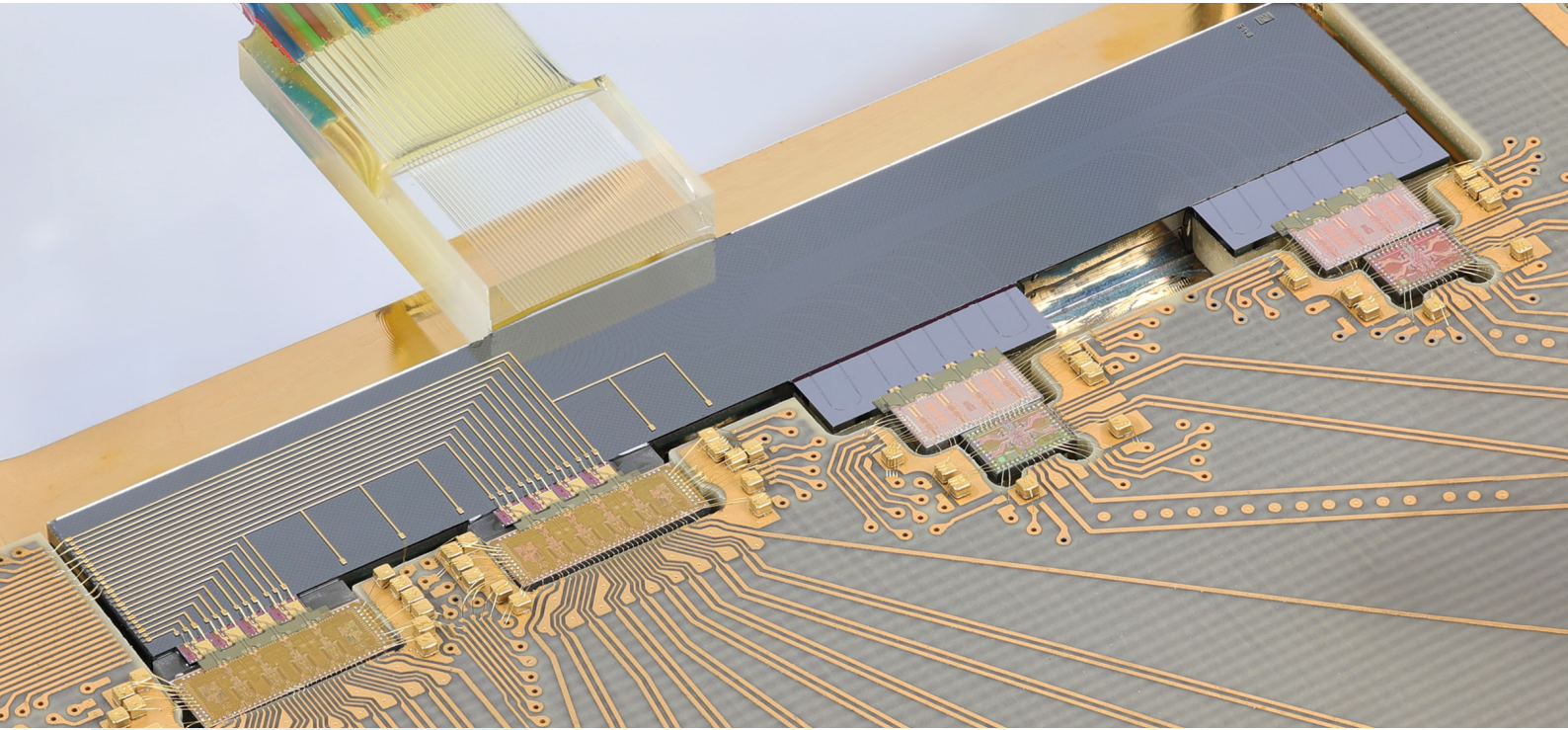


HYBRID PICS BEST OF ALL WORLDS



AT A GLANCE

HHI's hybrid integration technology enables the fabrication of complex hybrid photonic integrated circuits (Hybrid PICs) based on the material systems polymer, SiN, TFLN, InP, GaAs and GaN.



Applications

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

Features

- Rapid prototyping
- Short iteration cycles
- Low upfront development effort

Services

- Design and simulation
- Process development
- Device fabrication
- Characterization
- Assembly
- Qualification

Hybrid PICs

The Hybrid PICs team develops photonic components and hybrid integrated circuits based on PolyBoard, SiN and thin film lithium niobate (TFLN) single mode waveguides in combination with active elements made of InP, GaAs or GaN.

We are working to harness the unique properties of light for applications in fiber-based communications, quantum technologies, microwave photonics and 6G wireless networks and beyond, as well as life sciences, medicine, sensing and analytics.

Our technology enables rapid prototyping, short iteration cycles and low development effort and cost. Our expertise includes design and simulation, CAD, technology development and device fabrication as well as characterization, assembly and qualification.

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)

Association

PolyPhotonics e.V.
www.polyphotonics-berlin.de

Assembly Partner

PHIX
www.phix.com
 ficonTEC
www.ficontec.com



Dr. rer. nat. Moritz Kleinert
Hybrid Integration and Sensing

Phone +49 30 31002-380
moritz.kleinert@hhi.fraunhofer.de

Fraunhofer Heinrich Hertz Institute
 Einsteinufer 37, 10587 Berlin
 Germany

www.hhi.fraunhofer.de/phs

Hybrid Integration Technology

PolyBoard platform based on polymer waveguides

- Passive WG structures: MMIs, AWGs, gratings
- Thermo-optic structures: TO-shifters, VOAs, tunable gratings
- μ Bench with slots, U-grooves, vertical mirrors to integrate micro lenses, NLO crystals, isolators, and thin film elements (PBS, $\lambda/2$ plates, filters);
- 3D photonic integrated elements: 3D MMIs, 3D optical phased arrays for beam steering;

SiN platform based on silicon nitride waveguides:

- Passive WG structures: Ring resonators, MMIs, AWGs, gratings.
- Thermo-optic structures: TO-shifters, VOAs, tunable gratings;

LN-on-SiN platform based on heterogeneous lithium niobate-silicon nitride waveguides.

Hybrid Integration for more complex functions:

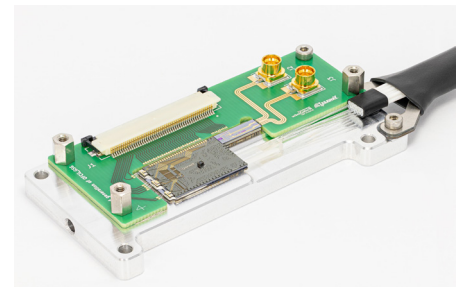
Platforms can be combined and hybrid integrated with InP, GaAs or GaN active elements: lasers, detectors, gain chips and modulators to form complex hybrid photonic integrated circuits.

RF Flexlines based on electrical co-planar waveguides:

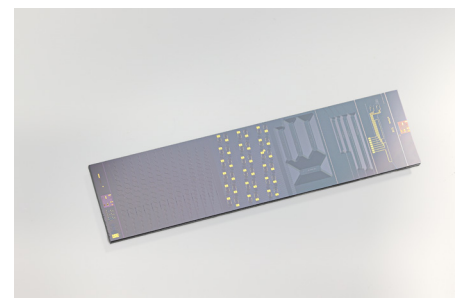
Connecting optical and electrical components at very high speed (200 GHz and beyond)



Applications



Tunable, narrow-linewidth signal generator (InP-PolyBoard)



SiN PIC with tuning electrodes



Mode-locked laser module (InP-SiN)