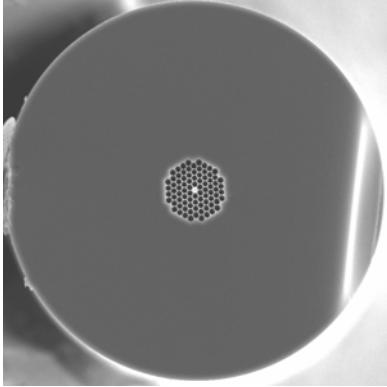Photonic Crystal Fibers by

CRYSTAL FIBRE

NL-1.7-700-02

Highly nonlinear PCF

Our highly nonlinear photonic crystal fibers guide light in a small solid silica core, surrounded by a microstructured cladding formed by a periodic arrangement of air holes in silica. The optical properties of the core closely resemble those of a rod of glass suspended in air, resulting in strong confinement of the light and, correspondingly, a large nonlinear coefficient. By selecting the appropriate core diameter, the zero-dispersion wavelength can be chosen over a wide range in the visible and near infrared spectrum, making these fibers particularly suited to supercontinuum generation with Ti:Sapphire or diode-pumped Nd^{3+}-laser sources.

Nonlinearity: 148 W^{-1} km^{-1}
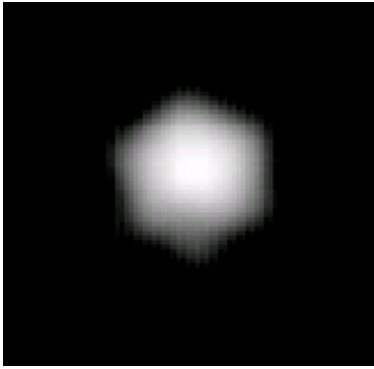**Zero dispersion λ=700nm**
Single material
Spliceable

Unique properties of Highly nonlinear PCF

- Zero dispersion wavelengths from 670-880 nm available

- Nonlinear coefficients up to 190 $W^{-1}km^{-1}$ available
  (cf 1.1 $W^{-1}km^{-1}$ for SMF 28 at 1550 nm)

- Near-Gaussian mode profile

Applications

- Supercontinuum generation for frequency metrology, spectroscopy or optical coherence tomography

- Four-wave mixing and self-phase modulation for switching, pulse-forming and wavelength conversion applications

- Raman amplification

Typical measured near field
profile (log scale)

Optical properties

- Zero dispersion wavelength (λ_0)   700±5 nm

- Dispersion slope at λ_0 1.0 ps $\cdot$nm$^{-2}\cdot$km^{-1}

- Attenuation λ_0 <   50 dB/km

                                       1550 nm   <   20 dB/km

                                       1380 nm   <   300 dB/km

                                       1000 nm   <   40 dB/km

                                       600 nm   <   60 dB/km

- Mode field diameter[1] at λ_0 1.2±0.1 µm

- Numerical aperture[2] at λ_0 0.45

- Effective nonlinear area[3]   1.51 µm^2

- Nonlinear coefficient[4] at λ_0 148 W$^{-1}\cdot$km^{-1}


Physical properties

- Core diameter (average)   1.7±0.1µm

- Pitch (distance between cladding holes)   1.8 µm

- Air Filling Fraction in the holey region   >85%

- Width of struts holding the core   60 nm

- Diameter of holey region   18.5 µm

- Diameter of outer silica cladding (OD)   116 µm

- Coating diameter (single layer acrylate)   220 µm

- Available length   up to 1 km

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Typical attenuation spectrum and chromatic dispersion
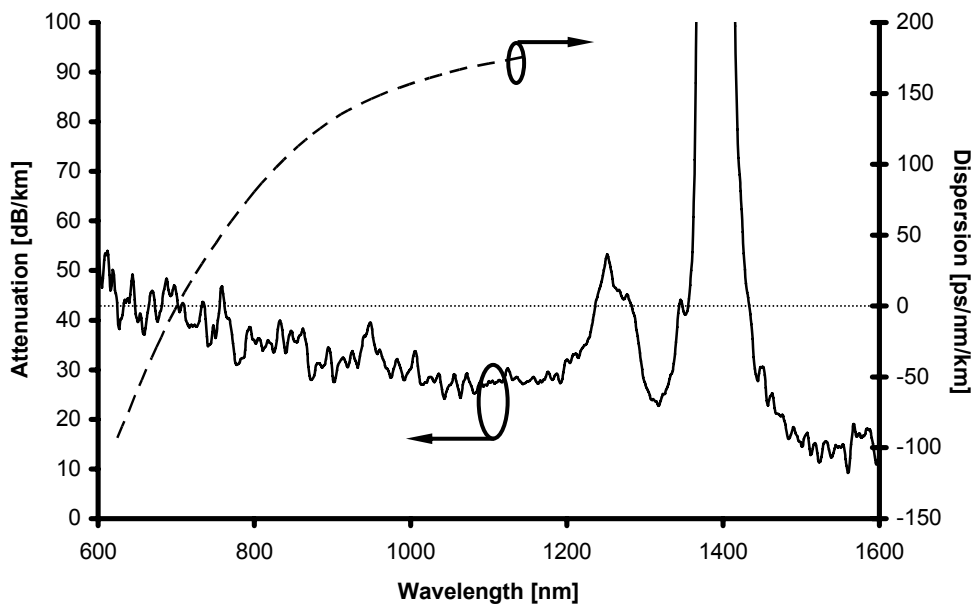
SEM image of PCF region and core
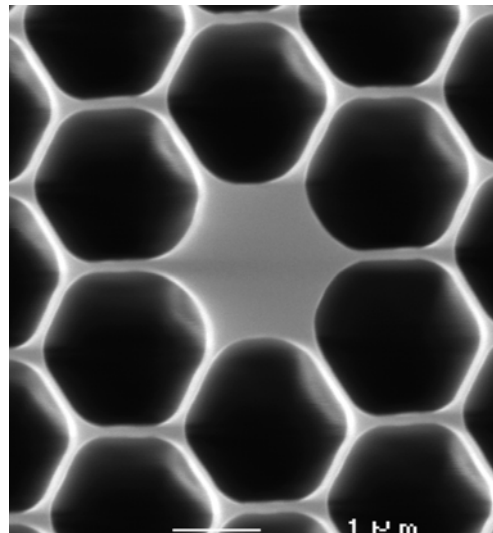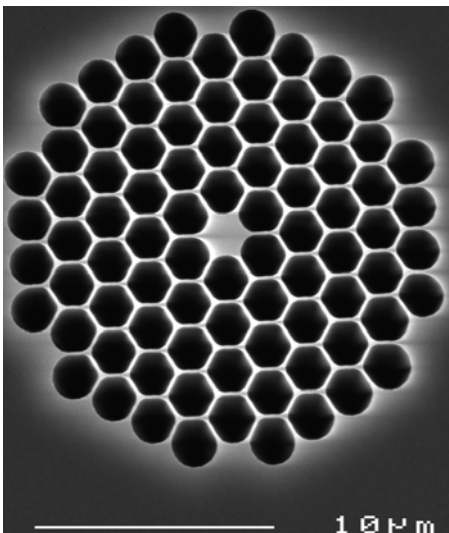
Notes

1   Full 1/e-width of the near field intensity distribution

2   Sine of half angle at which a Gaussian fit to the far field intensity distribution has dropped to 1% of its peak value

3      $$A_{eff} = \frac{\left(\int\limits_{\infty} |\mathbf{E(r)}|^2 d^2\mathbf{r} \right)^2}{\int\limits_{silica} |\mathbf{E(r)}|^4 d^2\mathbf{r}}$$

4      $$\gamma = \frac{2\pi n_2}{A_{eff}\lambda}$$

$n_2 \approx 2.5 \times 10^{-20}$ m^2 W^{-1} for silica

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To contact Crystal Fibre A/S, please visit our website www.crystal-fibre.com
or send an email message to contact@crystal-fibre.com