

What is a dual-fiber sensor



Article Overview

Dual-fiber sensors are optical devices capable of simultaneously measuring two physical parameters, such as temperature and pressure or magnetic field, using specialized fiber structures and interferometric techniques.

Overview

Dual-fiber sensors leverage optical fibers to detect multiple parameters concurrently, enhancing measurement efficiency and reducing system complexity. They typically combine two sensing mechanisms within a single fiber system, allowing independent or minimally cross-sensitive detection of each parameter. Common configurations include photonic crystal fibers (PCF), dual-core fibers, and capillary fibers integrated with interferometric setups like Mach-Zehnder interferometers (MZI) and Fabry-Perot interferometers (FPI) .

Working Principles

- **Photonic Crystal Fiber-Based Sensors:** In PCF dual-parameter sensors, grooves or channels in the fiber are filled with different materials, such as magnetic fluids for magnetic field detection and polydimethylsiloxane (PDMS) for temperature sensing. The sensor operates on surface plasmon resonance (SPR), where changes in refractive index due to external stimuli shift the resonance wavelength. For example, magnetic field sensitivity can reach 86 pm/Gs, while temperature sensitivity can be $-2.63 \text{ nm}/^{\circ}\text{C}$.
- **Interferometer-Based Sensors:** Dual-fiber sensors can also combine MZI and FPI structures. The FPI cavity, formed by a capillary fiber between a single-mode fiber and a dual-core fiber, responds to pressure changes by altering the refractive index...

Article Content

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A composite fiber sensor integrating double Fabry-Perot interferometers (FPIs) and a whispering gallery mode (WGM)

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A dual parametric sensor is proposed based on photonic crystal fiber (PCF) structure and surface plasmon resonance

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Fiber-optic sensor

A fiber-optic sensor is a sensor that uses optical fiber either as the sensing element ("intrinsic sensors"), or as a means of relaying

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A compact dual-parameter optical fiber sensor combining surface plasmon resonance (SPR) and lossy mode

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Learn all about the principles, structures, and features of eight sensor types according to their detection principles. The fiber optic

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Single-core dual-parameter sensors have wide applicability and importance in the fields of environmental monitoring,

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A Dual-Parameter Optical Fiber SPR Sensor for Simultaneous Measurement of Glucose and Cholesterol Concentrations Abstract: A

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Based on sodium films, we design a dual-channel SPR sensor using a dual-side-polished no-core fiber structure. By

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Flexible optical fiber sensors benefit from both technology-merits of optical fiber sensing and flexible materials. They utilize specially

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Dual channel optical fiber refractive index sensor based on surface ...

In this paper, an optical fiber refractive index sensor based on surface plasmon resonance (SPR) is presented. This

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Dual-FBG and F-P Cavity Compound Optical Fiber Sensor for

A dual-FBG and F-P cavity compound optical fiber sensor based on a multi-core fiber (MCF) is proposed. A hollow core fiber (HCF)

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They developed a specialized fiber sensor fabricated from high-strength birefringent fiber coated with a protective

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Fiber Optic Sensor

Fiber optic sensors are defined as devices that utilize optical fibers to measure a variety of stimuli, including mechanical, thermal,

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Distributed multi-parameter sensing using composite optical fibers of ...

Distributed optical fiber sensing (DOFS) has shown great significance in health monitoring of various industrial

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Optical Fiber Sensors and Sensing Networks: Overview of the Main

Optical fibers provide sensing solutions for many types of applications and environments with high performance. The

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Dual Fiber Bragg Grating Sensor for Vibration Measurement in High ...

Dual Fiber Bragg Grating Sensor for Vibration Measurement in High Temperature
Abstract: Fiber optic vibration

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Fiber Optic Sensor : Types, Working, Interfacing & Its Applications

These sensors are available at less cost, in small size and their fabrication is easy so replaced normal sensors that

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A dual-mode fiber-shaped flexible capacitive strain sensor ...

A dual-mode fiber-shaped flexible capacitive strain sensor fabricated by direct ink writing technology for wearable and

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Optical Fiber Sensing

Optical fiber sensing refers to the use of optical fibers to measure various parameters such as temperature, strain, and pressure by

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An active fiber sensor based on modal interference in few-mode fibers ...

Abstract We propose a dual-parameter active fiber sensor (DP-AFS) based on a fiber ring laser, which uses a single

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Dual-Parameter Fiber Optic Sensor for Pressure and Temperature Using Fabry-Pérot Interferometry and Anti

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