# NEWS RELEASE

Hamamatsu Photonics has developed a high-brightness supercontinuum light source that delivers high stability equivalent to that of xenon lamps and so allows high-precision and high-resolution measurements.

October 11, 2018
Hamamatsu Photonics K. K.
Headquarters: 325-6, Sunayama-cho,
Naka-ku, Hamamatsu City, Japan
President and CEO: Akira Hiruma

Hamamatsu Photonics has newly developed a supercontinuum light source (also called the “SC light source”) that produces higher brightness approximately 1000 times higher than our typical xenon lamps. At the same time it ensures high stability equivalent to that of xenon lamps by optimizing output conditions and also using a high nonlinear optical fiber as the nonlinear optical material. This newly developed SC light source is targeting for complex structure of semiconductor optical measurements. We will officially release products from next spring.

This SC light source was jointly developed with the Prof. Norihiko Nishizawa research group at Nagoya University, Japan, and will be exhibited at the “PHOTON FAIR 2018” to be held for every 5 years at Act City Hamamatsu (Naka-ku, Hamamatsu City, Japan) from November 1st (Thursday) to 3rd (Saturday). We will also exhibit this SC light source at the “Photonics West 2019 Exhibition” to be held at the Moscone Center, San Francisco (California, USA) from February 5 (Tuesday) to February 7 (Thursday), 2019.

## <Development Background>

Measurement technology using light sources and light detectors is applied across a broad range of fields such as industrial measurement and inspection, medical diagnosis, environmental monitoring, and academic research. For the semiconductor inspection market, Hamamatsu Photonics has developed and sold high-stability xenon lamps that emit the wide spectrum of light essential for measuring semiconductor microstructures with good repeatability and accuracy. Continuing advances in microminiaturization of semiconductor devices means there is now a critical need for high brightness light sources to measure

semiconductor microstructures even more accurately. Moreover, in the field of optical coherence tomography (OCT : Optical Coherence Tomography) for capturing cross-sectional images of living bodies, there is an increasing demand for high brightness broad band light sources to monitor the interior of living bodies more precisely. High-brightness SC light sources that emit a broad spectrum of light are already commercially available to meet these needs in various measurement applications. However, the radiant output from those SC light sources is not stable enough so that fluctuations appear in measurement results. This situation has created demands for SC light sources with much higher stability.

Comparison with other light sources

| | Xenon lamp | Other manufacturer's SC light source | Hamamatsu SC light source |
|---|---|---|---|
| Stability (%) | 0.1 | 2 | 0.1 |
| Relative brightness | 1 | 1000 | 1000 |

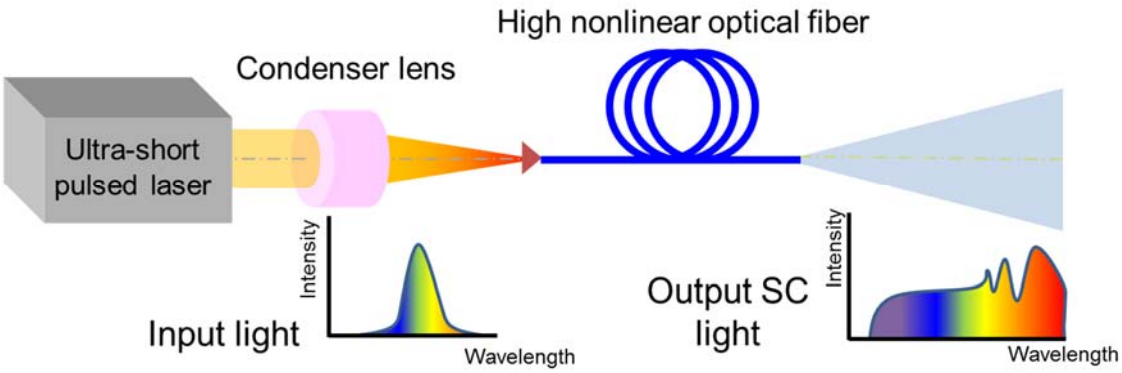
<Overview of SC light sources>

SC light sources are relatively new light sources having the high brightness like a lasers, and designed to emit light covering a broad wavelength range like lamps. SC light sources creates high-brightness broad wavelength range light by utilizing a nonlinear phenomenon in which the wavelength of ultrashort pulsed laser repeatedly output at very short time intervals, broadens when it travels through an optical fiber of nonlinear optical material.

The high stability of supercontinuum light source is achieved by high nonlinear optical fiber for controlling the nonlinear phenomenon that occurs in the nonlinear optical material. Moreover, the output conditions of the ultrashort pulsed laser and the length of the optical fiber are optimized to achieve excellent stability about 20 times higher than that of commercially available SC light sources. We also succeeded in cutting costs by minimizing the number of parts used, as well as extending life time by redesigning the ultrashort pulsed laser light source. Using our newly developed SC light source capable of emitting a broad spectrum of near infrared light with high brightness and high stability allows accurate measurements with high repeatability when inspecting semiconductor device structures that are constantly shrinking in size due to the rapid pace of microminiaturization. Our new SC light source will also prove a valuable tool in other measurement applications using light and photonics technology such as OCT where it will help capture more detailed images.

To respond to market needs, we will push ahead with plans to achieve longer life time,

higher brightness, and a wider spectral range extending to longer wavelengths.




How the SC light source generates a supercontinuum spectrum

●Main specifications

| Items | Specifications | Units |
|---|---|---|
| Laser mode | Single mode | - |
| Output wavelength | 1250 to 2000 | nm |
| Total optical power | 50 | mW |
| Light output stability | ≦0.1 | % |
| Lighting frequency | 50 | MHz |
| Fiber output diameter | φ10 | μm |
| Polarization characteristics | Linear polarization | - |
| Output connector | FC/APC | - |
| Power requirement | 100 to AC | V |
| Power consumption | 30 | W |

External view of SC light source