

# Bachelor / Master Thesis: Photonic Wire Bonds with Advanced Functionalities

Photonic wire bonding (PWB) is a novel technology of making 3D freeform polymer optical waveguides by direct laser printing [1]. It is the enabling technology towards an efficient chip coupling, and multi-chip integration [2, 3]. Up to now, PWB was only used for making optical waveguides. Therefore, modeling, design, and optimization efforts were aimed at minimizing waveguide propagation losses. It is, however, of great interest not just making low-loss freeform waveguides, but also making waveguide based photonic devices with advanced functionalities.

## Your tasks:

- Modeling, design and optimization of waveguide based photonic devices with advanced functionalities
- 3D nano-printing and optical packaging of optimized devices
- Experimental verification of optically packaged devices

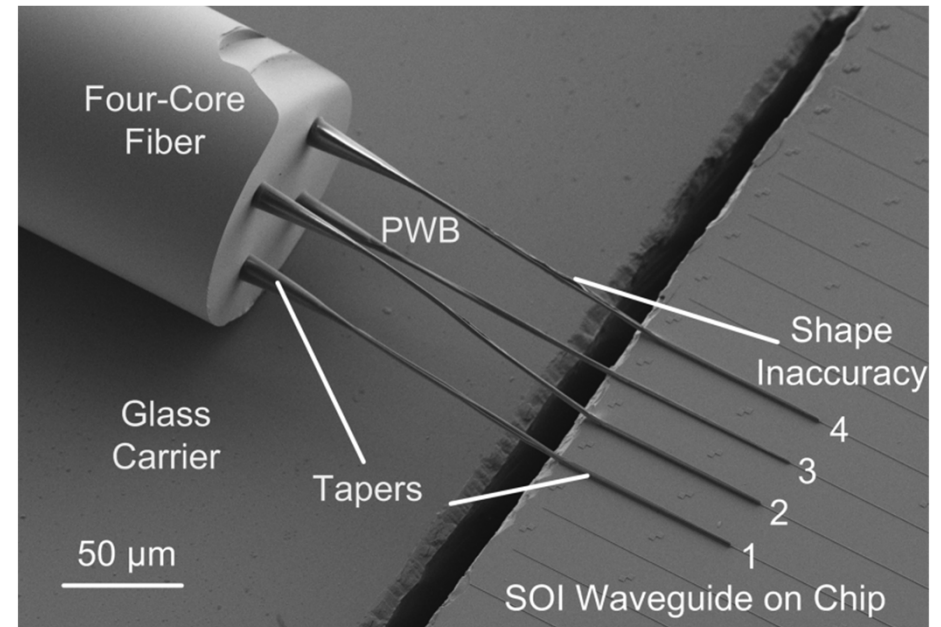


Figure 1: Photonic wire bonds (PWB) connect the individual cores of a four-core fiber to different on-chip SOI waveguides [2].

- [1] N. Lindenmann et al., "Photonic wire bonding: a novel concept for chip-scale interconnects," *Optics Express*, **20**(16), pp. 17667-17677, 2012
- [2] N. Lindenmann et al., "Connecting Silicon Photonic Circuits to Multicore Fibers by Photonic Wire Bonding", *Journal of Lightwave Technology*, **33**(4), pp. 755-760, 2015
- [3] M. R. Billah et al., Four-Channel 784 Gbit/s Transmitter Module Enabled by Photonic Wire Bonding and Silicon-Organic Hybrid Modulators, 43<sup>rd</sup> European Conf. Opt. Commun. (ECOC 2017), Gothenburg, Sweden, Sept. 17 –21, paper Th.PDP.C.1 (2017) (postdeadline)

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