LUMASENSE TECHNOLOGIES

Reliability and Stability

Fluoroptic® vs. Semiconductor Absorption Edge

Fluoroptic®

LumaSense's fluoroptic thermometry is based on the principle that a phosphor material can be caused to fluoresce when excited with light, and that the decay time of the fluorescence is proportional to temperature. A fiberoptic temperature sensor can be constructed by affixing a phosphor material to the top of an optical fiber and encapsulating it for protection.

Two of the major advantages of this technology are ***reliability*** and ***measurement stability.*** Reliability comes from using only components that do not deteriorate with time. All components can be solid state, including the LED light source with its virtually unlimited life. Measurement stability comes from the physical fact that the decay time of the phosphor never changes. This is assured because the operating temperature of the phosphor is well below the refractory temperature used to create it.

Semiconductor Absorption Edge

A temperature sensor can be constructed by adhering a semiconductor crystal to the top of an optical fiber onto which a dielectric mirror is deposited. The temperature can be determined by illuminating the crystal and measuring the wavelength of the light absorption.

The potential problem with this technology includes:

Light source life: To be able to measure a wide range of temperature (eg. 0°C to 200°C) requires a wideband light source such as an incandescent or halogen bulb which has a typical life of 1½ years. Only if the instrument has self-diagnostics and alarms would the user be aware of bulb failure.

Bulb replacement requiring returns to the factory: Replacing the light bulb requires re-calibration with sophisticated photometric equipment, normally requiring returning the instrument to the manufacturer. This may also be required to correctly install the replacement bulb in the optical assembly.

Long term drift requiring periodic re-calibration: To maintain measurement repeatability, the light source and optical system must remain perfectly stable. Shift in calibration can result from the light spectrum shift and signal reduction due to bulb aging and changes in the throughput of the optical system.

3033 Scott Blvd.
Santa Clara, CA 95054
Phone 408.727.1600
Fax 408.727.1677
www.lumasenseinc.com