

For current pricing, please see our website.

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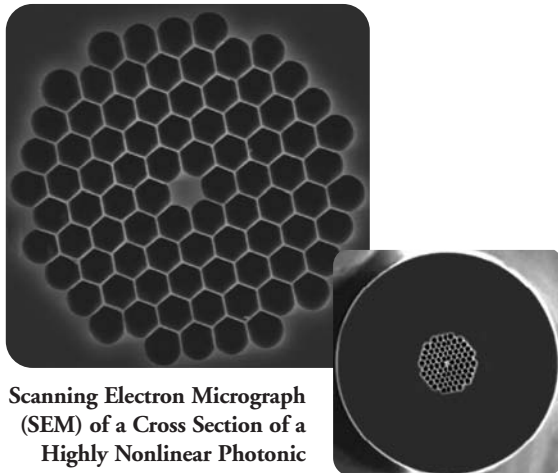
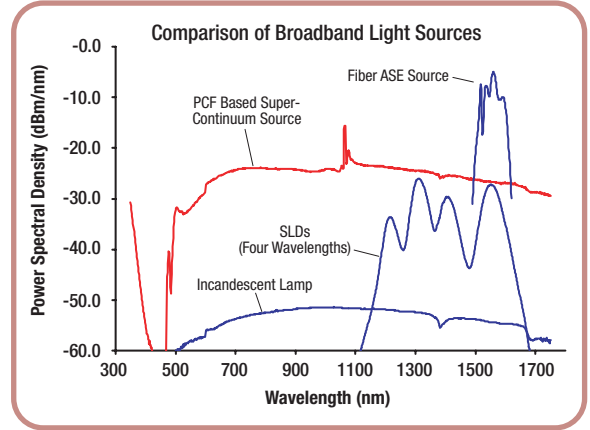
Plastic Optical Fiber

# Highly Nonlinear Photonic Crystal Fiber (Page 1 of 2)

## Nonlinear Fibers for Supercontinuum from Visible to NIR

Supercontinuum (SC) sources are a new type of light source that combine the high brightness of a laser (output in a single transverse mode) with a spectral bandwidth usually associated with an incandescent source. This combination often drastically improves the signal-to-noise ratio, reduces the measurement time, or widens the spectral range in applications that require a broadband source, including high-resolution spectroscopy, the characterization of optical components, or optical coherence tomography.

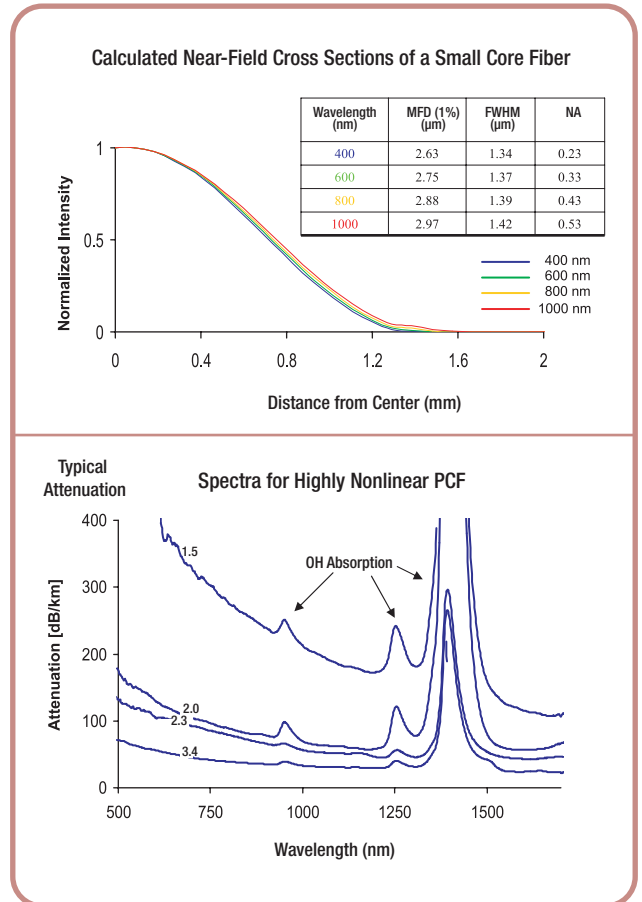
Despite the complex nature of the nonlinear optical processes that convert the narrowband output of a laser into a supercontinuum, the practical realization can be surprisingly straightforward. All that is required is a high-peak-power laser and a nonlinear element with the right dispersion characteristics. The high concentration of power, long length at comparatively low loss, and ability to achieve zero dispersion at wavelengths shorter than 1,250 nm – something that is not achievable with conventional fibers – make small-core PCF (Photonic Crystal Fiber) ideally suited as the nonlinear element in an SC source. NKT Photonics offers a range of small-core fibers suitable for use with fs Ti:sapphire lasers (NL Series of fiber), as well as a fiber specifically designed to generate SC radiation from the output of a compact, low-cost, Nd<sup>3+</sup>-YAG microchip laser (SC-5.0-1040). The graph above compares the time averaged power spectral density for supercontinuum sources to that of other typical broadband sources. Detailed application notes are available on our website.



Scanning Electron Micrograph (SEM) of a Cross Section of a Highly Nonlinear Photonic Crystal Fiber

### Applications

- Supercontinuum Generation for Frequency Metrology, Spectroscopy, or Optical Coherence Tomography Using Ti:Sapphire, Nd<sup>3+</sup>-Microchip, or Nd<sup>3+</sup> Fiber Laser Pumps
- Four-Wave Mixing and Self-Phase Modulation for Switching, Pulse-Forming, and Wavelength Conversion Applications
- Raman Amplification



## Highly Nonlinear Photonic Crystal Fiber (Page 2 of 2)

| ITEM #        | $\lambda_0$ , ZERO DISPERSION WAVELENGTH | MFD @ $\lambda_0$     | NUMERICAL APERTURE @ $\lambda_0$ | EFFECTIVE NONLINEAR AREA | NONLINEAR COEFFICIENT @ $\lambda_0$ | CORE DIAMETER (AVERAGE) | CLADDING DIAMETER | COATING DIAMETER |
|---------------|--|-----------------------|----------------------------------|--------------------------|-------------------------------------|-------------------------|-------------------|------------------|
| NL-1.5-670-02 | 670 ± 5 nm                               | 1.1 ± .01 μm          | 0.5                              | 1.23 μm <sup>2</sup>     | 190 (W•km) <sup>-1</sup>            | 1.5 ± 0.1 μm            | 106 ± 1 μm        | 220 μm           |
| NL-1.7-700-02 | 700 ± 5 nm                               | 1.2 ± 0.1 μm          | 0.45                             | 1.51 μm <sup>2</sup>     | 148 (W•km) <sup>-1</sup>            | 1.7 ± 0.1 μm            | 116 μm            | 220 μm           |
| NL-1.8-730-02 | 730 ± 5 nm                               | 1.4 ± 0.1 μm          | 0.4                              | 1.76 μm <sup>2</sup>     | 122 (W•km) <sup>-1</sup>            | 1.8 ± 0.1 μm            | 127 μm            | 220 μm           |
| NL-2.0-745-02 | 745 ± 5 nm                               | 1.4 ± 0.1 μm          | 0.42                             | 2.0 μm <sup>2</sup>      | 104 (W•km) <sup>-1</sup>            | 2.0 ± 0.1 μm            | 127 μm            | 220 μm           |
| NL-2.3-790-02 | 790 ± 5 nm                               | 1.5 ± 0.1 μm          | 0.4                              | 2.7 μm <sup>2</sup>      | 75 (W•km) <sup>-1</sup>             | 2.3 ± 0.1 μm            | 147 μm            | 220 μm           |
| NL-2.4-800    | 800 ± 5 nm                               | 1.5 ± 0.1 μm          | 0.19                             | 2.8 μm <sup>2</sup>      | 70 (W•km) <sup>-1</sup>             | 2.4 ± 0.1 μm            | 105 ± 1 μm        | 230 ± 5 μm       |
| NL-2.8-850-02 | 850 ± 5 nm                               | 1.9 ± 0.1 μm          | 0.38                             | 4.0 μm <sup>2</sup>      | 47 (W•km) <sup>-1</sup>             | 2.8 ± 0.1 μm            | 136 μm            | 220 μm           |
| NL-3.3-890-02 | 890 ± 5 nm                               | 2.1 ± 0.1 μm          | 0.35                             | 4.8 μm <sup>2</sup>      | 37 (W•km) <sup>-1</sup>             | 3.2 ± 0.1 μm            | 154 μm            | 220 μm           |
| NL-PM-750     | Short: 750 ± 15 nm<br>Long: 1260 ± 20 nm | 1.6 ± 0.3 μm @ 780 nm | 0.38 ± 0.05 @ 780 nm             | –                        | -95 (W•km) <sup>-1</sup> @ 780 nm   | 1.8 ± 0.3 μm            | 120 ± 5 μm        | 240 ± 10 μm      |
| SC-5.0-1040   | 1040 ± 10 nm                             | 4.0 ± 0.2 μm          | 0.20 ± 0.05 @ 1060 nm            | –                        | 11 (W•km) <sup>-1</sup> @ 1060 nm   | 4.8 ± 0.2 μm            | 125 ± 3 μm        | 244 ± 10 μm      |

| ITEM #        | PRICE/m    | \$          | £          | €          | RMB         | DESCRIPTION  |
|---------------|------------|-------------|------------|------------|-------------|--|
| NL-1.5-670-02 | 1 to 9 m   | \$ 1,495.00 | £ 1,076.40 | € 1,300.65 | ¥ 11,915.15 | 1.5 μm Core Diameter, Nonlinear PCF                                      |
|               | 10 to 49 m | \$ 1,345.50 | £ 968.76   | € 1,170.59 | ¥ 10,723.64 |  |
| NL-1.7-700-02 | 1 to 9 m   | \$ 1,495.00 | £ 1,076.40 | € 1,300.65 | ¥ 11,915.15 | 1.7 μm Core Diameter, Nonlinear PCF                                      |
|               | 10 to 49 m | \$ 1,345.50 | £ 968.76   | € 1,170.59 | ¥ 10,723.64 |  |
| NL-1.8-730-02 | 1 to 9 m   | \$ 1,495.00 | £ 1,076.40 | € 1,300.65 | ¥ 11,915.15 | 1.8 μm Core Diameter, Nonlinear PCF                                      |
|               | 10 to 49 m | \$ 1,345.50 | £ 968.76   | € 1,170.59 | ¥ 10,723.64 |  |
| NL-2.0-745-02 | 1 to 9 m   | \$ 1,495.00 | £ 1,076.40 | € 1,300.65 | ¥ 11,915.15 | 2.0 μm Core Diameter, Nonlinear PCF                                      |
|               | 10 to 49 m | \$ 1,345.50 | £ 968.76   | € 1,170.59 | ¥ 10,723.64 |  |
| NL-2.3-790-02 | 1 to 9 m   | \$ 1,495.00 | £ 1,076.40 | € 1,300.65 | ¥ 11,915.15 | 2.3 μm Core Diameter, Nonlinear PCF                                      |
|               | 10 to 49 m | \$ 1,345.50 | £ 968.76   | € 1,170.59 | ¥ 10,723.64 |  |
| NL-2.4-800    | 1 to 9 m   | \$ 1,495.00 | £ 1,076.40 | € 1,300.65 | ¥ 11,915.15 | 2.4 μm Core Diameter, Nonlinear PCF                                      |
|               | 10 to 49 m | \$ 1,345.50 | £ 968.76   | € 1,170.59 | ¥ 10,723.64 |  |
| NL-2.8-850-02 | 1 to 9 m   | \$ 1,495.00 | £ 1,076.40 | € 1,300.65 | ¥ 11,915.15 | 2.8 μm Core Diameter, Nonlinear PCF                                      |
|               | 10 to 49 m | \$ 1,345.50 | £ 968.76   | € 1,170.59 | ¥ 10,723.64 |  |
| NL-3.3-890-02 | 1 to 9 m   | \$ 1,495.00 | £ 1,076.40 | € 1,300.65 | ¥ 11,915.15 | 3.3 μm Core Diameter, Nonlinear PCF                                      |
|               | 10 to 49 m | \$ 1,345.50 | £ 968.76   | € 1,170.59 | ¥ 10,723.64 |  |
| NL-PM-750     | 1 to 9 m   | \$ 1,495.00 | £ 1,076.40 | € 1,300.65 | ¥ 11,915.15 | 1.8 μm Core Diameter, Polarization-Maintaining Nonlinear PCF             |
|               | 10 to 49 m | \$ 1,345.50 | £ 968.76   | € 1,170.59 | ¥ 10,723.64 |  |
| SC-5.0-1040   | 1 to 9 m   | \$ 629.00   | £ 452.88   | € 547.23   | ¥ 5,013.13  | Nonlinear PCF for Supercontinuum Generation, with Nd <sup>3+</sup> Laser |
|               | 10 to 49 m | \$ 478.04   | £ 344.19   | € 415.90   | ¥ 3,809.98  |  |

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See pages 1276 - 1279