

Photonic Crystal Fiber end-sealing

Long term use of solid core fibers is often limited by end facet damage due to the high intensity in a fiber core. This is especially the case when small core nonlinear fibers are pumped by high peak power femtosecond pulses.

Crystal Fibre has developed an elegant fiber end treatment to increase the fiber end damage threshold and generally ease the interfacing. By collapsing/tapering of the fiber end, we obtain the following advantages:

- Hermetic sealing of the fiber
- Can be connectorized and polished
- Beam expansion such that the fiber end facet spot size can be significantly larger than the internal mode field diameter resulting in very high fiber end damage threshold
- Effective incoupling NA is reduced/mode field diameter is increased resulting in higher coupling efficiency and stability

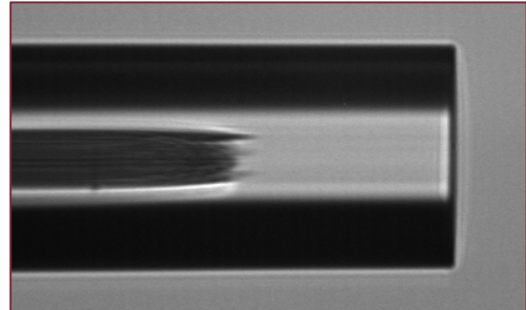
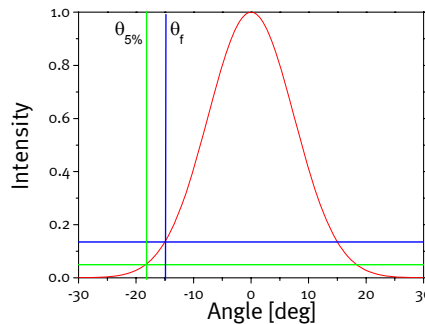
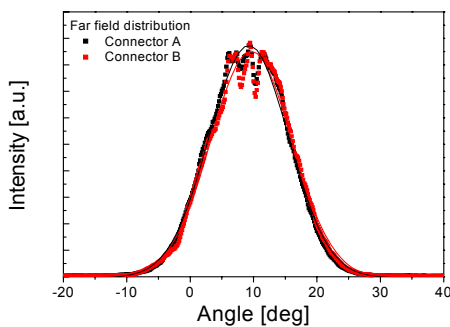


Photo of collapsed fiber end

Example of far field distribution for collapsed and FC/PC connectorized nonlinear fiber, $\lambda = 780$ nm



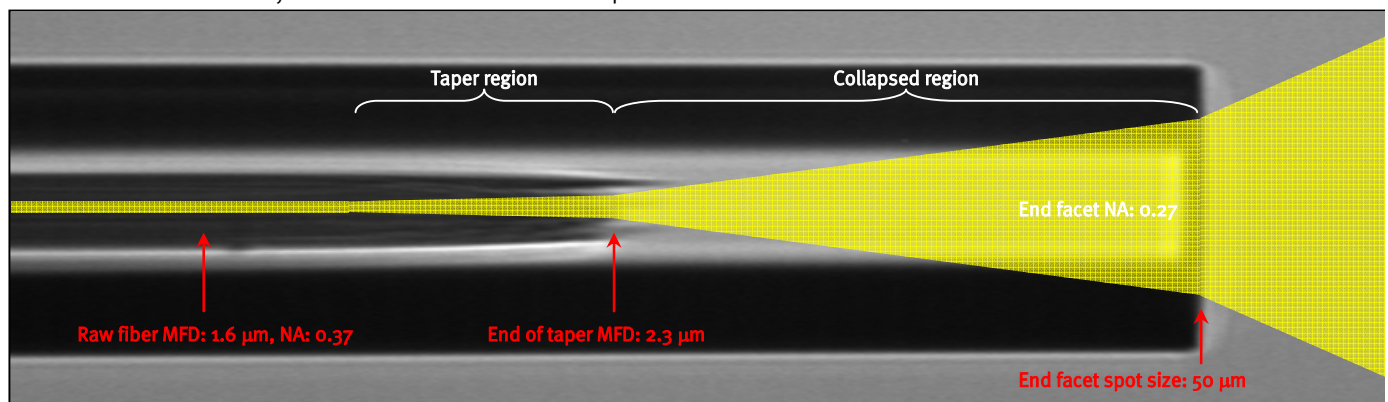
Definition of far field parameters

Assuming a Gaussian far field distribution, the following definitions are used:

- θ_f is the angle where the peak intensity has decreased to $1/e^2$ (see figure)
- $\theta_{5\%}$ is the angle where the peak intensity has decreased to 5% (see figure)
- $\theta_{5\%} = (\ln(20)/2)^{1/2} * q_f = 1.2239 * \theta_f$
- $NA = \sin(\theta_{5\%})$
- $MFD = 2l / (p \sin(q_l))$ (Gaussian mode field diameter)

Example of nonlinear fiber end treatment, $\lambda = 780$ nm

The end of the Photonic Crystal Fiber is heat treated to collapse the airholes



End-sealing-100409