

SPIO
SYSTEMS

Miniaturised Optical Engines on Wafer Level via SPIO Technology

CONFIDENTIAL

About SPIO Systems

SPIO Systems is a deep-tech company.

- Development and production of **miniaturized optical systems** for customers
- Technology based on **new manufacturing platform** for optical engines
- SPIO technology enables miniaturization of existing optical engines by at least an order of magnitude
- 10 employees
- Private company, backed by large industrial investors

 Farum, Denmark



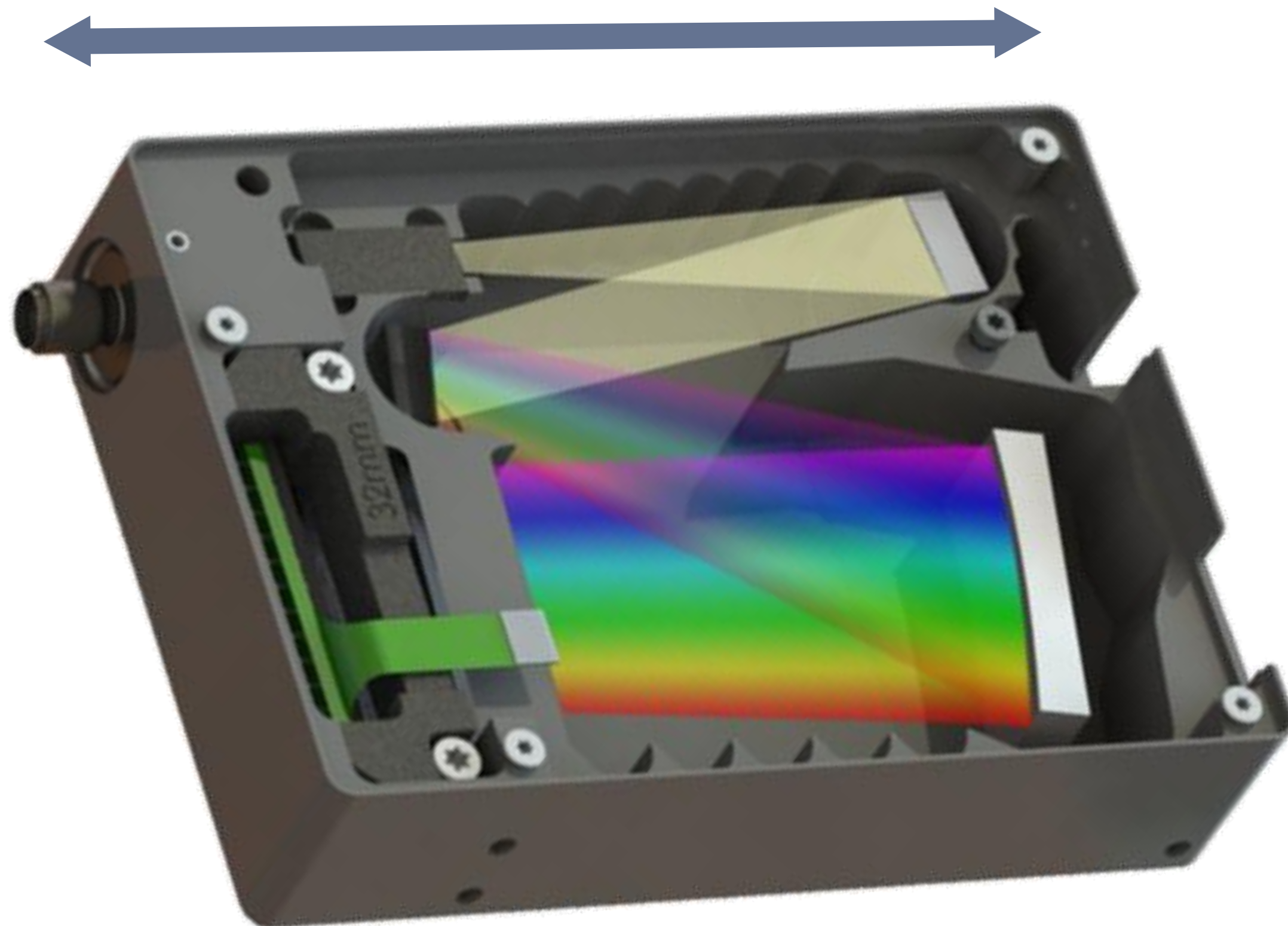
SPIO stands for
**Stacked
Planar
Integrated
Optics**

SPIO versus conventional device

CONVENTIONAL DEVICE: €€€€€€

Discrete optical elements
Manual assembly and alignment

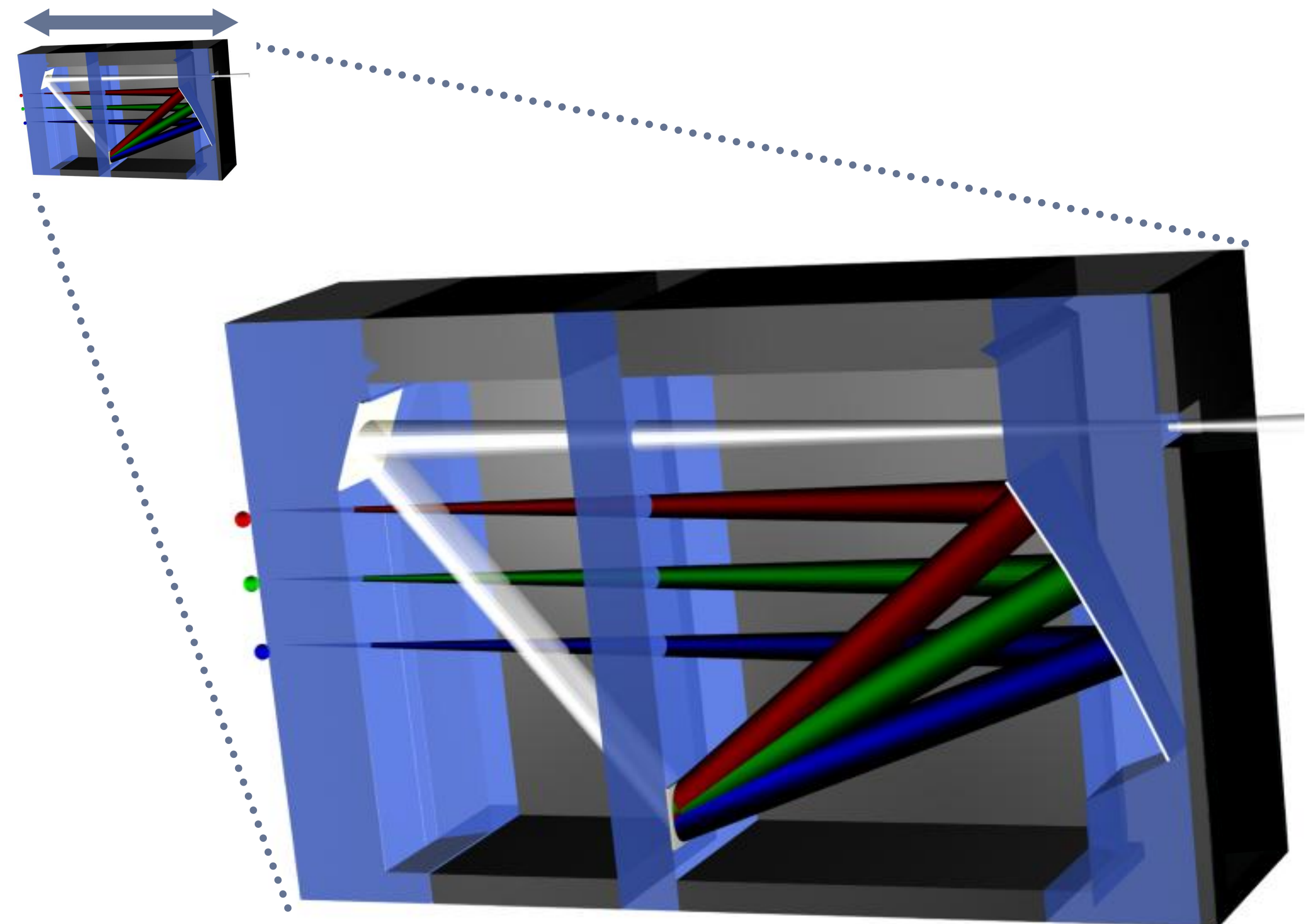
50mm



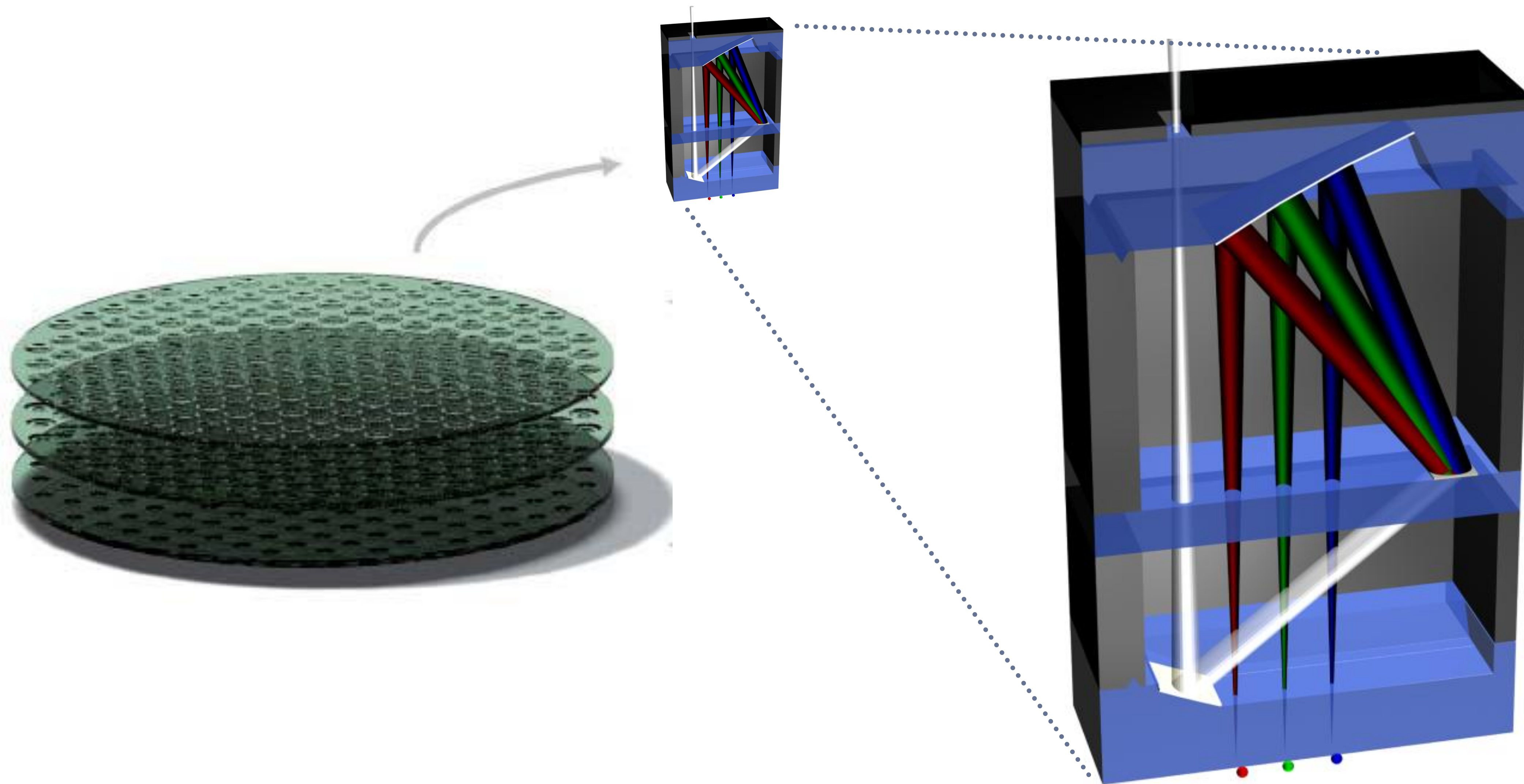
SPIO DEVICE: €

Integrated optical components in multiple planar layers on wafers
Automated assembly and alignment

2mm

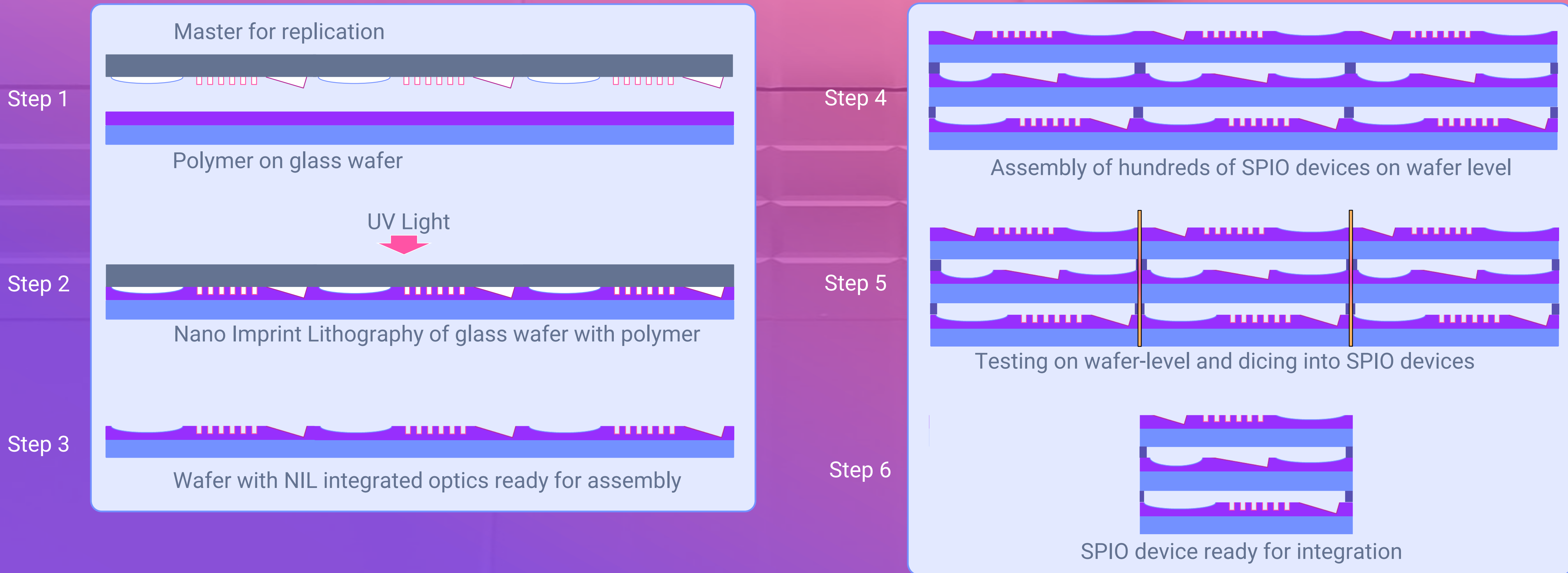


Wafer platform approach for manufacturing optical instruments



Technology

LOW COST, MASS PRODUCTION OF COMPLEX OPTICAL SYSTEMS



What is SPIO?

SPIO IS...



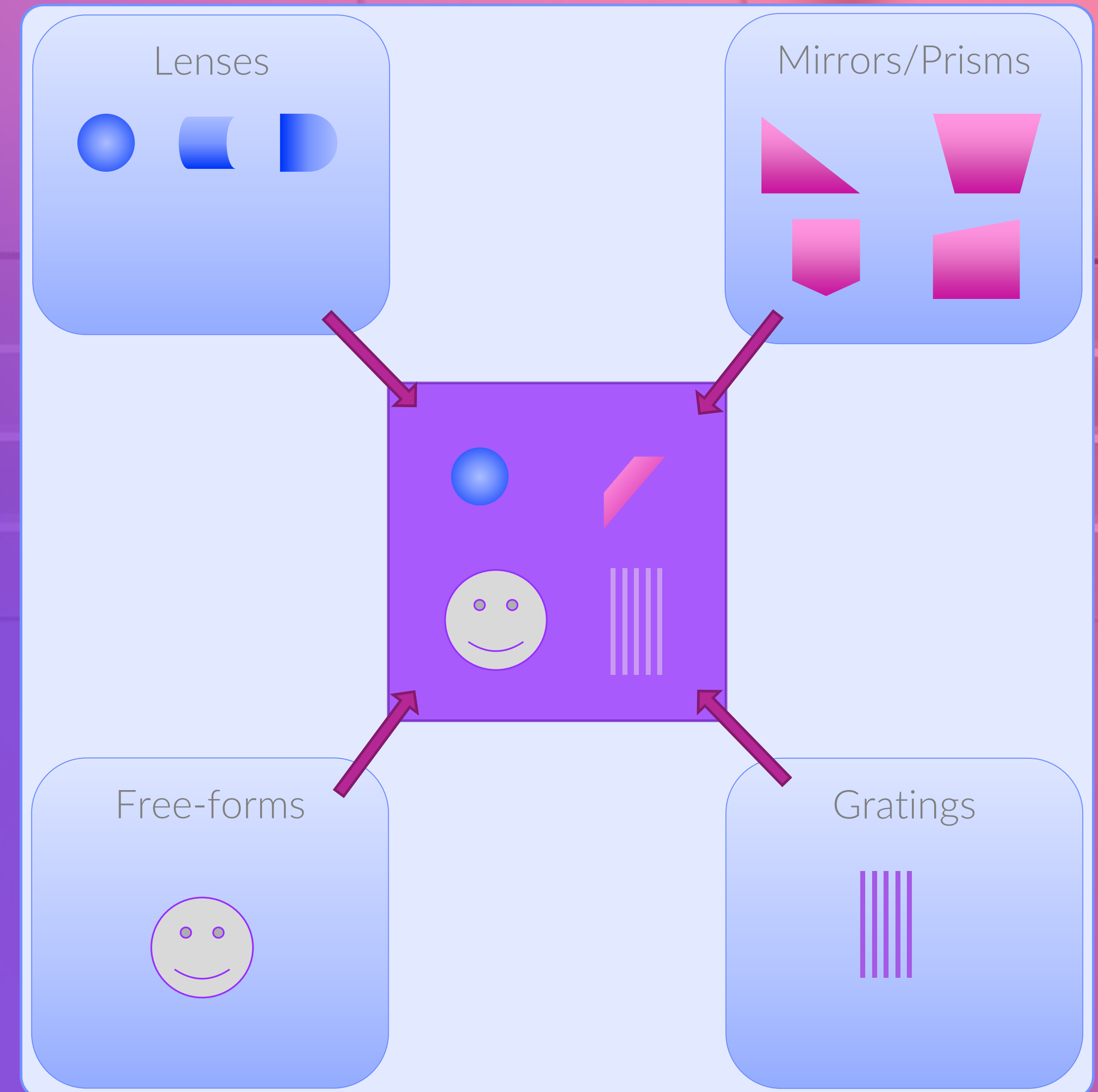
Stacked
Planar
Integrated
Optics

A **technology platform** that enables the guiding and processing of light in advanced, complex optical structures.

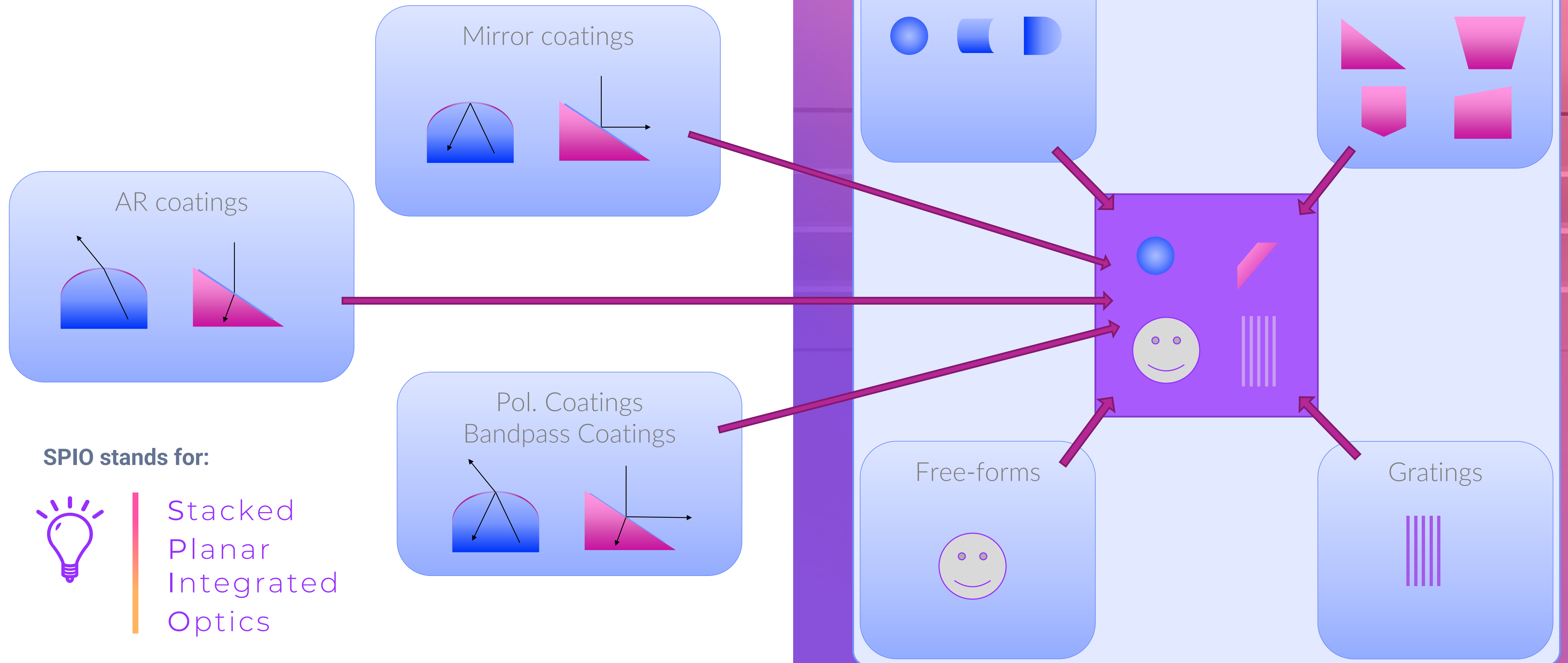
- A toolbox of optical elements integrated into a single component
- Closed packed design: No mechanics on individual elements
- “Cubic” design: Optical light paths in 3 dimensions – within 2D planar layers and between layers as well



SPIO
SYSTEMS

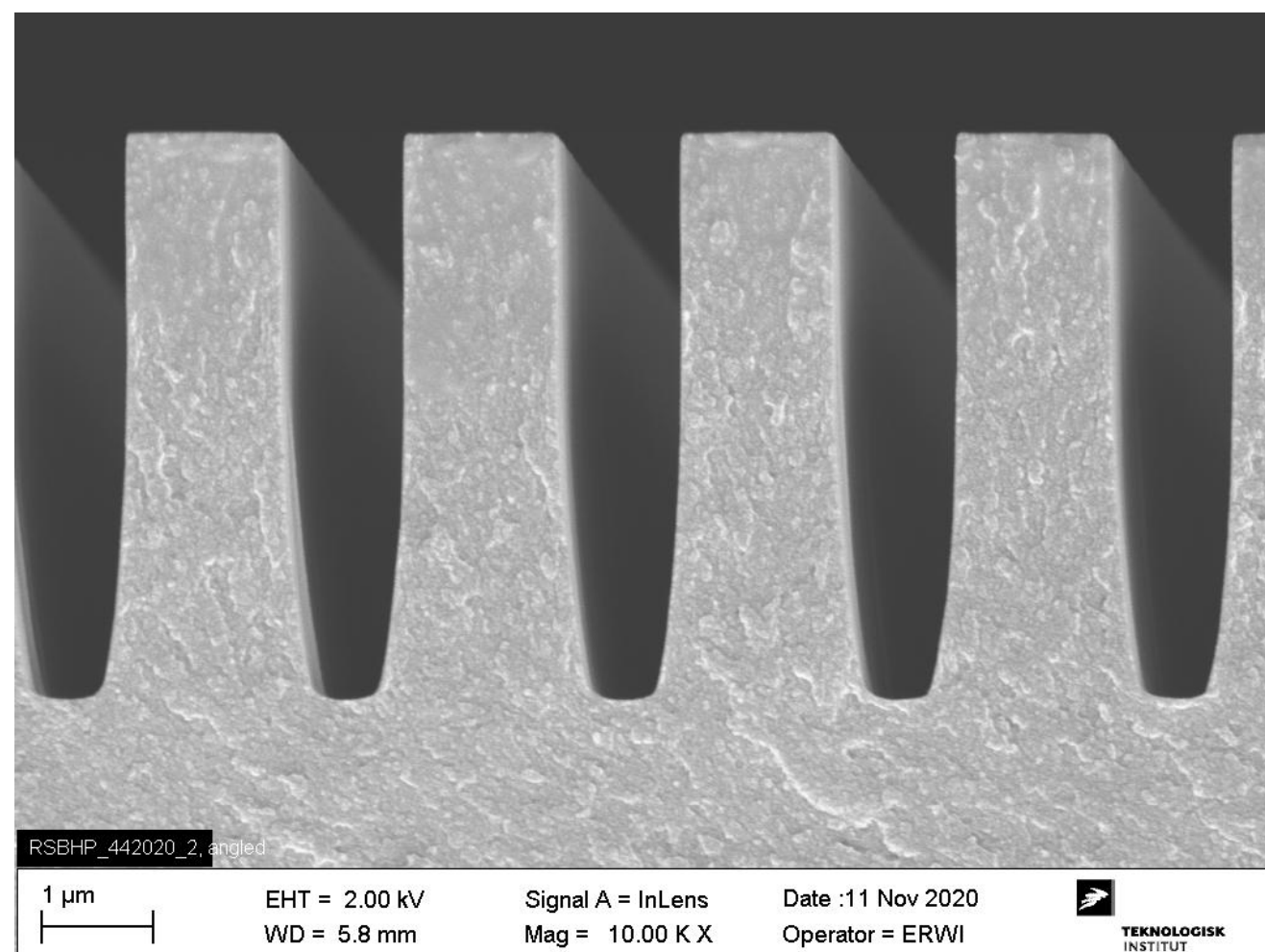
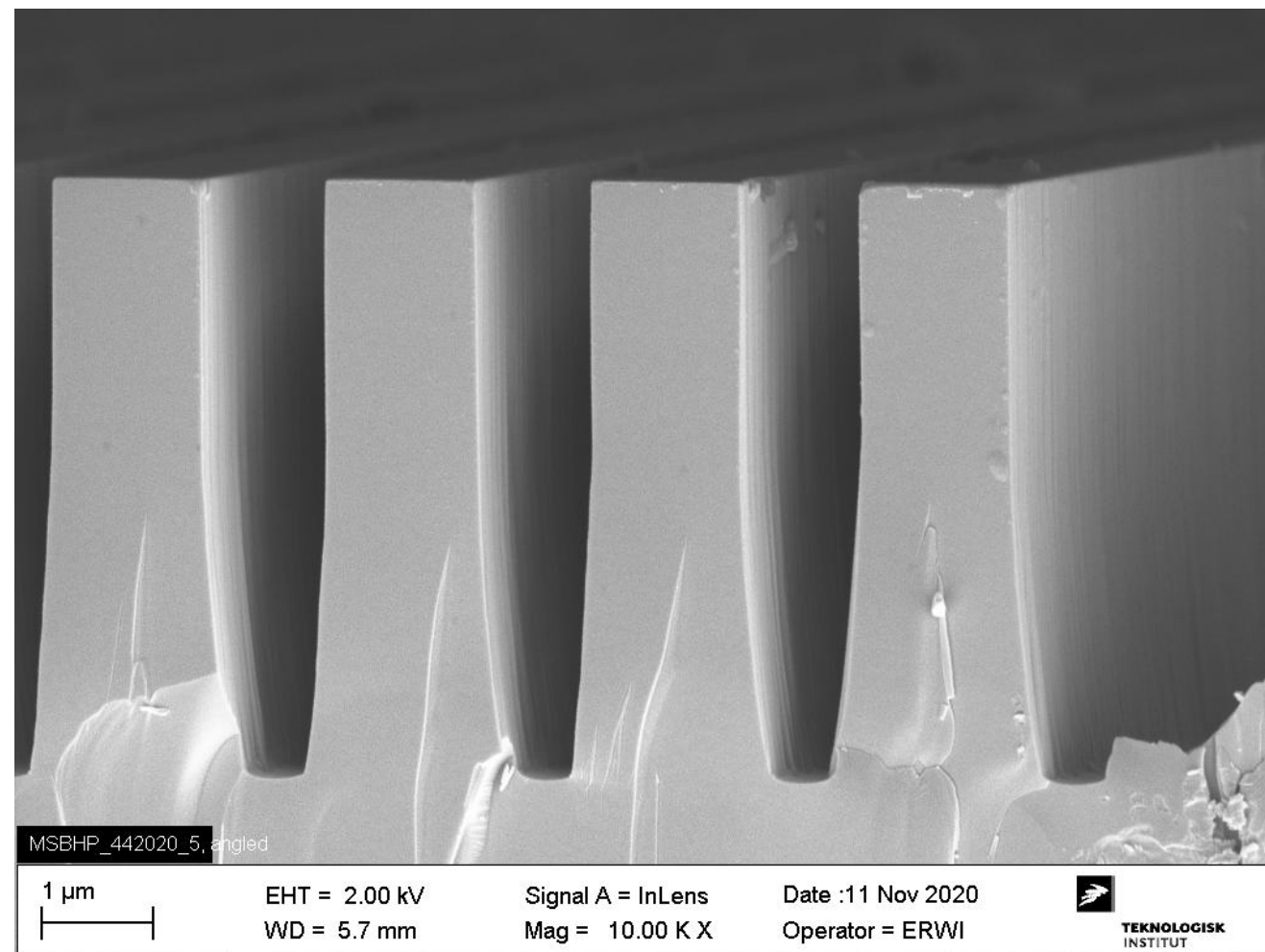


SPIO design toolbox includes coatings

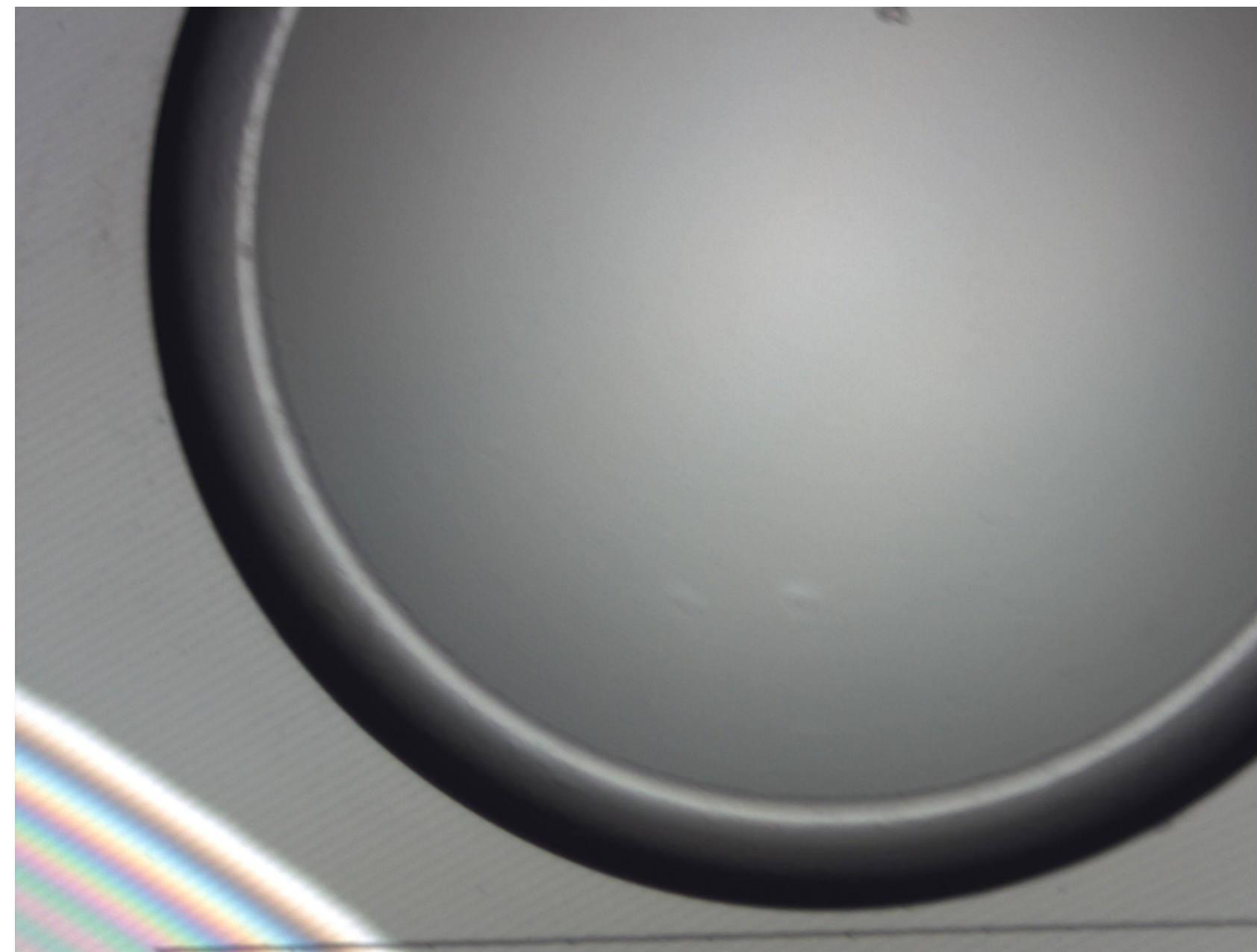


Grating, Lens & Prism Structures

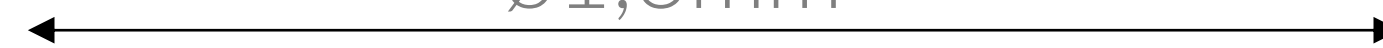
GRATING: MASTER VS REPLICA



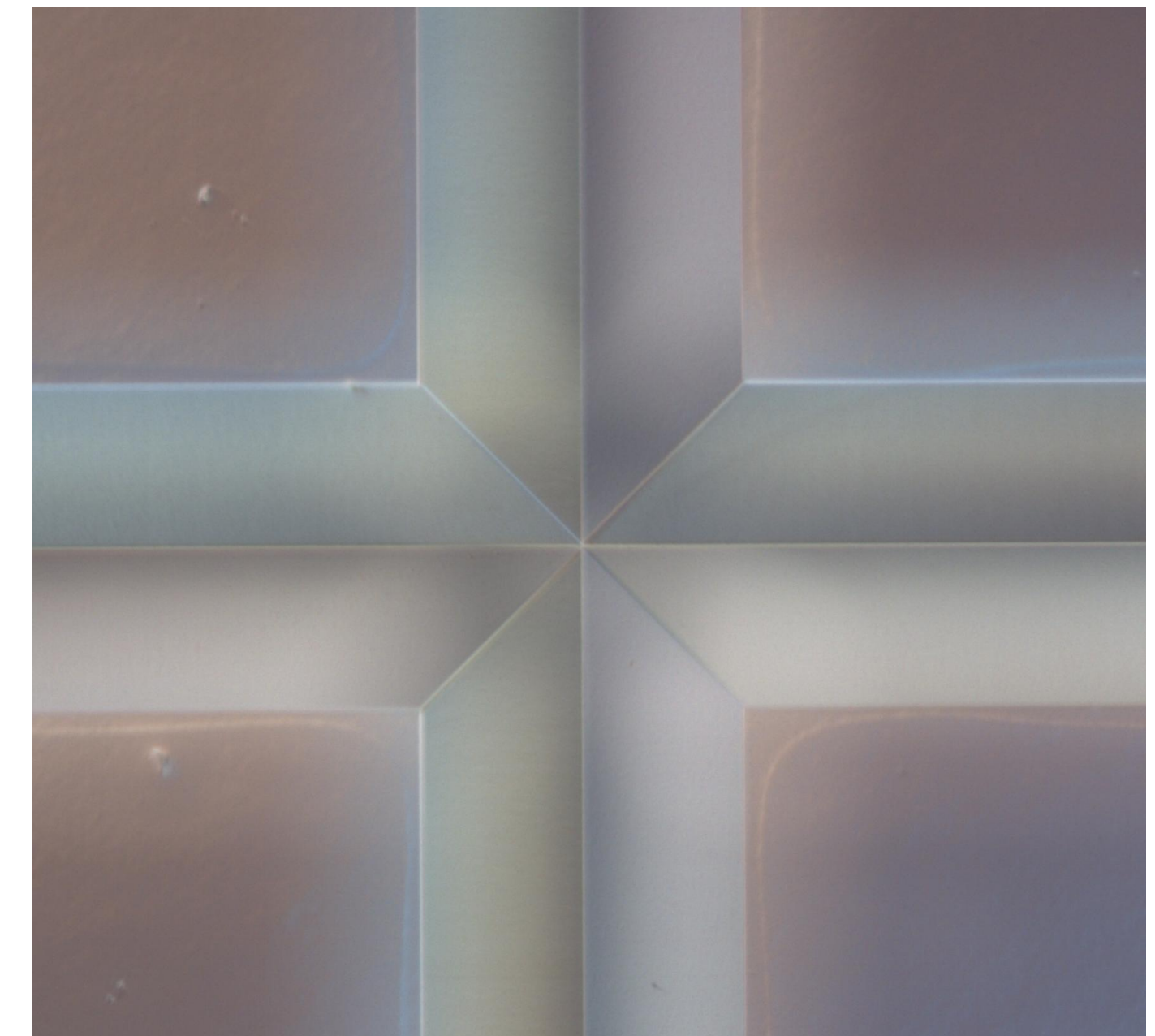
TILTED PARABOLIC LENS REPLICA:



$\varnothing 1,6\text{mm}$

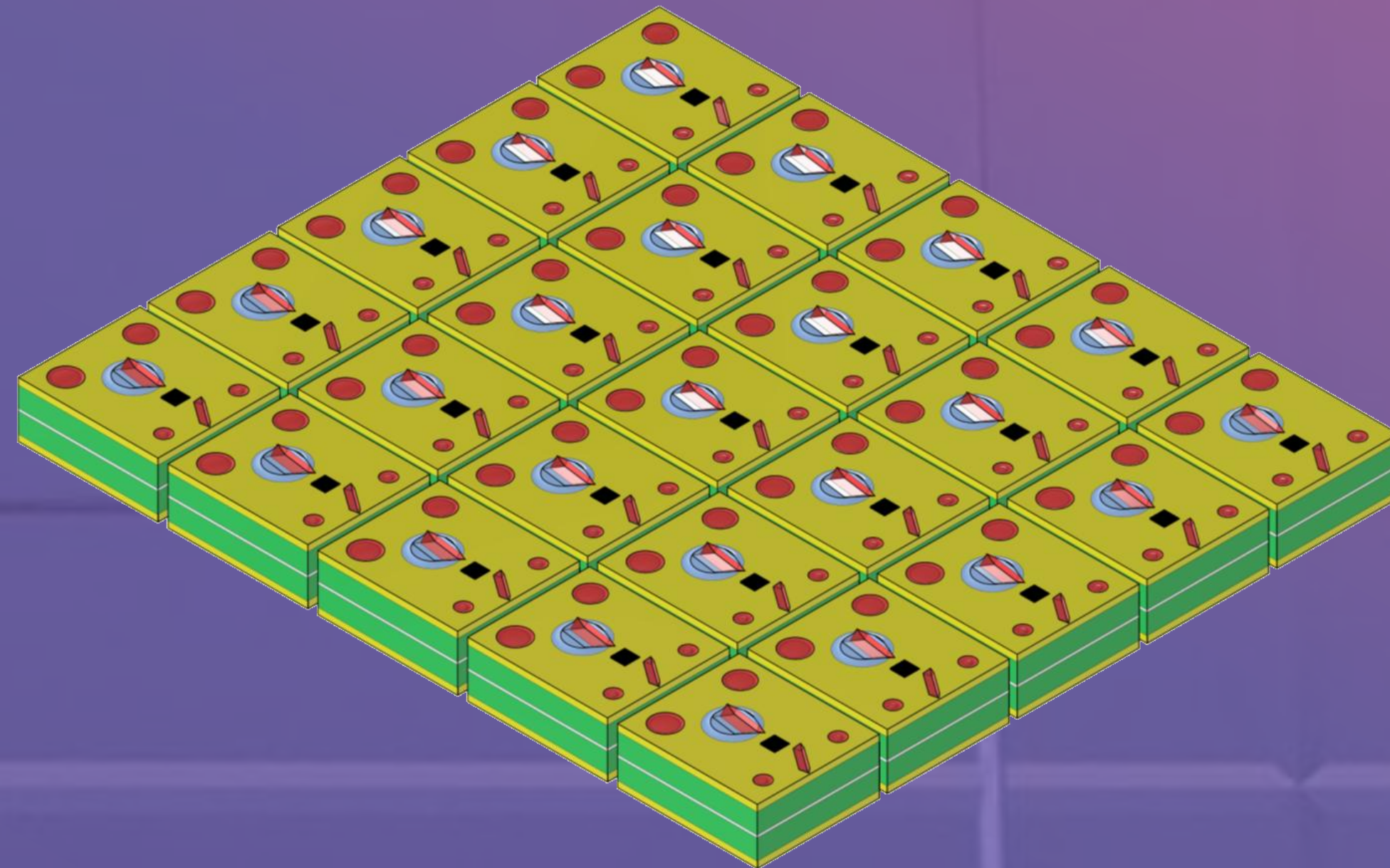


REPLICATED V- GROOVES (CROSSED)



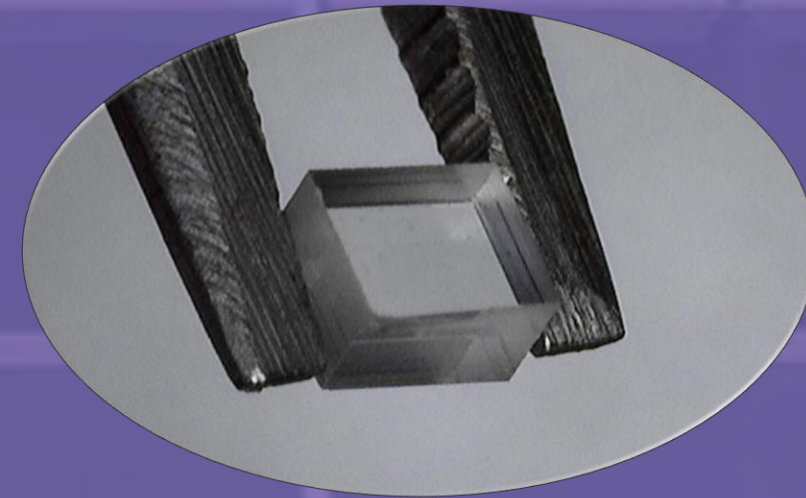
Customer Projects

Telecommunication receiver



Conventional

SPIO



Tactile robot grabber sensors

Proximity: Measure distance to an object

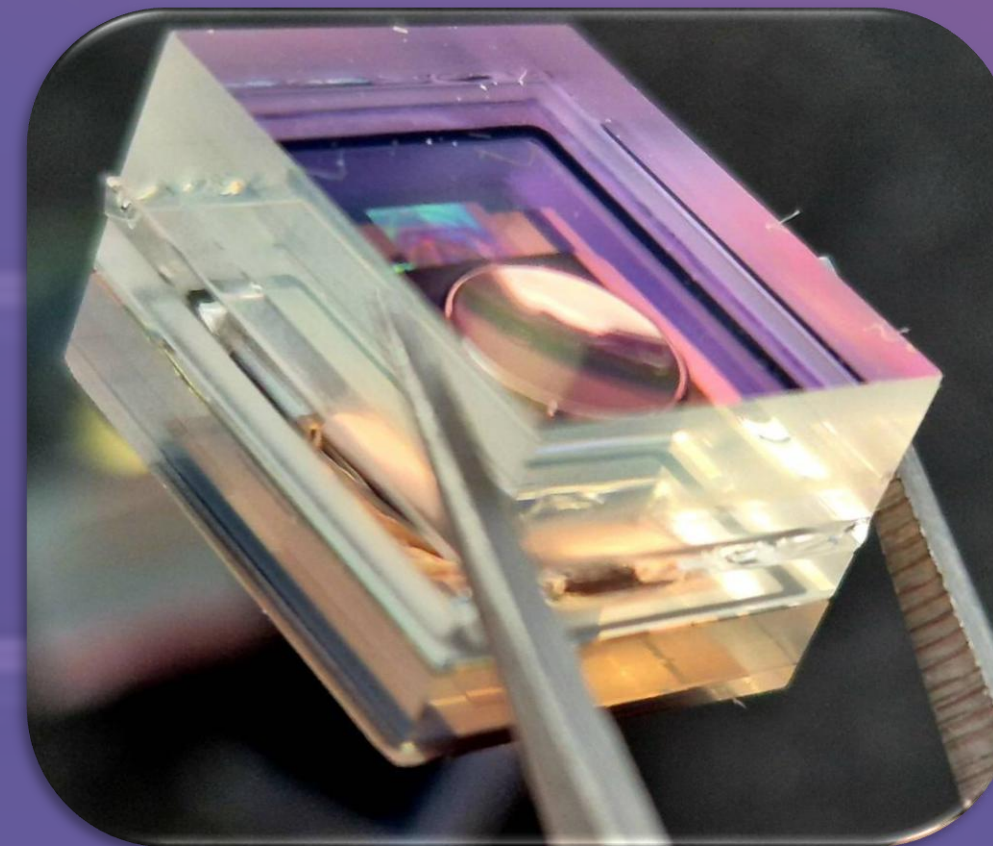
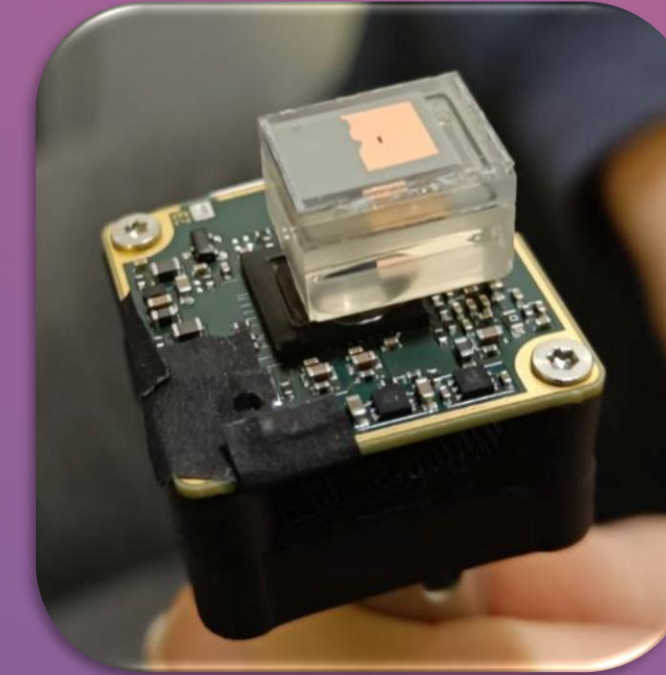
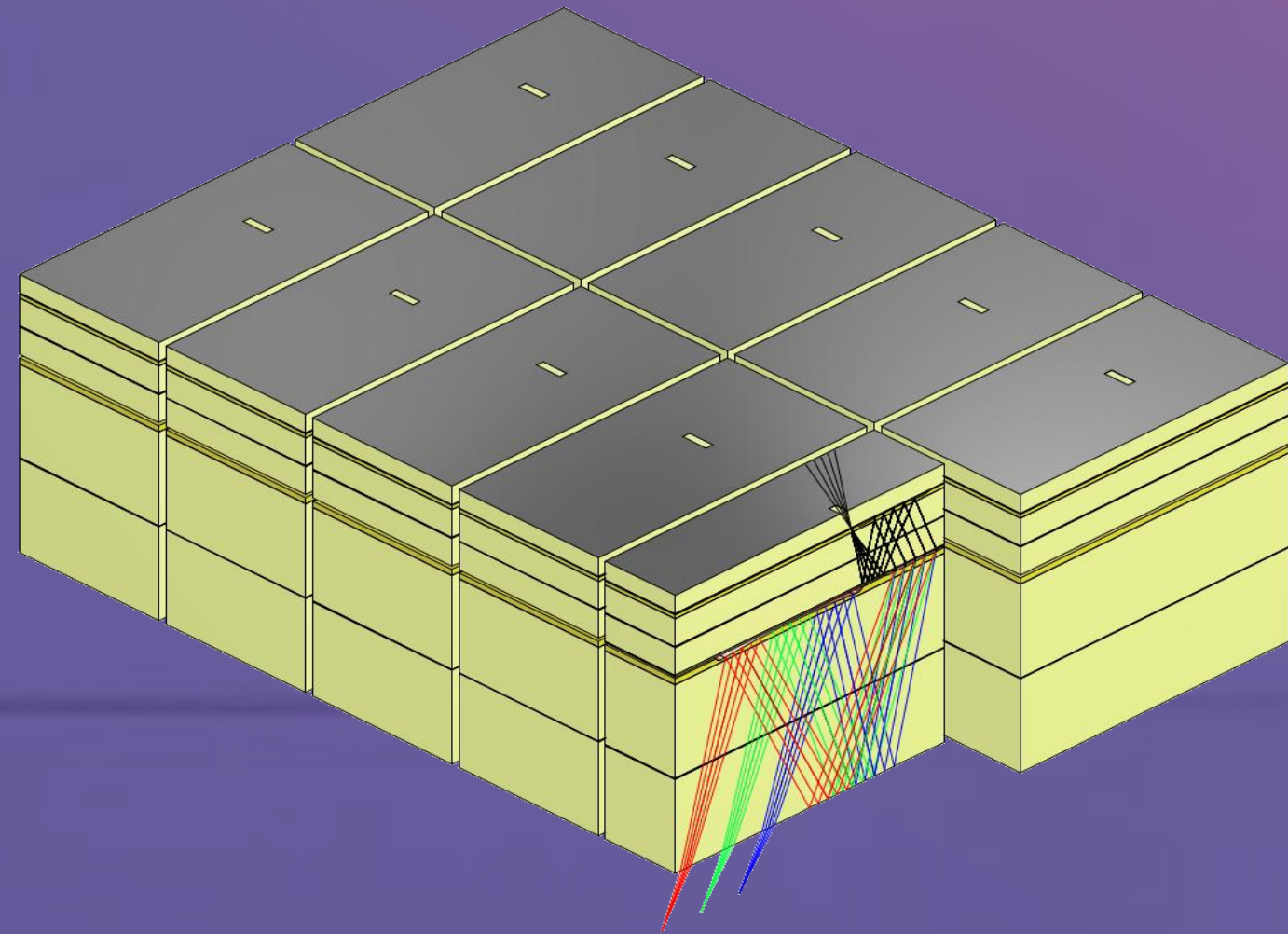
Touch force: Handle delicate objects like tomatoes and glass



Object slippage: Detect object glide and react accordingly

Customer Project

Mini Agriculture Spectrometer



Client case:
830-1070nm
NA 0,22, Res. 8 nm

2 lenses,
4 mirrors,
1 grating,
1 aperture/slit,
2 AR coatings,
2 absorbing coatings

Summary



SPIO: Stacked Planar Integrated Optics – an optical engine production platform

OPPORTUNITIES:

New application: Size and volume

Integrate with PIC's and Fibers

Scaling rate

CHALLENGES:

Yet immature technology

Different approach to design and production

Active component integration

SPIO Systems ApS
Hørmarken 2
3520 Farum
Denmark

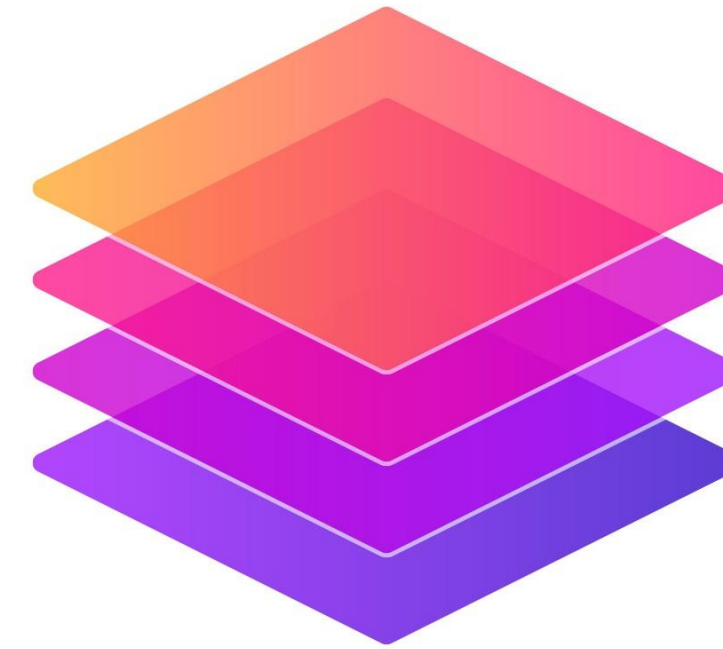
+45 31181265

contact@spiosystems.com

www.spiosystems.com



Stacked
Planar
Integrated
Optics



SPIO
SYSTEMS

Thank you!



CONFIDENTIAL