



Opsens SCBG temperature sensing technology

Opsens SCBG (**Semi**Conductor **B**and**G**ap) fiber optic temperature sensing technology is based on a simple but robust spectrophotometric technique. This technique relies on the temperature dependence of the bandgap of GaAs semiconductor crystal. GaAs crystal is opaque for wavelengths below its bandgap and transparent for wavelengths above it. The transition region, i.e. the bandgap spectral position, is a function of the temperature.

The schematic of the SCBG technology is shown in Figure 3. The fiber optic temperature sensor (i.e. the OTG-R model) is composed of a miniature GaAs crystal bonded to the tip of an optical fiber. Light injected from the signal conditioner (i.e. the PSR module) into the optical fiber is sent to the GaAs crystal. The crystal absorbs wavelengths of light below the bandgap spectral position and reflects back to the conditioner those wavelengths above the bandgap. Light reflected back to the conditioner goes into a miniature optical spectrum analyser (OSA) that spatially decomposes the light into its wavelength constituents. A linear CCD array detector measures the intensity of these wavelengths. Each pixel of the CCD array corresponds to a specific calibrated wavelength and therefore the whole detector array provides the spectral intensity distribution of the light reflected back by the GaAs crystal. A typical spectral intensity distribution curve is shown on Figure 3.

The bandgap spectral position is calculated from the light spectral intensity distribution and converted into an absolute temperature reading using a proprietary digital signal processing method based on adaptive filtering. This filtering method provides significant noise reduction without compromising on the response time of the system. Unlike other competitor systems, Opsens electronic board and signal processing method are 100 % digital. That means there are no analog-to-digital conversions which can create loss of accuracy and additional noise in the measurements. The output measurement readings are done at a rate of 1000 Hz, the highest rate in the industry.

As opposed to interferometric techniques found in other competitor products, Opsens SCBG spectrophotometric technique is not sensitive to mechanical vibration and fiber-optic movement, a must for HERO and RADHAZ applications!

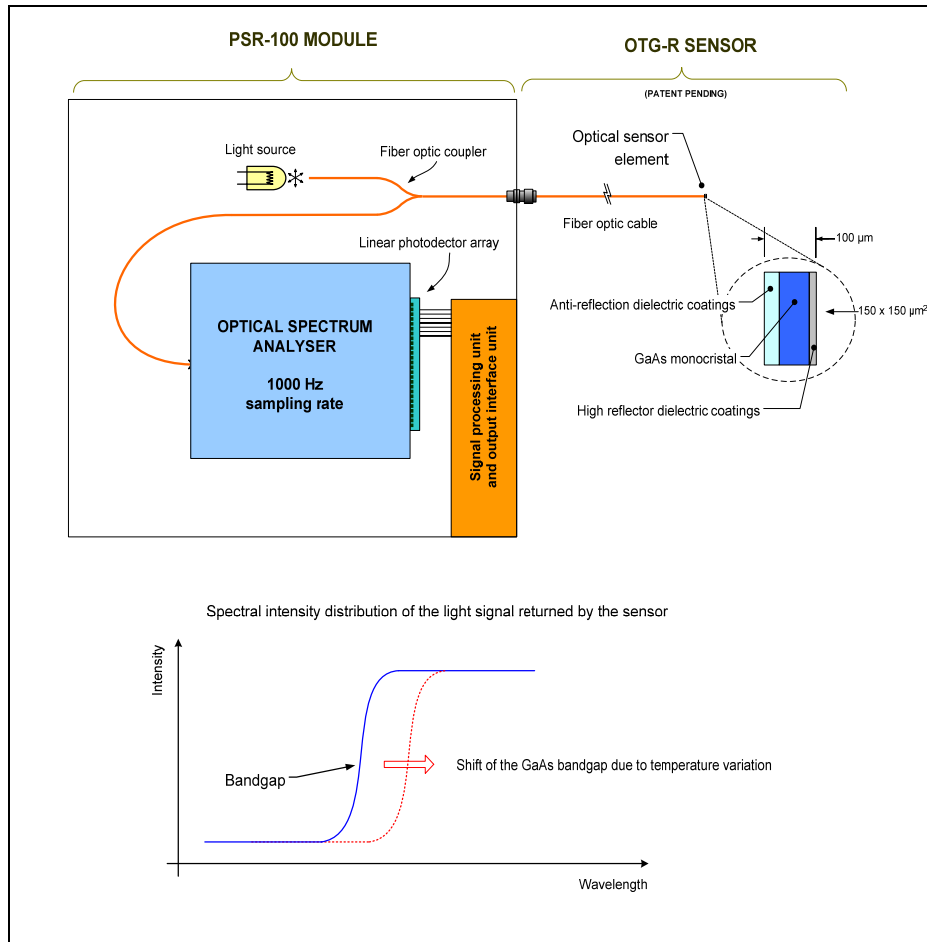


Figure 3: Schematic of Opsens SCBG technology