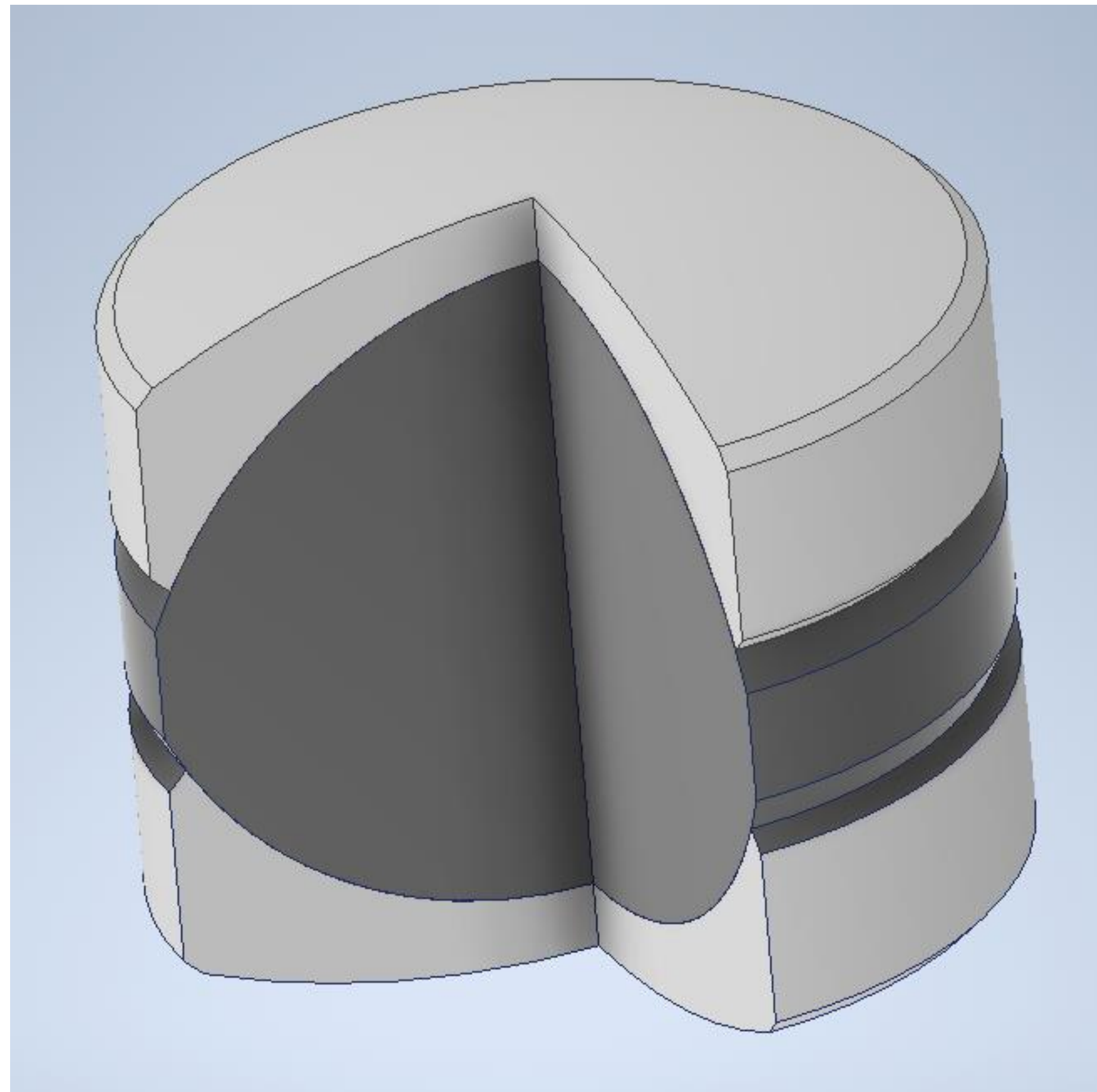


[www.heteromerge.com](http://www.heteromerge.com)

3D imaged by



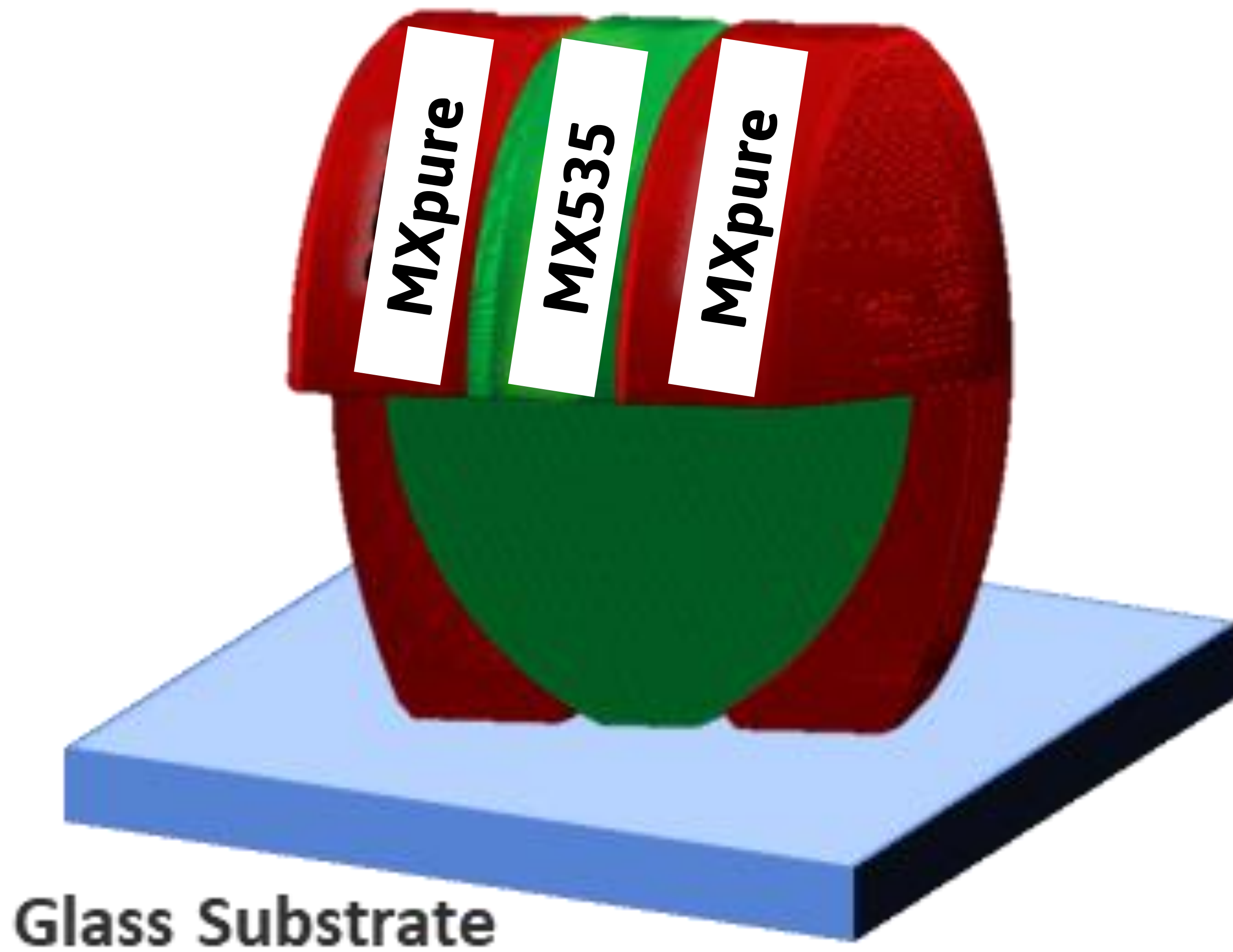
[www.microqubic.com](http://www.microqubic.com)



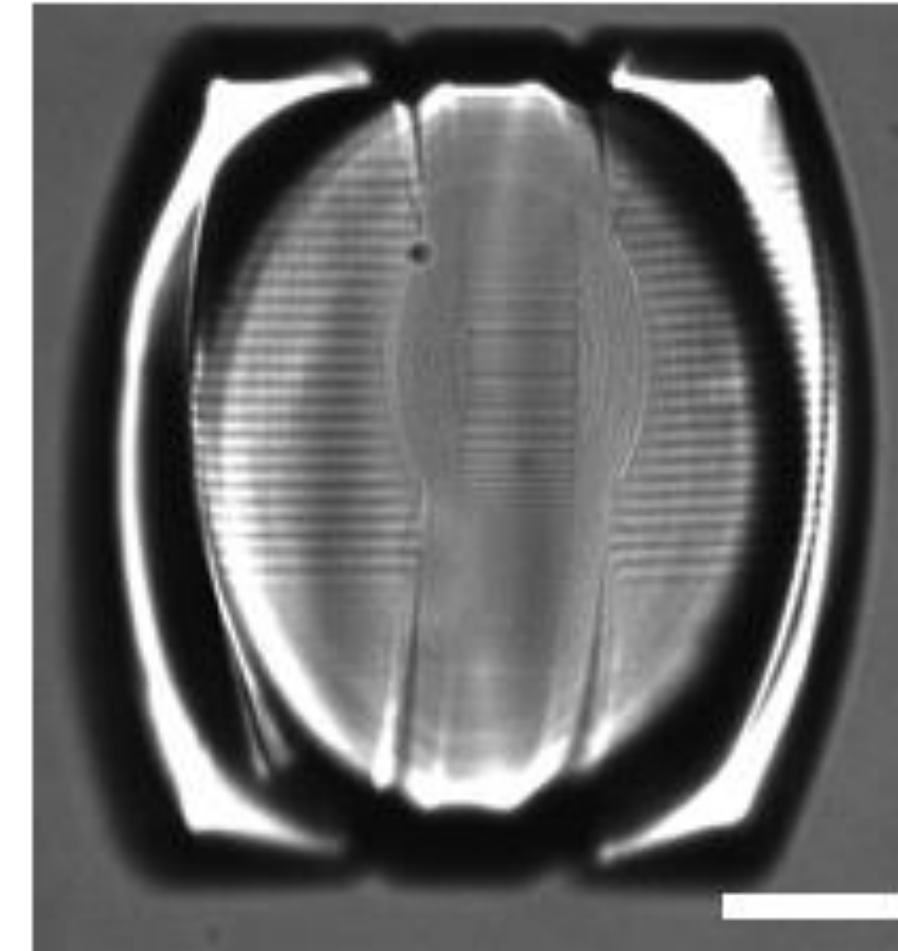
■ MXpure (printed 1st)

■ MX535 (printed 2nd)

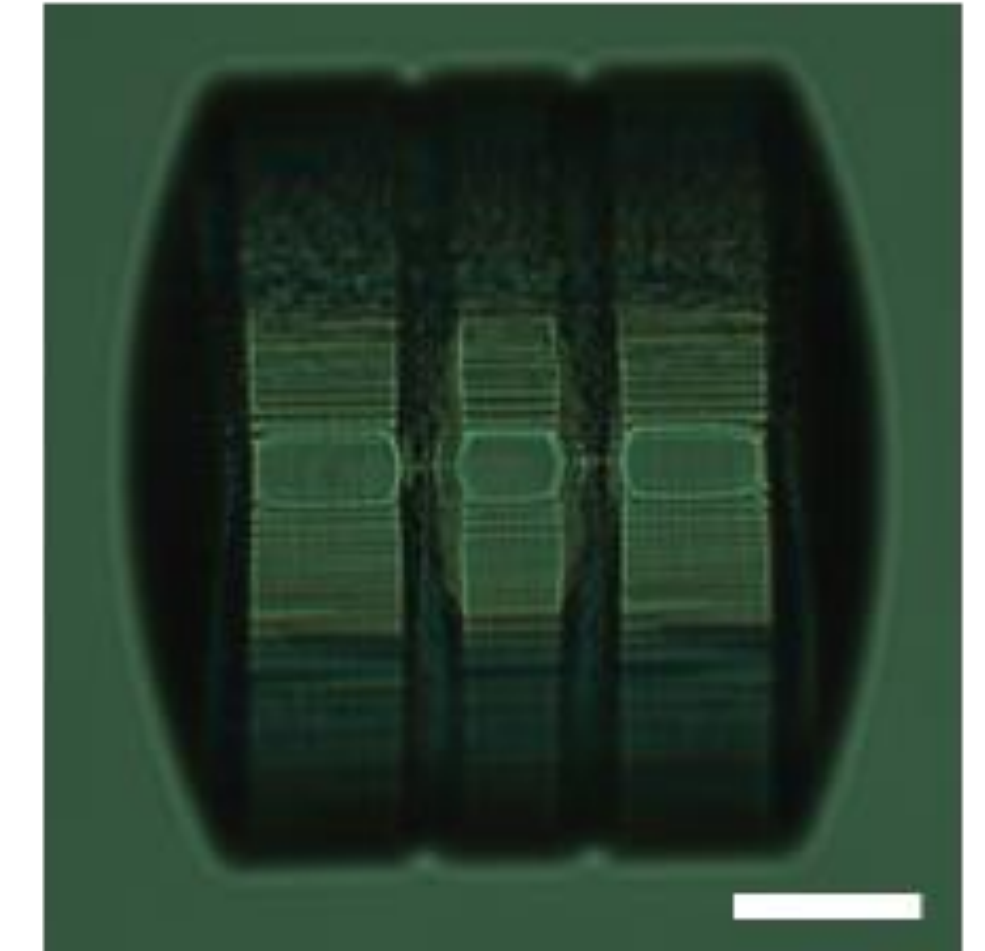
■ MXpure (printed 3rd)



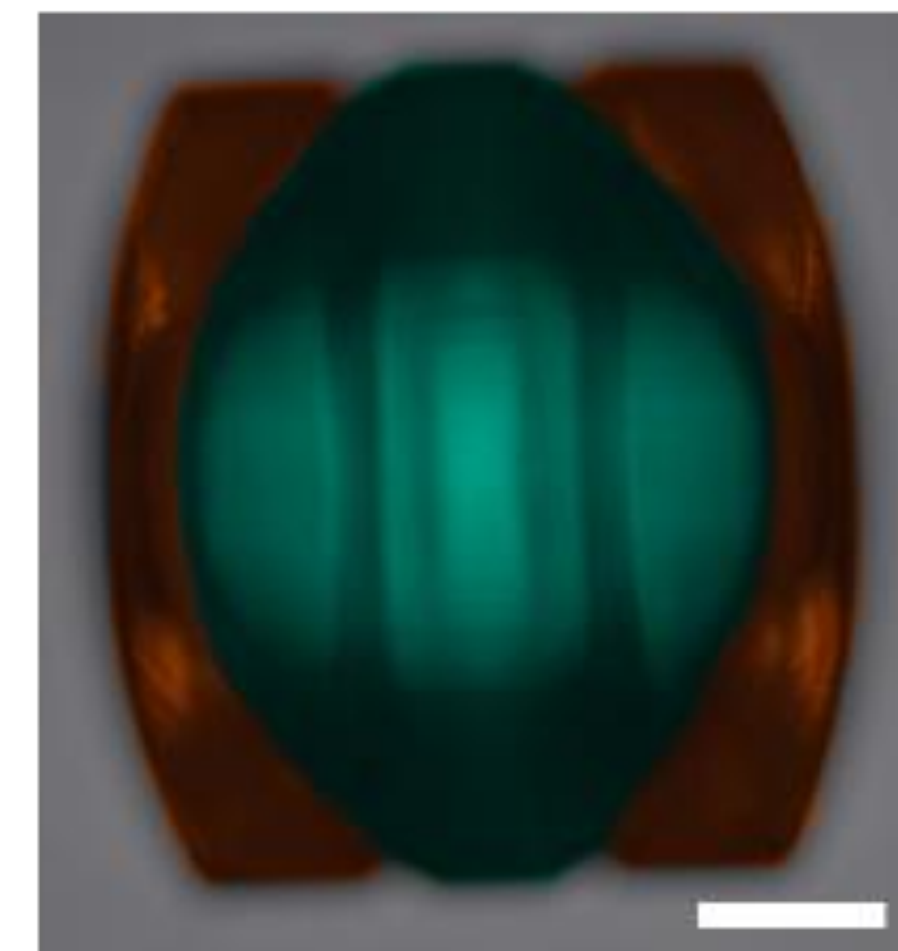
i. Optical image (during writing)



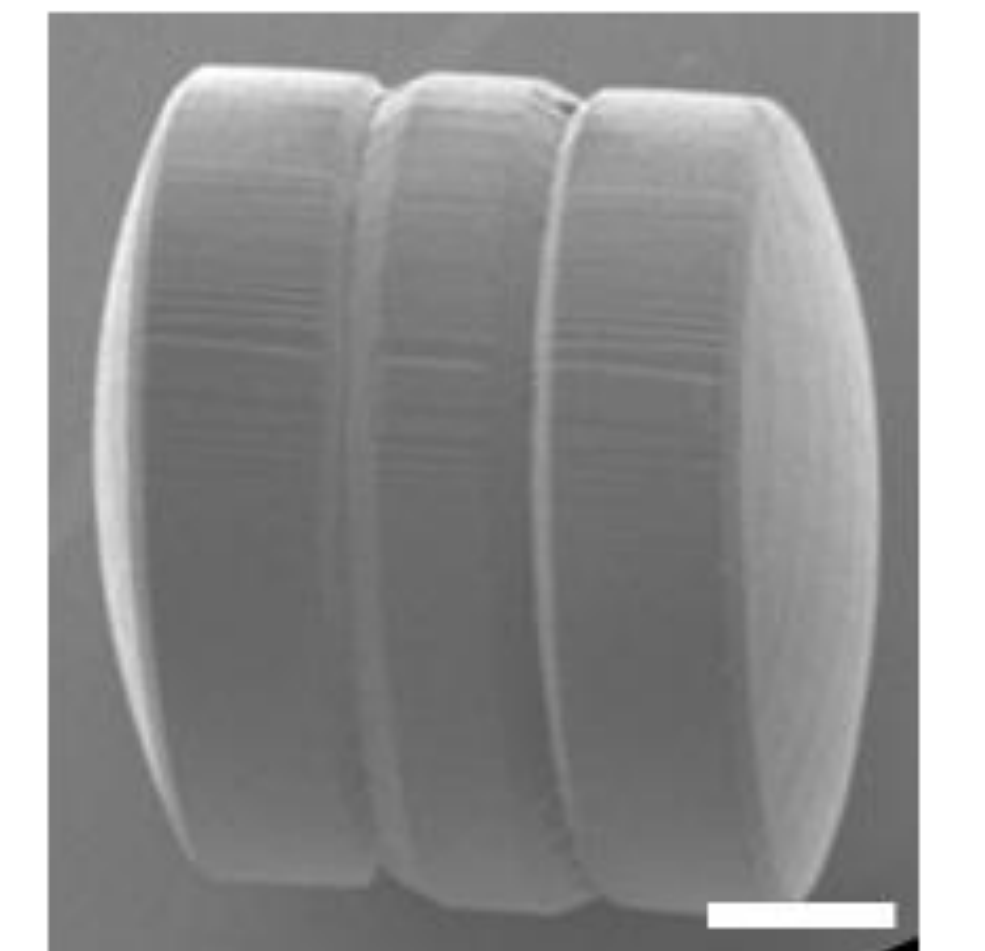
ii. Optical image (after writing)



iii. Edited fluorescent image

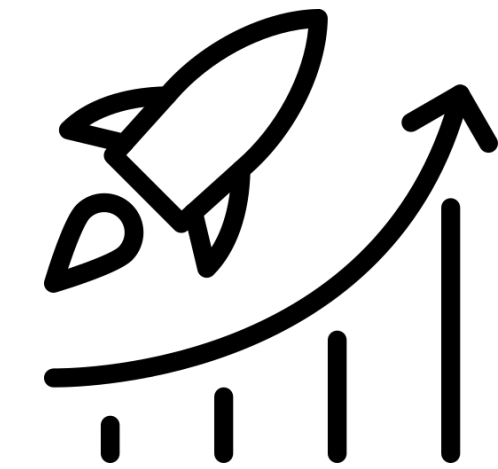


iv. SEM image





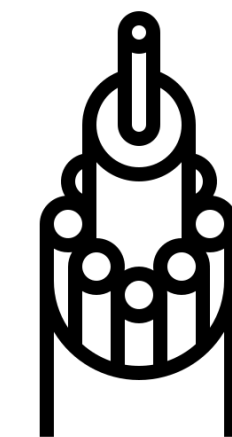
**3D printing trend**

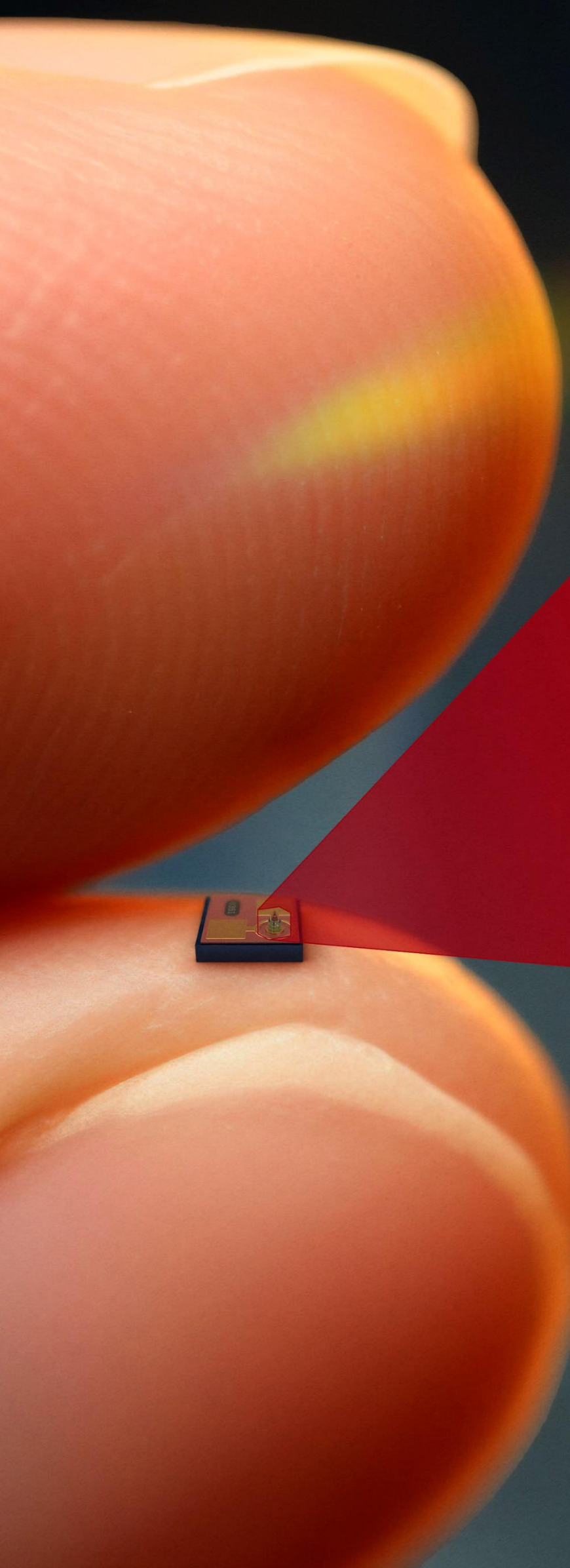


**2PP enters industry 2-5 years**



**Photonics integration trend**





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