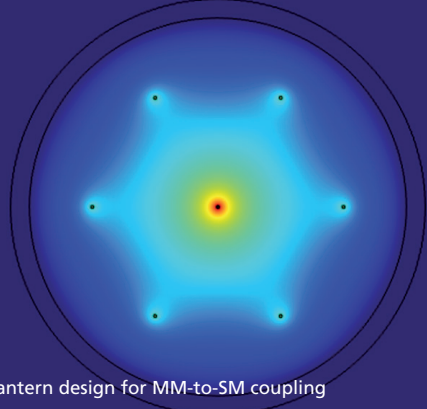
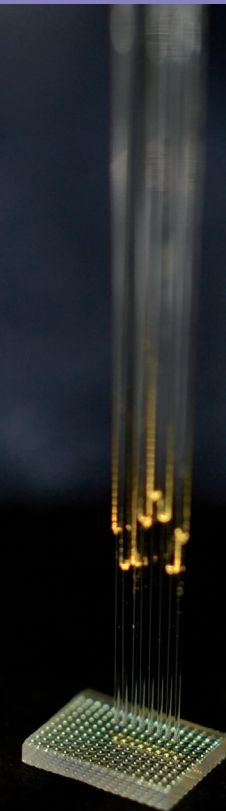


FIBER OPTIC INTERCONNECTS AND SENSORS



CONTACT

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SERVICES

Simulations

- Optical fiber design
- Mode coupling analysis
- Optical propagation analysis
- Tools: Zemax, Comsol, Optiwave OptiBPM

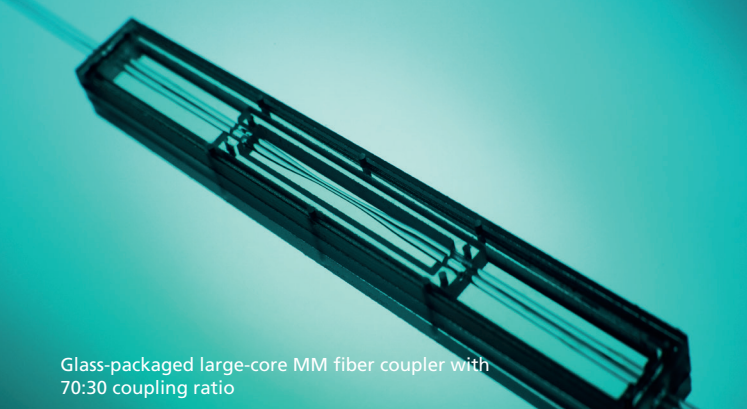
Manufacturing and Processing

- Laser structuring of fibers
- Laser fusing of fibers and capillaries to glass chips
- Fused tapering of fibers and capillaries
- Arc and filament splicing of standard and microstructured fibers from 80 μm to 1200 μm
- Cleaving of standard and special fibers
- Etching of fibers and capillaries

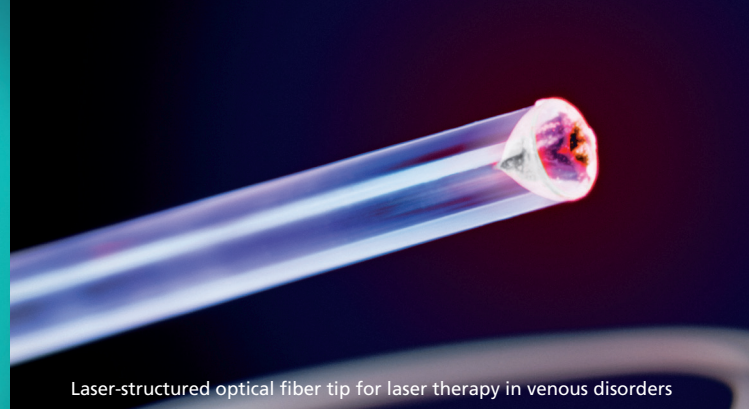
Test

- Beam profile analysis
- Near/far field analysis
- Spectral transmission measurements

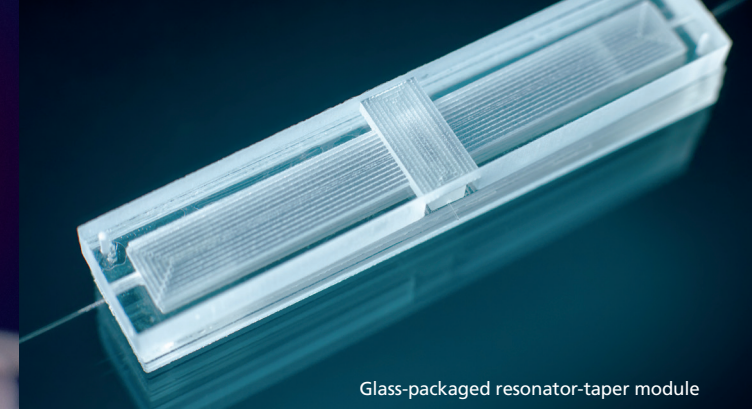
For more information please go to
www.fraunhofer.de/of



Glass-packaged large-core MM fiber coupler with 70:30 coupling ratio



Laser-structured optical fiber tip for laser therapy in venous disorders



Glass-packaged resonator-taper module

APPLICATIONS

Optical fibers provide unique features such as high bandwidths, low-loss transmission at high frequencies, low-cost, light weight and immunity to electromagnetic interference. Thus, they are used in a wide range of applications:

- Data transmission
- Microlasing
- Spectroscopy
- Minimally invasive laser therapy
- Diagnosis in healthcare
- Environmental sensing and monitoring
- Aerospace

A diversified group of fiber components are found inside the topic of fiber optic interconnects and sensors (FOIS):

- Couplers
- Radial-firing fiber tips
- Optical and fluidic connections to glass chip
- Fiber bundle probes
- Bottle and sphere microresonators

FIBER OPTICS AT FRAUNHOFER IZM

Our activities related to FOIS are focused on the development of processes and systems to form, to fuse, to splice and to etch optical fibers and capillaries. Different kind of fiber materials might be used such as all glass types, soft and crystalline materials covering a full spectral range from UV to mid-IR.

In particular, Fraunhofer IZM has a great experience in constructing customized laser machines, which provide fiber components with high quality and reproducibility.

Moreover, these processes might easily be adapted to the requirements of the customer. Some machines have the ability of active alignment capabilities with sub-micron accuracy.

Recently, Fraunhofer IZM is involved in designing, manufacturing and packaging of optical sensing modules addressed to the development of portable diagnostic systems and gyroscopes. Hybrid integration of optofluidic biochips via laser-structured double-sided adhesive tapes have been also investigated.

TECHNICAL DATA

Fused silica fiber couplers

- Diameters from 80 μm to 660 μm
- Coupling ratios of 70:30, 50:50 and 90:10
- Large-core couplers with 1.5 dB @ 850 nm

Fiber tips with protective glass caps

- Diameters up to 2 mm
- Shaped tip: Wedge, cone and ball
- Glue-free joining of caps via CO₂ laser

Fused fibers or capillaries to glass chips

- Single-mode, multi-mode fibers and silica capillaries with diameters of up to 1000 μm
- Minimum pitch of 125 μm

Glass bottle resonators

- Diameters from 200 μm to 1000 μm
- Lengths from 300 μm to 1300 μm

Thinned glass fibers and tips

- Biconical tapers by etching with uniform diameters down to 10 μm and lengths from 10 mm to 5 cm
- Wedge-shaped tips with 10 mm in length