WHITE PAPER

OSENSA Innovations Corp. Fluorescent Sensor Technology

Nearly all materials will fluoresce under the right conditions. Fluorescence can be very simply defined as the emission of light when a material is exposed to electromagnetic radiation. This emission may continue for a period of time after the initial excitation. The length of time that a material will emit is a product of a number of interactions that occur at the atomic level and the amount of energy that is absorbed. Both excitation and emission intensities behave exponentially with respect to time. This dual time-dependent behaviour is a unique property that can be used to indicate what state the molecules of the fluorescent material are in.

Scientists have found various classes of fluorescent materials that can be doped with specific elements to make their behaviours highly dependent on certain physical properties that are of practical interest for sensing applications. OSENSA Innovations has discovered that it is possible, for instance, to use the fluorescent properties of certain crystal matrices to measure temperature, pressure, humidity, oxygen, and carbon dioxide. All of these physical properties can be measured by accurately determining the exponential time constant of the unique fluorescent material. OSENSA is developing a series of very cost effective fiber optic sensors that exploit these principles.

One significant advantage that OSENSA has over competing sensing technologies is that fiber optic sensors are inherently immune to electromagnetic noise and interference. There are no metal conductors that act as antennae to transmit current and voltage. This makes OSENSA's sensors ideally suited for applications in high voltage power transmission, microwave, and plasma environments. In addition, OSENSA's technology permits the use of inexpensive, large-core polymer plastic optical fiber in applications below 150°C. Plastic optical fiber is extremely robust and durable, and is already widely used in the automotive, industrial and telecommunication industries.

OSENSA's engineers have developed a three-channel fiber optic temperature sensor that is targeted for applications such as electrical power transmission and distribution. Unlike previous generation fiber optic signal conditioners which were bulky and expensive lab devices, OSENSA's fiber optic temperature transmitter looks remarkably similar to a thermocouple or RTD (Resistance Temperature Detector) transmitter. It is DIN rail mountable and includes standard 4-20mA analog outputs as well as an industrial RS-485 serial bus for modbus communication to daisy-chained devices. OSENSA's fiber optic probes also share a similar look and feel as standard thermocouples and RTD's. Best of all, the cost of OSENSA's fiber optic temperature sensors is close to commercial RTD and transmitter combinations.

The accuracy and stability of OSENSA's fiber optic sensors surpasses traditional thermocouples and can approach PRT's (Platinum Resistance Thermometers) in calibrated applications. OSENSA has demonstrated long-term stability below ±0.025°C, although the bulk of its products ship with much lower accuracy requirements in applications which are far less demanding.

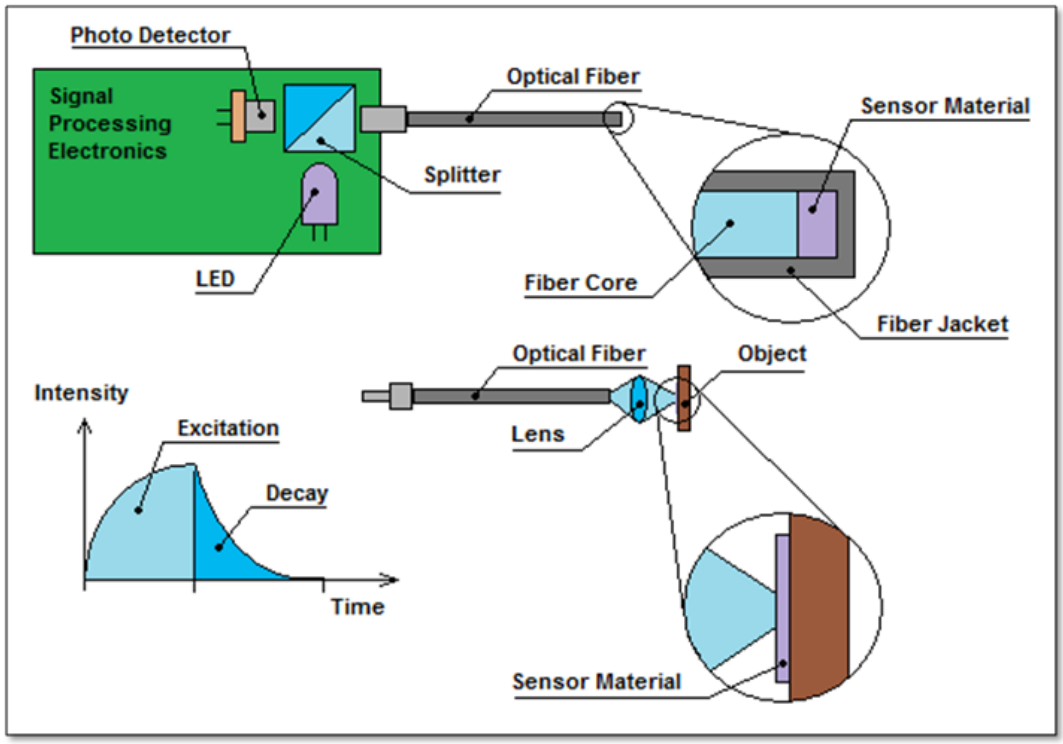

Figure 1: Schematic overview of OSENSA's fluorescent sensor technology.

OSENSA's temperature sensing technology is also unique in that it can be both contact and non-contact. After applying a specially prepared formulation of sensitive material to an object of interest, its temperature may be read. This is a particularly valuable feature for characterizing temperatures of critical electronic components and profiling the thermal heat distribution over larger objects. A fiber optic probe can be brought close enough to the sensing material to read its temperature, without causing stem conduction losses from electrical wires, and without the need to strategically place and route thermocouple leads everywhere. The optical temperature reading is more accurate than an Infrared (IR) camera reading, and at a fraction of the cost.

Some advantages of OSENSA's fiber optic temperature sensing technology are:

- Immunity to high voltage, high RF (radio frequency) microwave, and electromagnetic fields
- Robust polymer plastic optical fiber for simple installation and ease of handling
- Standard industrial temperature transmitter with digital and analog outputs
- Accuracy up to ±0.05°C, but generally ±0.5° to ±1.0°C is more typical
- Fast response time, contact or non-contact sensing
- Low installed system cost, ranging from $500 to $2,000
- Cryogenic temperatures to over 1000°C possible, typically -45°C to +200°C
- Potential to compete with thermocouples and RTD's in a variety of applications

For further information, please contact:

Daryl James, President
Tel : 604-754-5943
Email: info@osensa.com
Web: www.osensa.com