Nota Técnica / Technical Note

The SCT1000 laser
FYLA Laser S.L.

ABSTRACT:

This OPA technical note presents the main characteristics of the supercontinuum laser SCT1000 developed by FYLA, and an application note co-developed with a Research Center.

RESUMEN:

Esta nota técnica de OPA presenta las principales características del láser de supercontinuo SC1000 desarrollado por la empresa FYLA, así como una notas de aplicación Co-desarrollada con un centro de Investigación

The company FYLA Laser

The company FYLA Laser S.L. (http://www.fyla.com/) rises form the merge between a world leading industrial group within the laser sector and a world reference research group in the areas of fiber laser technology. As a result, FYLA has a synergistic unified the manufacturing and industrialization capacity with a full integration and control of the supply chain, with the excellence in R+D from a world top scientific group, becoming a unique One-Stop-Shop for generating the more powerful and novel Fiber Laser based technologies for wide range of industrial sectors, as well as for the scientific community.

As a company, FYLA is the only one in the south of Europe, and one of the few in the world, able to produce and control the supply and manufacturing of the 100% of the components and technologies required for the production of our Ultrafast pulsed lasers inlcuding our unique supercontinuum lasers, which requires the production of our proprietary Photonic Crystal Fibers (PCF's).

All our components and lasers are produced and assembled in Europe, within our 10.000 m^2 of production facilities.

The SCT1000 laser

The SCT1000 is a white all-fiber pulsed laser, achieving unprecedented values in terms of Power stability, Jitter and Spectral range (starting at 420nm up to 2400nm), joining Singulartity and robustness, making FYLASCT1000 a new and unique competitive solution within supercontinuum lasers. Its use is especially interesting when an extreme brightness source is required, adding spot high quality and single mode illumination in all the spectral range .

Fig. 1. Picture of the FYLASCT1000 laser

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Figure 2 shows the SCT1000 spectrum propfile, bringing a single source of white light spectra, with up to 40000x higher efficiency than halogen lamps, higher flatness on visible spectral area, having one source for all the VIS/NIR/SWIR based application for sensing and spectroscopy. And Table 1 shows the main characteristics of the laser.

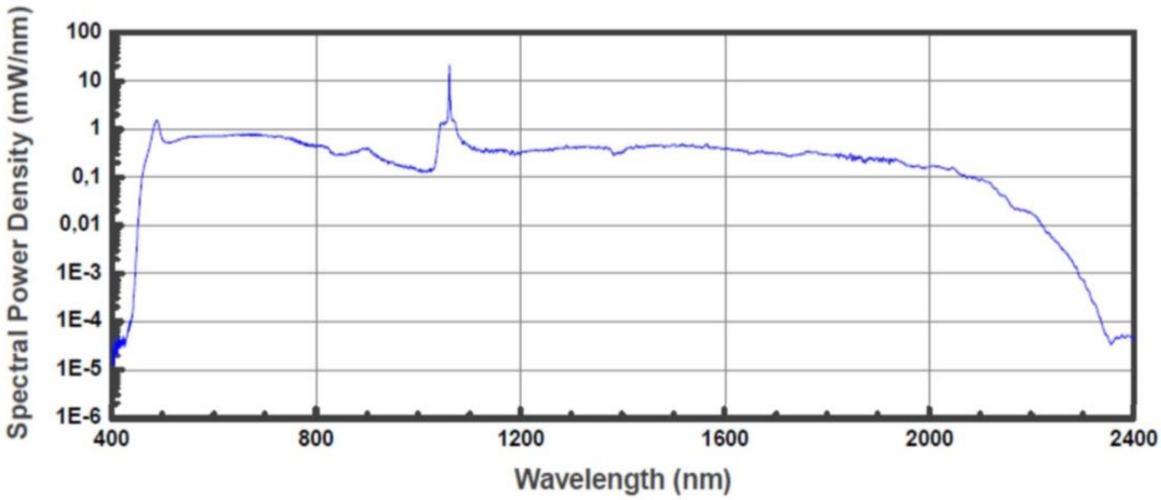

Fig. 2. FYLA SCT1000 laser spectrum.

Application Note :

Synchronus interferometric broadband measurement of dispersion applied to manufacturing optimization of microstructured optical fibers

Stable supercontinuum sources offer very significant advantages to characterize photonic devices: full VIS-NIR spectrum availability, high spectral power density and low-loss coupling, among others. Not only amplitude, but also phase properties can be measured comfortably. In this work we present an interferometric method to measure chromatic dispersion of photonic devices (e.g. photonic crystal fibers) using a pulsed FYLA SCT1000 supercontinuum source of fixed repetition rate. A synchronized control of the pulses overlapping allows an optimum visibility of fringes, resulting in very high-resolution dispersion measurement. Below the Experimental Layout

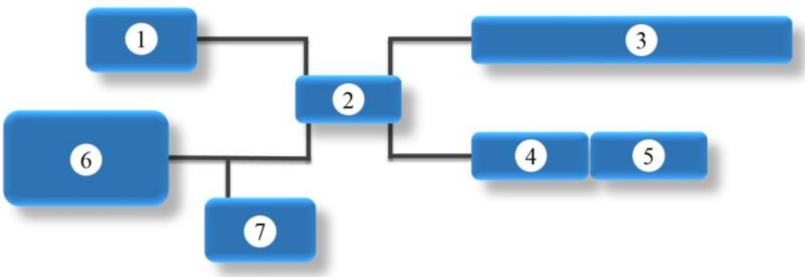

Fig. 3. Experimental layout for interferometer: 1. Supecontinuum Source SCT1000. 2. Fiber wideband Coupler 50/50. 3. Free Space Length-Tunable Arm. 4. Reference Standard Fiber. 5. Photonic Device to Characterize. 6. Optical Spectrum Analyzer. 7. Fast Oscilloscope

The main advantage about using a pulsed laser is the optimum visibility of fringes obtained by synchronized control of pulse overlapping within the full VIS-NIR range down to a resolution of less than

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1nm. This method simplifies very significantly the long and tedious state-of-the-art interferometric methods based in several SLEDs as illumination sources.

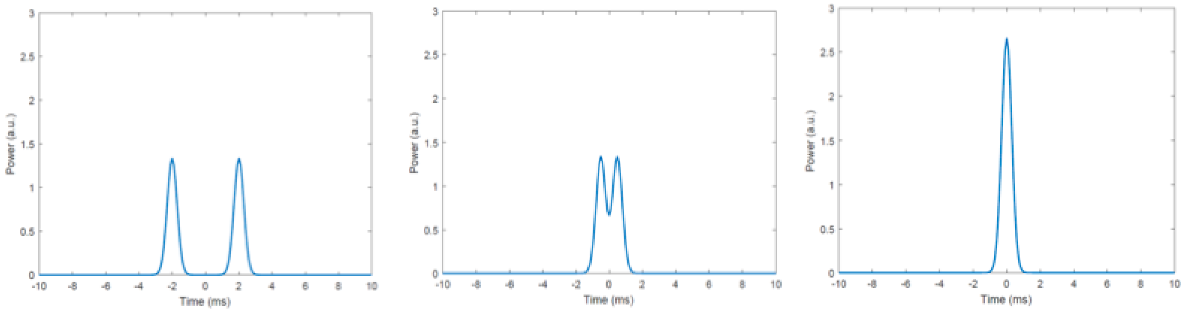

Fig. 4. In the images, from left to right, a diagram of the pulse overlapping process. Each pulse refers to a different arm of the interferometer and they gather together when you tune the length of the free space arm.

Besides the advantage of the pulse overlapping, there are more benefits about the using of a pulsed SCT1000 supercontinuum source for the interferometric methods.

The most direct one is the spectrum wideness. Working with LED's involve a long and tedious procedure because the system must be realigned every time the light source is changed. Moreover, there are wavelength bands that aren't accessible at all. This implies less accuracy when curve is reconstructed along the incomplete bands.

Fig. 5 shows several bands that have been measured with different LED sources (SLED1 to SLED3). On the contrary, in Fig. 6 a full supercontinuum measurement can be seen. Not only a wider spectrum is swiped but also the point density is also higher. This fact leads to the second main benefit about using a pulsed SCT1000 source: its high-power stability. The high stability enhances the capability of differentiating the interferences and a high density of measures is allowed.

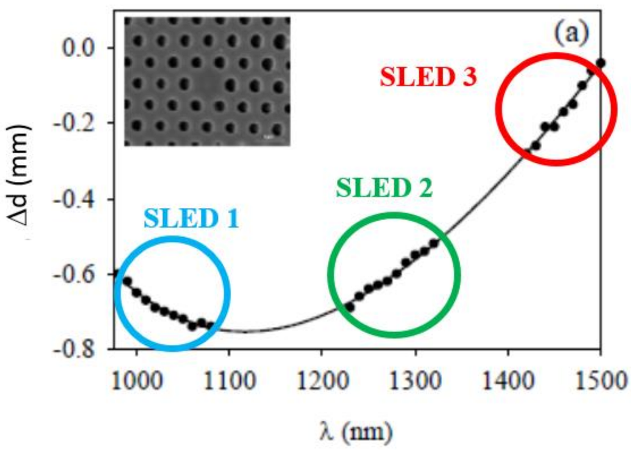

Fig. 5. Different bands measured for different LED sources

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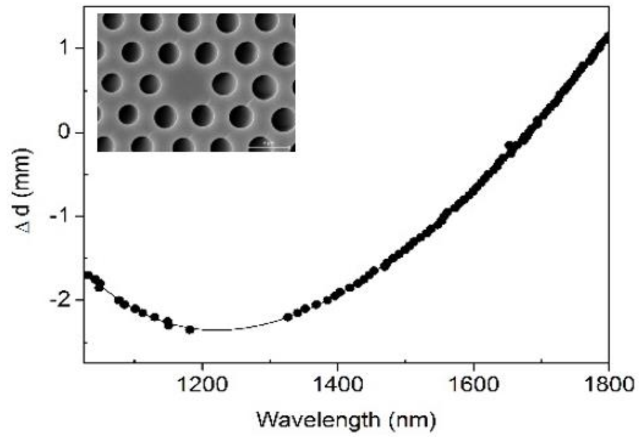

Fig. 6. Measures for a supercontinuum laser source.

As a conclusion, the application note shows an interferometric method to measure chromatic dispersion using a single picosecond pulsed SC source of fixed repetition rate applied to the design and fabrication of customized supercontinuum sources is presented. Optimum visibility of fringes has been obtained by synchronized control of pulse overlapping within the full VIS-NIR range down to a resolution of less than 1nm. This method simplifies very significantly the long and tedious state-of-the-art interferometric methods based in several SLEDs as illumination sources.

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