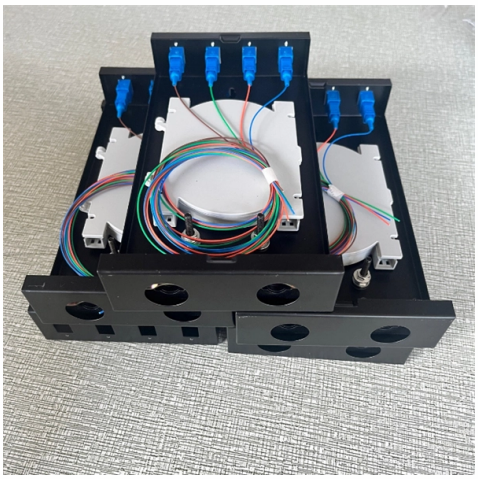
Sensor Fiber Optic Stripping Principle



Overview

Optical Fiber Sensors: Working Principle, Applications, and Limitations. Brief theory of sensing principle, fabrication method, applications, advantages.

Key Takeaways

Fiber optic stripping for sensors can be performed using mechanical, thermal, chemical, laser, or solvent-based methods, each tailored to the fiber type and coating material.

Mechanical Stripping

Mechanical strippers use precision blades to remove the fiber coating without damaging the glass cladding. They are widely used for end stripping and mid-span “window” stripping, especially for acrylate-coated fibers. Adjustable mechanical strippers allow for different fiber diameters and coating thicknesses, providing high-strength fusion splices when properly used.

However, tool wear and operator skill can affect repeatability and may introduce nicks on the fiber surface, reducing tensile strength and splice quality.

Thermal and Thermo-

Mechanical Stripping

Thermal methods soften the coating using heat, sometimes combined with mechanical blades to remove it. Non-contact thermal techniques, such as 3SAE's Burst™ Technology, use superheated air or nitrogen to cleanly burst the coating away from the fiber. These methods are chemical-free and suitable for high-strength applications like fiber Bragg gratings or mode field adaptors.

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Thermo-mechanical stripping is also used for end stripping of single and ribbon fibers but may risk uneven coating removal or heat damage to surrounding buffers.

Chemical Stripping

Chemical stripping involves solvents or acids to dissolve or soften the coating. For polyimide-coated fibers, a mixture of methanol and acetone (2: 1 ratio) can be used to soak the fiber for several hours, causing the coating to expand and separate from the glass. After soaking, standard mechanical strippers can remove the coating easily.

This method is inexpensive and avoids the need for specialized equipment, but requires careful handling to prevent fiber damage. Laser StrippingLaser-based stripping, such as UV laser systems, provides a non-contact, automated method for removing coatings from single or ribbon fibers. This approach maintains high tensile strength, repeatability, and cleanliness, making it suitable for high-volume sensor fiber production.

Laser stripping is particularly advantageous for mid-span stripping and complex fiber geometries where mechanical or chemical methods are less effective.

Specialized Sensor Fiber Methods

For distributed sensing fibers, the striping-inscribing-recoating (SIR) method is used to fabricate kilometer-long backscattering-enhanced fibers. This method combines continuous low-loss stripping with grating inscription and flexible recoating, enabling sensor deployment in harsh environments. It ensures precise control over the stripped regions and maintains fiber integrity over long lengths.

Summary

The choice of stripping method depends on the fiber coating type, application requirements, and desired precision. Acrylate coatings are often stripped mechanically or thermally, polyimide coatings benefit from solvent-based methods, and high-precision or automated sensor applications may use laser or SIR techniques. Proper selection ensures high fiber strength, clean surfaces, and reliable sensor performance.

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Article Content

(PDF) Optical Fiber Sensors: Working Principle, Applications, and ...

Brief theory of sensing principle, fabrication method, applications, advantages and disadvantages of the different fiber-optic sensors, are addressed. Recent progress in numerous

Optical Fiber Sensors: Working Principle, Applications, and Limitations

Recent progress in numerous sensing fields, including environmental, industrial, and biomedical are discussed for each class of fiber-optic sensors. The review highlights the methods and techniques

Fiber Optic Sensors: Types, Working Principle & Applications

This article explores the different types of Fiber Optic Sensors, their working principles, and various applications. We''ll delve into Intrinsic, Extrinsic, and Hybrid fiber optic sensors, explaining how they

Fiber Optic Sensors: Fundamentals, Principles & Applications

Radiation absorption excites an orbital electron to a higher energy level. Radiation absorption creates electronic excited states that are trapped by localized defects for extended periods of time. Heating

Review of Optical Fiber Sensors: Principles, Classifications and

Optical fiber sensors (OFSs) have emerged as essential tools in the monitoring of physical, chemical, and bio-medical parameters in harsh situations due to their high sensitivity,

Optical Fiber Sensors: Working Principle, Applications, and Limitations

Fiber-optic technology emerged originally for applications in data transmission and telecommunications. However, sensors based on fiber-optics have been developed rapidly because of their excellent

Fiber-optic Sensors – distributed sensing, temperature,

Many fiber-optic sensors are based on fiber Bragg gratings. The basic operation principle is often that the Bragg wavelength (i.e., the wavelength of maximum

Investigation of cladding and coating stripping methods for specialty ...

In this study, we focused on cladding and coating stripping of specialty optical fibers. Chemical stripping, mechanical stripping, and laser stripping methods were considered to determine

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Fiber Optic Shape Sensors: A comprehensive review

A Fiber Optic Shape Sensor (FOSS) can be defined as fiber optic cable with multiple cores and embedded strain sensors. The working principle is the following: in each instrumented section

Fiber Optic Sensors: Fundamentals, Principles & Applications

Extrinsic Fiber Optic Sensors Fiber is Only an Information Carrier To and From a Black Box Light Signal Generation in Black Box Depending on the Arriving Information

Optical Fiber Sensors: An Overview

This chapter presents an overview of fiber optic sensors and their applications. It also describes new optical materials that are being investigated for the development of chemical optical sensors. The

Fiber Optic Sensors: Types, Working Principle

Explore fiber optic sensors: their working principles, types (intrinsic, extrinsic, hybrid), and diverse applications in mechanical, chemical, and structural health

Optical Fiber Sensors: Working Principle, Applications, and Limitations

This work reviews the fiber-optic sensors based on Bragg gratings, long period gratings, interferometers, surface plasmon resonance, fluorescence, and light diffusion. Brief theory of sensing principle,

Optical Fibre-Based Sensors—An Assessment of Current Innovations

Optical fibre sensors are an essential subset of optical fibre technology, designed specifically for sensing and measuring several physical parameters. These sensors offer unique advantages over traditional

Fiber Optic Sensor

Fiber optic sensors are defined as sensing devices that utilize optical fibers to convert lightwave properties into information about the state of structures, offering long-term durability, immunity to

Fiber Optic Sensors: Principles, Characteristics, and

Fiber optic sensors utilize the propagation characteristics of light within optical fibers to detect environmental changes. The basic working principle

What is a fibre optic sensor? | Sensor Basics: Principle-based Guide

Outline The fibre optic sensor has an optical fibre connected to a light source to allow for detection in tight spaces or where a small profile is beneficial. Principle and major types The optical fibre consists

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Optical Fiber Sensors Guide

Operating Principle Optical fibers are also attractive for applications in sensing, control and instrumentation. In these areas, optical fibers have made a significant. For these applications fibers

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