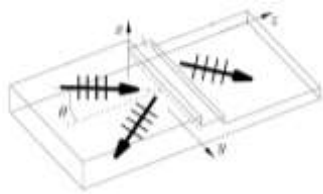


# Antireflective integrated optical waveguide

## Lossless excitation of thin optical waveguides by oblique incidence of semi-guided waves

### Invention

In transitions between dielectric optical waveguides of different thickness, it comes through modal mismatch usually to radiation losses and optical backscatter. Taper structures, which can produce



Schematic arrangement of a preferred design option

a gradual, quasi-adiabatic transition between the waveguides with different thicknesses, can help here. However, tapering structures of this kind are generally complicated to design and manufacture. In addition, these structures are usually relatively large in relation to typical dimensions of integrated-photonics components. The University of Paderborn has set itself the task and developed a possibility for an efficient, low-loss transition between two optical layer waveguides of different thicknesses.

### Commercial Opportunities

The novel solution is based on the finding that an efficiency gain can be achieved with an intermediate stage at the transition of the two optical waveguides. This intermediate stage does not run perpendicular to the propagation direction of the light, but obliquely. By individually adjusting the angle, step width and height, it is possible to minimize the transmission losses, or (almost) completely avoid them.

### Current Status

The invention was filed for patent by the Paderborn University. On behalf of the University, PROvendis offers licenses to interested companies for patent applications and cooperation opportunities with the inventors. If you are interested, we would be pleased to inform you about possible cooperation and the current status of the process.

### Relevant Publications

M. Hammer, L. Ebers, J. Förstner, "Oblique quasi-lossless excitation of a thin silicon slab waveguide", XXVI International Workshop on Optical Wave & Waveguide Theory and Numerical Modeling, Bad Sassendorf, Germany (2018).

<https://www.computational-photonics.eu/Papers/Pres/arcpos.pdf>

M. Hammer, "Oblique incidence of semi-guided waves on rectangular slab waveguide discontinuities: A vectorial QUEP solver", Optics Communications 338, 447-456 (2015).

An invention of the Paderborn University.

### Competitive Advantages

- Simple design
- Cost-effective production
- Compact dimensions

### Technology Readiness Level

1 2 3 4 5 6 7 8 9

Technology concept formulated

### Industries

- Physical Industry

### Ref. No.

5349

### Contact

Andreas Brennemann  
E-Mail: [ab@provendis.info](mailto:ab@provendis.info)  
Phone: +49(0)208-94105-33

