TECHNOLOGICAL OFFER

Non-invasive temperature sensor suitable for extreme cryogenic measurements.

MARKET NEED

Use in **cryogenic systems** that require temperature an/or level control in storage tanks.

CONTACT

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STAGE OF DEVELOPEMENT

- Technology protected by **patent application.**
- **TRL 5:** Testing in storage tanks.
- Seeking **collaboration** for identification of specific niches and **technology transfer.**

OPTICAL FIBER SENSOR FOR TEMPERATURES CLOSE TO 0K

Researchers from the Department of Composite Materials at INTA have developed an optical fiber-based temperature sensor capable of measuring temperatures close to 0K with high resolution.

The use of Fiber Bragg Grating Sensors (FBGS) has been employed in recent years to measure temperature across different ranges. These sensors offer several advantages: they are very simple, lightweight, have negligible volume, and do not generate interference. Additionally, they can **host multiple sensors within a single fiber**. All these features make them an economical type of sensor, very easy to apply in solutions where measurements are required using devices that do not interfere with the environment and that provide measurement redundancy.

However, as temperatures approach cryogenic levels (below 50K), current solutions begin to experience resolution problems due to the limitations of the materials that make up the fibers. This is particularly relevant, for example, when working with **liquid hydrogen** (20K), a substance that has been receiving a lot of attention in recent years.

Researchers at INTA, through the careful selection of coating materials and a specific manufacturing methodology for this type of sensor, have been able to overcome this limitation. In doing so, they have managed to **extend the simplicity of temperature measurement using optical fiber to the most extreme cryogenic temperature range.**

ADVANTAGES

- High resolution (~14 pm/K at 20K temperature).
- Extends the simplicity of measurement using optical fiber to the cryogenic range.
- A single fiber can incorporate a large number of sensors, allowing coverage of large surfaces.
- Enables monitoring of liquid storage levels under cryogenic conditions.
- Simple, cost-effective system free from electromagnetic interference.