



- 1 Manufactured capillary with CO<sub>2</sub>-laser.
- 2 4:1 Tapered optical fiber (MM 720 µm) with long down taper and short waist.
- 3 4:1 Tapered fused silica capillary (outer diameter: 1200 µm).

## TAPERING OF DIFFERENT OPTICAL COMPONENTS WITH CO<sub>2</sub>-LASER

### Fraunhofer Institute for Applied Optics and Precision Engineering IOF

Albert-Einstein-Straße 7  
07745 Jena

Director  
Prof. Dr. Andreas Tünnermann

Department Opto-mechatronic  
Components and Systems  
Head of Department  
Dr. Erik Beckert

Contact  
Dipl.-Ing. Steffen Böhme  
Phone +49 3641 807-305  
steffen.boehme@iof.fraunhofer.de

[www.iof.fraunhofer.de](http://www.iof.fraunhofer.de)

### CO<sub>2</sub>-Tapering

Laser based tapering overcomes typical limitations of conventional taper equipment. The technology is contamination free and without limits of power and needs no consumables. The symmetry of the laser radiation permits a processing of larger glass geometries.

### Properties

The computer-controlled tapering process offers a lot of flexibility with high reproducibility. A broad range of tapered components (fibers, capillaries etc.) can be manufactured. The input to output ratio of the Numerical Aperture (NA) for optical fibers is free selectable:

$$NA_o = (\text{Ratio} * NA_i).$$

Tapered lengths up to 90 mm can be realized. The current taper device supports fiber or capillaries with an outer diameter of max. 3 mm.

The linear down taper, waist and linear up taper length can be defined over a wide range. The technology is also suitable for Biconic Tapers, Fused Fiber Bundles, Fiber Couplers and Combiners.

### Result

Apart from different optical fiber tapers we used this technology to draw capillaries to a wall thickness of about 10 µm.