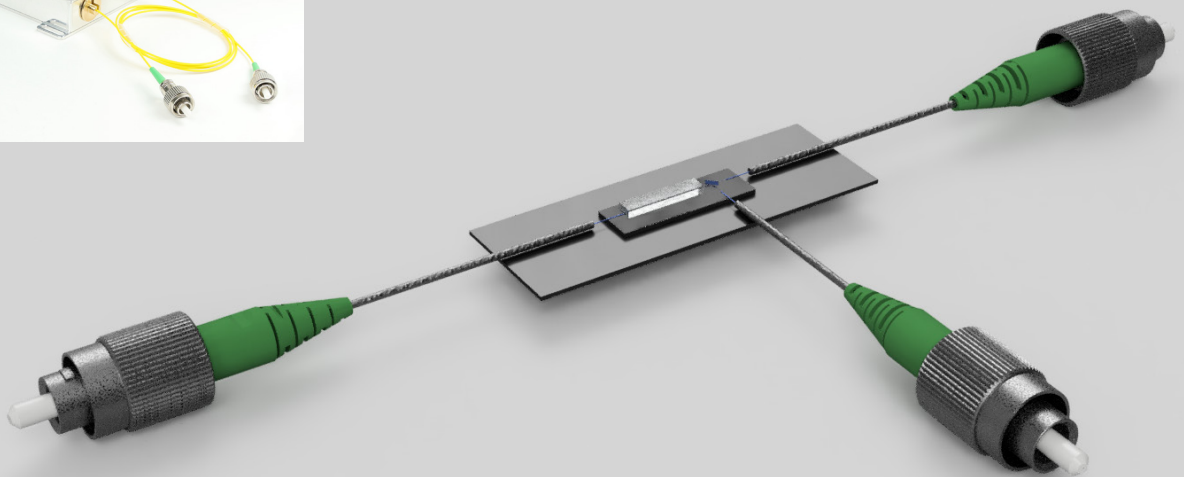


Photon Pair Source



$\mu$ Bench with integrated ppKTP crystal for quantum technology

## AT A GLANCE

HHI's  $\mu$ Bench based on the hybrid integration platform PolyBoard enables the integration of micro-optical functions and elements on photonics integrated circuits (PICs).



### Features

Polymer-based photonic integration platform featuring:

- **U-grooves:**  
F/C coupling, GRIN Lenses, free space sections for crystals
- **Slots:**  
Thin film elements as  $\lambda/2$  plate,  $\lambda/4$  plate, polarization beam splitter (PBS), filters
- **45° mirrors:**  
PD / VCSEL coupling

### Applications

- Telecom / datacom
- Quantum technology
- Microwave photonics
- Sensing and analytics
- Medical and life science

### Micro-Optical Bench ( $\mu$ Bench)

HHI's  $\mu$ Bench demonstrates the capability and flexibility of hybrid photonic integration.

Features as slots, U-grooves or vertical mirrors allows a hybrid integration of passive or active elements.

#### Typical passive elements to be integrated:

SM fibers, GRIN lenses, crystals,  $\lambda/2$  plates,  $\lambda/4$  plates, PBS, thin film filters

#### Typical active elements to be integrated:

lasers, photodiodes, modulators

## References

### International R&D projects

PHOENICS  
 POETICS  
 POLYNICES  
 QSNP  
 Qu-Test / Qu-Pilot  
 SPRINTER

TERA 6G  
 TERAMEASURE  
 TERAWAY  
 (funded by EU commission)

### National R&D projects

PolyChrome Berlin  
 PoLiSiQ  
 QuNET  
 Silhouette  
 VOMBAT  
 (funded by BMBF)



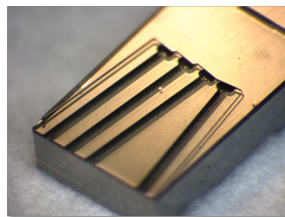
Crispin Zawadzki  
 Hybrid Integration and Sensing

Phone +49 30 31002-624  
 crispin.zawadzki@hhi.fraunhofer.de

Fraunhofer Heinrich Hertz Institute  
 Einsteinufer 37, 10587 Berlin  
 Germany

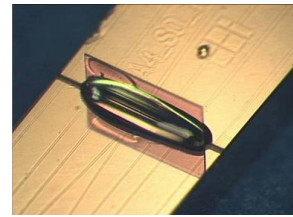
[www.hhi.fraunhofer.de/phs](http://www.hhi.fraunhofer.de/phs)

## Features



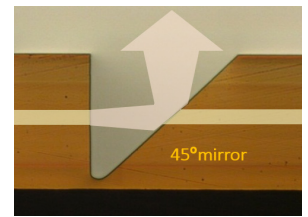
### U-grooves

- F/C coupling
- GRIN lenses
- Free space sections



### Slots

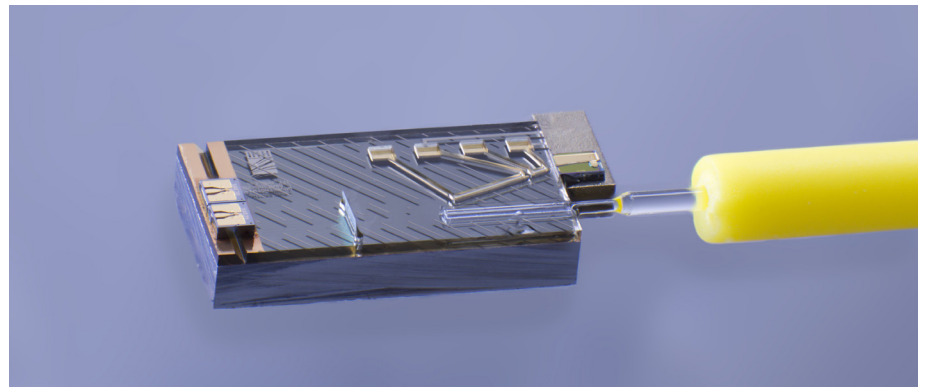
- PBS/PBC
- $\lambda/2$  &  $\lambda/4$  plates
- Filter



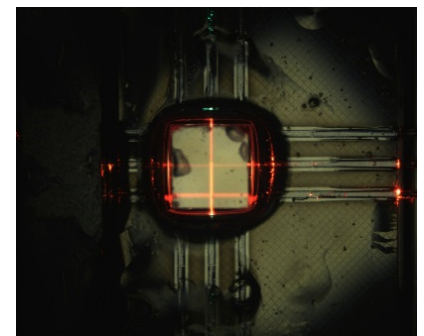
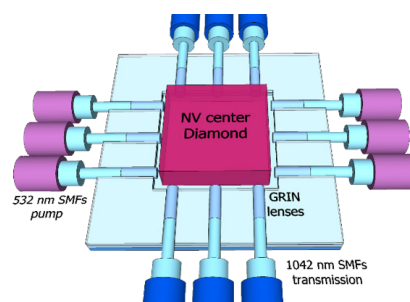
### 45° mirror

- Vertical input/output
- PD coupling
- VCSEL coupling

## Applications



Telecom/Datcom: *FFTH* transceiver based on HHI's optical  $\mu$ Bench



Quantum Sensing: *Magnetic field measurements w/NV centre diamonds*