



CONNECTS

Heterogeneous Integration for
Connectivity and Sustainability

Integration and Assembly of Co-Packaged Optics (CPO) for Smart Networking Cards and Switches

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AGENDA

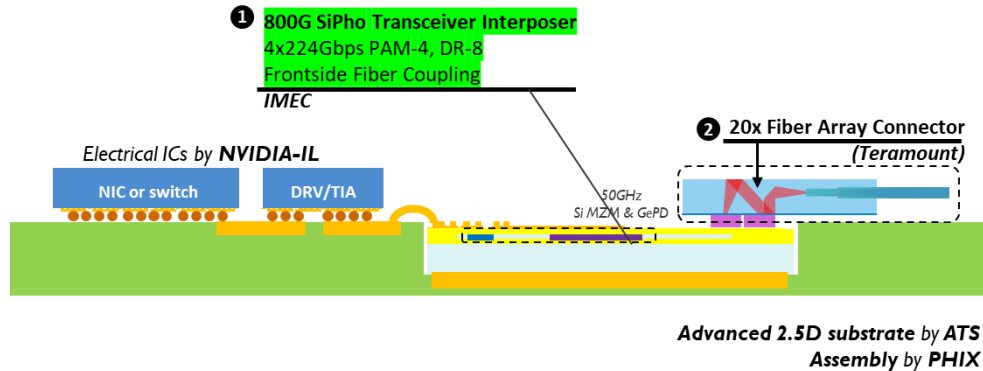
- Who we are
- HiCONNECTS: Co-packaged Optics
- Assembly of Pluggable Optics
- EICs to PIC
- Demo Module
- Take Aways

WHO WE ARE ?

PHIX is a world leading foundry for packaging and assembly of photonic integrated circuits (PICs) and MEMS, supplying components and modules in scalable production volumes.

- Founded in 2017, started operations in 2018
- Independent pure play packaging facility
- Specialized in hybrid PIC assembly, DC/RF connectivity, and fiber array interfacing

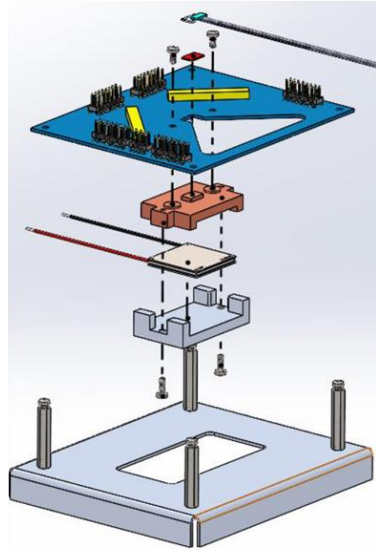
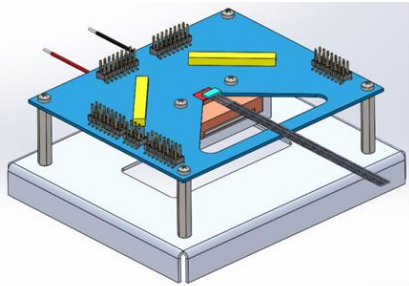
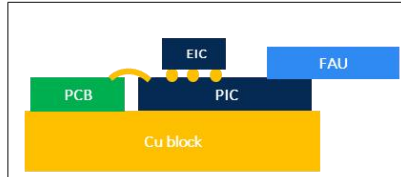
HiCONNECTS: Co-packaged Optics



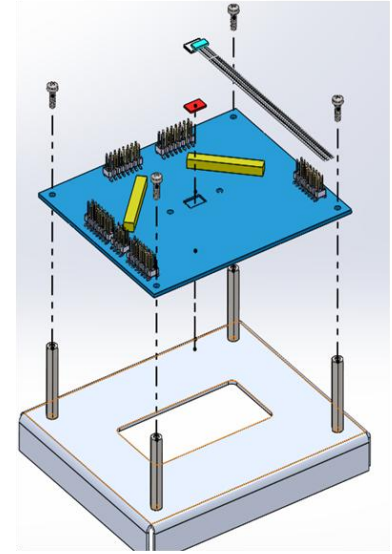
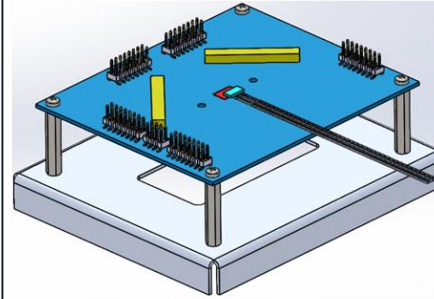
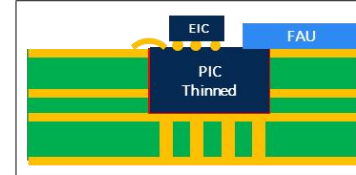
- **800G SiPho Transceiver** with 4x224 Gbps PAM-4 lanes
- **Co-packaged optics** with NIC/switch and DRV/TIA on interposer
- **SiPho chip** integrates 50 GHz MZM modulators & Ge PDs
- **Plugable optics fiber coupling** for optical I/O
- **Compact CPO architecture** enabling high-speed, low-loss links

HiCONNECTS: Co-packaged Optics

Packaging approach 1 : Cutout



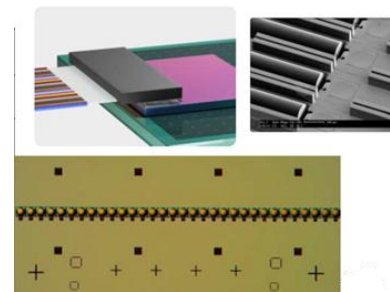
Packaging approach 2 : Cavity



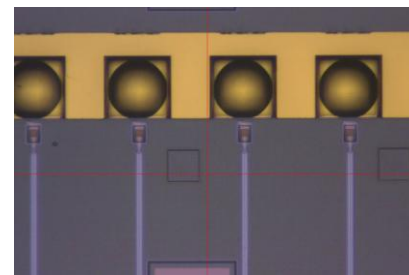
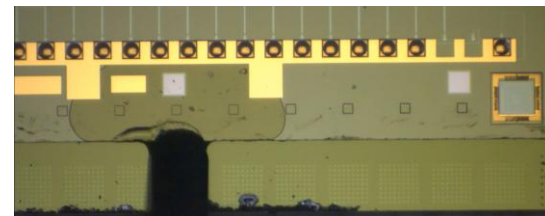
Assembly of Pluggable Optics

Key Challenges

- **Planarity & underfill uniformity:** Micron-level flatness needed for reliable contact. No voids
- **Alignment & inspection:** Sub-micron placement accuracy
- **Epoxy selectivity:** Transmission and absorption control at transmission wavelength



Bump on Carrier (BOC's) Glass substrate



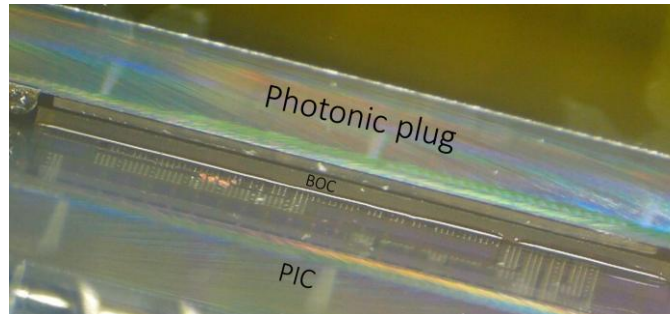
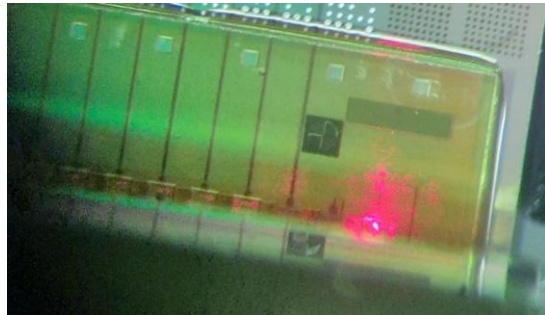
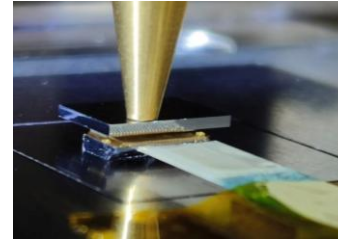
In-Cooperation with Teramont

Assembly of Pluggable Optics

Key Challenges

- **Passive Coupling:** Mechanical assisted spheres to control Z height, Sub-micron accuracy
- **Active Coupling:** Alignment-loop loss measurement

Fiber Coupling to BOC's

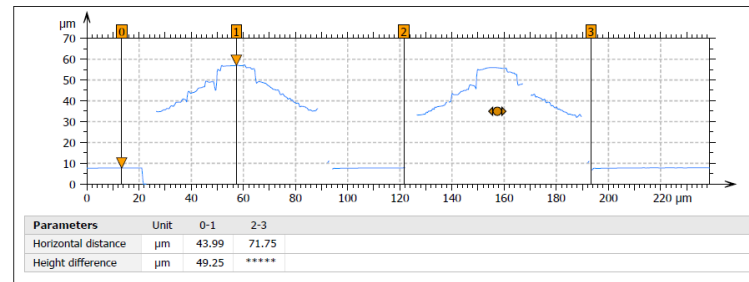
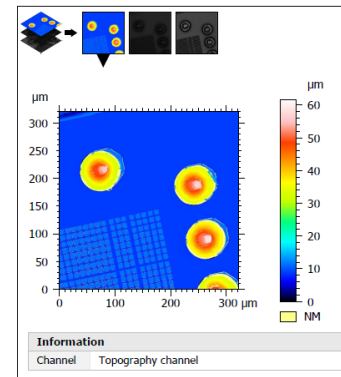
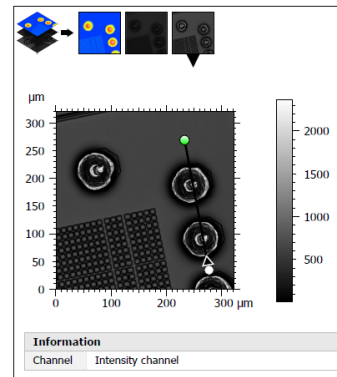
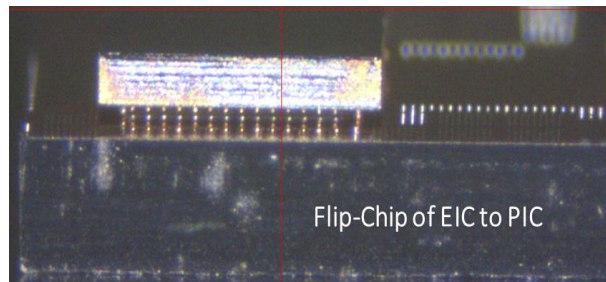
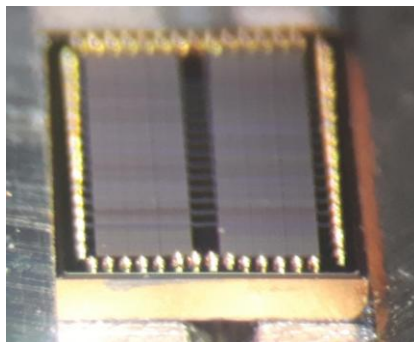


In-Cooperation with Teramont

EICs to PIC

Key Challenges

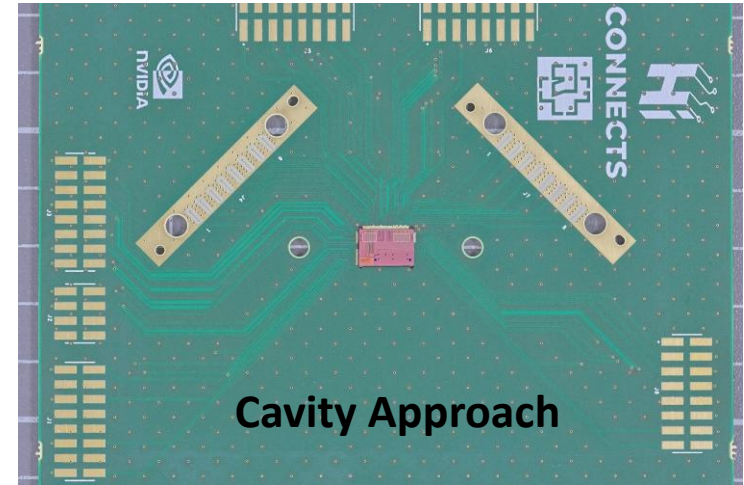
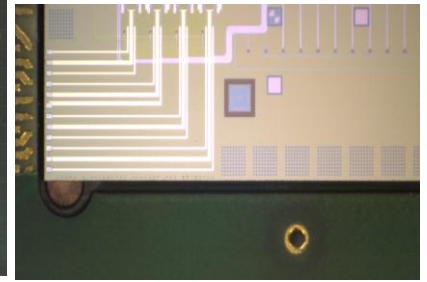
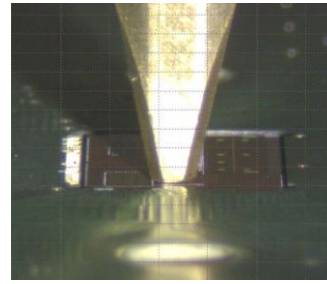
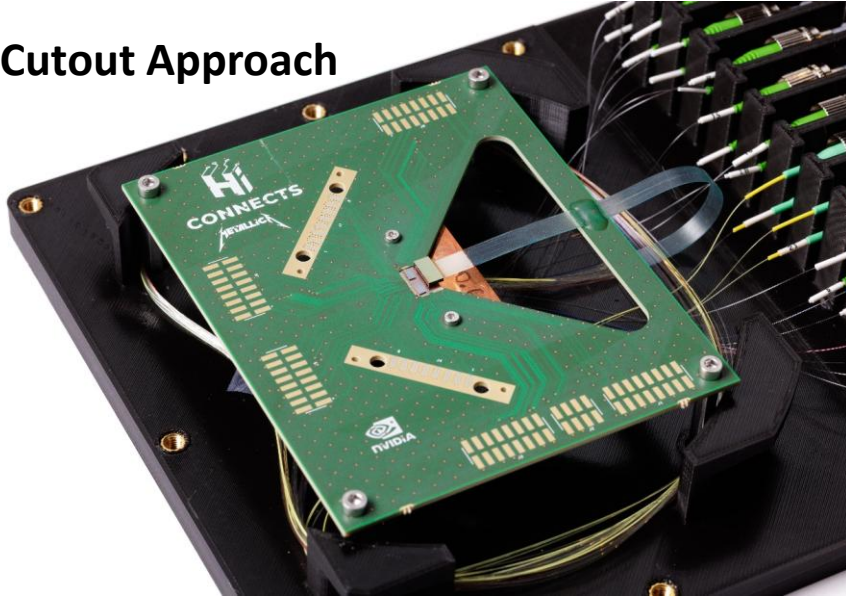
- Achieving Smaller footprint
- Au-Stud bumping of thin wire
- Flip-Chip integration
- Reflow profile for good intermetallic contact with Al pads



In-Cooperation with IMEC and Uyemura Japan on plating the gold

Demo Modules

Cutout Approach



Cavity Approach

In-Cooperation with AT&S

Take Aways

We demonstrated an innovative method for underfilling BOCs on PIC

Developed a process to couple pluggable fibers with both active and passive coupling (on- going challenges on loss measurements)

Demonstrated stud bumping on a smaller footprint on the EICs

Assembled Demo module for two different packaging approaches

Collaborating with great synergy among the partners within the consortium

Find Out More About Us

- Visit our website for more product details, news, and more!



Acknowledgement

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