Supercontinuum Generation in Carbon Disulfide Liquid's Core-Photonic Crystal Fiber

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In this work, we propose a design of a highly nonlinear and flattened chromatic dispersion photonic crystal fiber with two closely zero dispersion wavelengths at 1542 nm and 1706 nm wavelengths. The optimized PCF has an anomalous chromatic dispersion around 1650 nm wavelength with a value of 8.63 ps/nm.km, and a dispersion slope of ± 0.004 ps/nm^2.km in the wavelength range $1500 - 1700$ nm. In addition, the nonlinear coefficient at 1650 nm wavelength can be up to 750 $W^{-1}.km^{-1}$. We model pulses propagation in the PCF using generalized nonlinear Schrodinger equation (Eq.(1)), with hyperbolic secant shape input pulses parameters of 1650 nm central wavelength, 75 fs temporal width, and a peak power of 700 W.

$$i\frac{\partial A}{\partial z} + \frac{\alpha}{2}A - (\sum_{n\geq 2}\beta_n \frac{i^{n+1}}{n!}\frac{\partial^n A}{\partial T^n}) = i\gamma_{NL}(1 + \frac{i}{\omega_0}\frac{\partial}{\partial T})[A(z,T)\int_{-\infty}^{\infty} R(T')\left|A(z,T-T')\right|^2 dT'] \qquad (1)$$

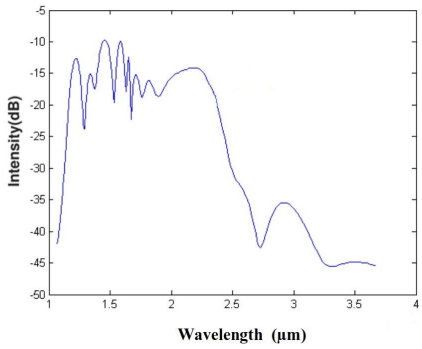

Figure 1. Supercontinuum generation

Numerical simulations show supercontinuum of 1200 nm spectral bandwidth in only 30 mm fiber length.

Références

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