

Article Overview

Fiber Bragg Grating (FBG) sensors come in several types, including standard, chirped, apodized, tilted, and long-period gratings, each tailored for specific sensing applications.

Standard FBG Sensors

Standard FBGs are the most common type, consisting of a periodic modulation of the refractive index along the fiber core. They reflect a narrow wavelength band (the Bragg wavelength) and are primarily used for strain and temperature measurements. These sensors are compact, immune to electromagnetic interference, and can be multiplexed along a single fiber for distributed sensing .

Chirped FBG Sensors

Chirped FBGs have a gradually varying grating period along the fiber length. This design allows them to reflect a broader range of wavelengths, making them suitable for dispersion compensation, pulse stretching, and monitoring non-uniform strain distributions .

Apodized FBG Sensors

Apodized FBGs feature a gradual tapering of the refractive index modulation to suppress spectral sidelobes. This improves measurement accuracy and reduces noise in applications requiring high-resolution strain or temperature detection .

Tilted FBG Sensors

Tilted FBGs are inscribed at an angle relative to the fiber axis. This tilt enables coupling of light from the core to the cladding modes, creating notch filters or sensors capable of detecting refractive index changes in surrounding media, which is useful in biochemical and environmental sensing .

Long-Period Gratings (LPGs)

Long-period gratings have a much longer grating period than standard FBGs, typically hundreds of micrometers. They couple light from the core to cladding modes, making them sensitive to external refractive index changes, temperature, and strain, and are often used in gain equalization and chemical sensing .

Specialized and Regenerated FBGs

- o Regenerated FBGs are created by thermally regenerating a previously written grating, offering enhanced

thermal stability for high-temperature applications .

o Type I, IA, and IIA FBGs differ in their fabrication conditions and hydrogen loading, affecting their reflectivity, temperature sensitivity, and long-term stability .

Applications

FBG sensors are widely used in structural health monitoring, aerospace, civil engineering, power systems, and environmental monitoring. Their ability to provide real-time, distributed measurements of strain, temperature, and other parameters makes them highly versatile . In summary, the choice of FBG sensor type depends on the specific measurement requirements, environmental conditions, and desired sensitivity, with each type offering unique advantages for different sensing applications.

In recent years, much attention has been paid towards optical fibre sensing technology for geotechnical health

We developed an innovative wearable system equipped with flexible sensors based on fiber Bragg gratings (FBGs) to

In recent years, fiber optic sensors, primarily based on fiber Bragg gratings (FBGs), have been gradually applied in

PDF | In the vast realm of optical fiber sensing, where precision and innovation converge, Fiber Bragg Gratings

Abstract and Figures This research explores the deployment of Fiber Bragg Grating (FBG) fiber-optic sensors for

Since its inception, Fiber Bragg grating (FBG) has been an ideal candidate for OFS technology; currently, most OFS systems use

Fiber Bragg grating (FBG) sensor is light- weight, easily installed and has multiplexing capability of sensing

Abstract: Fiber Bragg grating (FBG) sensors have emerged as advanced tools for monitoring a wide range of physical parameters in

For experimental stress analysis, the most highly developed common fibre-optic sensor is the fibre Bragg grating strain sensor. This

Abstract: The authors review their recent advances in the development of optical fiber Bragg grating (FBG) sensor technologies.

In conclusion, this comprehensive review paper provides a panoramic view of the recent advancements in Fiber

Explore Fiber Bragg Grating (FBG) sensors: their structure, working principle based on Fresnel reflection, applications in

A fiber Bragg grating (FBG) is a type of distributed Bragg reflector constructed in a short segment of optical

This Special Issue Fiber Bragg Grating-Based Sensors and Systems presents a collection of cyber-physical tasks that are far from

Basic fundamentals of FBG and recent progress of fiber Bragg grating-based sensors used in various applications for

Abstract: Fiber Bragg Grating (FBG) sensors have emerged as versatile tools for various sensing applications due to their unique

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