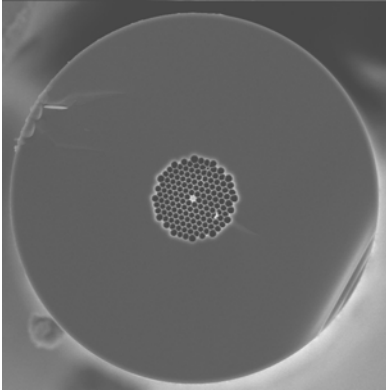


**NL – 2.0 – 745 – 02**

## ***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<sup>3+</sup>-laser sources.

**Nonlinearity: 104 W<sup>-1</sup> km<sup>-1</sup>**

**Zero dispersion  $\lambda=745\text{nm}$**

**Single material**

**Spliceable**

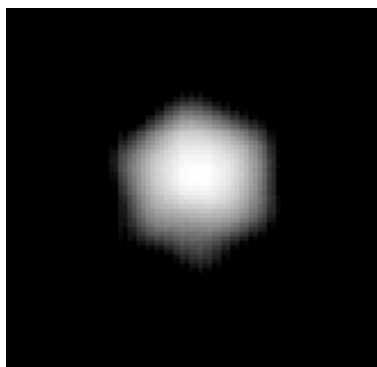
### **Unique properties of Highly nonlinear PCF**

- Zero dispersion wavelengths from 670-880 nm available
- Nonlinear coefficients up to 190 W<sup>-1</sup>km<sup>-1</sup> available (cf 1.1 W<sup>-1</sup>km<sup>-1</sup> 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

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Typical measured near field  
profile (log scale)

### Optical properties

- Zero dispersion wavelength ( $\lambda_0$ ) 745±5 nm
- Dispersion slope at  $\lambda_0$  0.85 ps·nm<sup>-2</sup>·km<sup>-1</sup>
- Attenuation
 

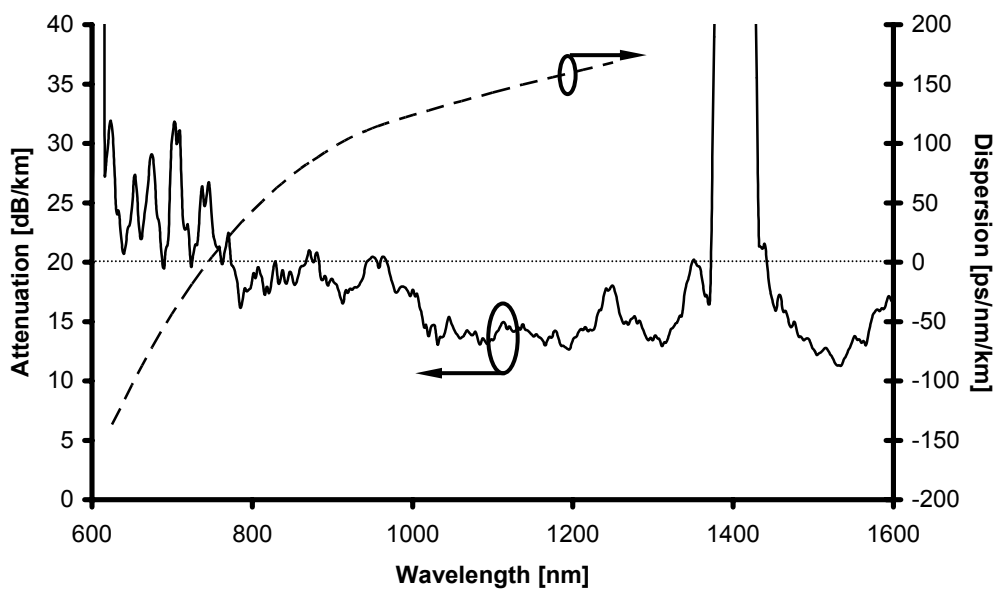
$\lambda_0$	<	30 dB/km
1550 nm	<	20 dB/km
1380 nm	<	200 dB/km
1000 nm	<	20 dB/km
600 nm	<	40 dB/km
- Mode field diameter<sup>1</sup> at  $\lambda_0$  1.4±0.1  $\mu$ m
- Numerical aperture<sup>2</sup> at  $\lambda_0$  0.42
- Effective nonlinear area<sup>3</sup> 2.0  $\mu$ m<sup>2</sup>
- Nonlinear coefficient<sup>4</sup> at  $\lambda_0$  104 W<sup>-1</sup>·km<sup>-1</sup>

### Physical properties

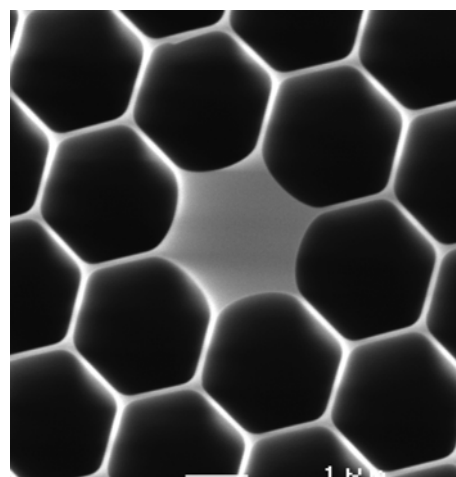
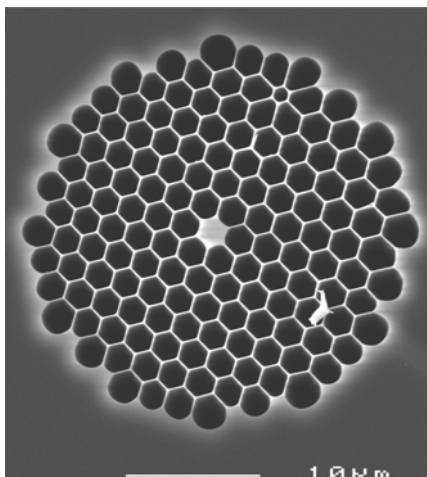
- Core diameter (average) 2.0±0.1  $\mu$ m
- Pitch (distance between cladding holes) 2.0  $\mu$ m
- Air Filling Fraction in the holey region >90%
- Width of struts holding the core 60 nm
- Diameter of holey region 28  $\mu$ m
- Diameter of outer silica cladding (OD) 127  $\mu$ m
- Coating diameter (single layer acrylate) 220  $\mu$ m
- Available length up to 1 km

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### Typical attenuation spectrum and chromatic dispersion



### SEM image of PCF region and core



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## 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

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

4

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

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