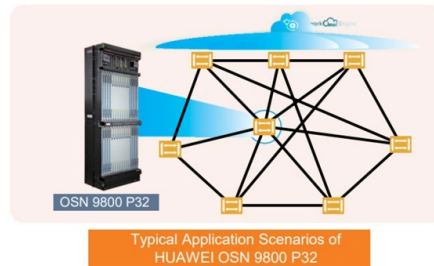


Principles of Metal Extraction from Optical Fiber Communication Cables



AI Overview

Metals, especially germanium, can be efficiently recovered from optical fiber cables using a combination of mechanical pre-treatment, pyro- and hydrometallurgical processes, solvent extraction, ion exchange, and distillation techniques.

Mechanical Pre-Treatment The first step in metal recovery involves removing the plastic and other non-metallic components from the cables. This is typically done using wire and cable strippers or multifunction machines, which strip the outer polymer layers efficiently and prepare the fibers for further processing. Additional steps may include cutting, crushing, grinding, and particle selection to separate metals from polyethylene and other materials.

Pyrometallurgical Methods Pyrometallurgy involves high-temperature treatment of fiber scraps to recover metals. This method is commonly used for germanium recovery from coal and fiber scraps. It is effective but can result in high energy consumption and impurity content in the recovered metal. Reductive roasting is a specific pyrometallurgical technique where fibers are heated with reducing agents to convert germanium compounds into recoverable forms.

Hydrometallurgical Methods Hydrometallurgy is often preferred for optical fiber recycling due to its higher purity and efficiency. The process typically includes:

- Solvent treatment:** Fibers are treated with solvents like acetone or ethanol to separate glass from plastics.
- Roasting with additives:** Sodium hydroxide (NaOH) is used to convert the fiber glass into silicates at elevated temperatures, facilitating metal leaching.
- Leaching:** Dilute acids, such as H_2SO_4 , are used to dissolve germanium, achieving leaching rates above 99%.
- Chemical precipitation and hydrolysis:** These steps recover germanium from the leachate.
- Ion exchange and solvent extraction:** These techniques further purify germanium from other dissolved elements.
- Distillation:** Germanium chloride can be...

Article Content

(PDF) Fundamentals of Optical Fiber Communication Principles ...

Detailed treatments of optical sources—both coherent and non-coherent—cover LEDs and laser diodes, their modulation capabilities, and operating characteristics, while chapters on photodetectors explore

Improve subsequent leaching efficiency and extraction rate of

Due to the rarity of germanium, developing an effective recycling process of recovering germanium metal from waste fibre optical cables is significant. Fibre optical cables was arranged to

Fiber-Optic Pressure Sensors: Recent Advances in

Fiber-optic sensing (FOS) technology has emerged as a cutting-edge research focus in the sensor field due to its miniaturized structure, high

Handbook Optical fibres, cables and systems

Throughout the discussions on the practical issues associated with the application of this technology, the explanations focus on how ITU-T Recommendations address them. It provides the organized

Principles of Optical Fiber Communications

The basic components are light signal transmitter, the optical fiber, and the photo detecting receiver. The additional elements such as fiber and cable splicers and connectors, regenerators, beam splitters,

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Chapter 1 Principles of Transmission

This chapter deals with the use of metallic (e.g., copper) conductors and optical fiber (e.g., glass) strands for the transmission of signals in analog or digital form.

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This book is designed to serve as a comprehensive introduction to optics and fiber optic communication systems for undergraduate students of Electronic Science and related engineering...

Optical Fiber Sensors and Sensing Networks: Overview of the Main ...

This section gives an overview of the development of optical fiber technology, which has been important for global communications. Optical fiber sensors have many advantages, such as being

Research Progress in Distributed Acoustic Sensing Techniques

The research progress and operation principles are systematically reviewed. The pivotal technologies and solutions applied to distributed acoustic sensing are introduced in terms of

Fiber optics | Definition, Inventors, & Facts | Britannica

Fiber optics, the science of transmitting data, voice, and images by the passage of light through thin, transparent fibers. In telecommunications, fiber

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Optical Fibre Cable

In optical fiber communication, metal wires are preferred for transmission because the signals travel more safely. Optical fibers are also resistant to electromagnetic interference.

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,

FIBER OPTICAL COMMUNICATIONS (R17A0418)

UNIT I general Optical Fiber communication system, advantages of optical fiber communications. Optical fiber wave guides- Introduction, Ray theory of transmission, Total Internal Reflection, Fiber materials, Fiber

Chapter 1 Principles of Transmission

Chapter 1 Principles of Transmission Chapter 1 provides the main concepts related to signal transmission through metallic and optical fiber transmission media. Among those concepts, this

Optical Fiber Light Transmission

Optical Fiber Light Transmission has revolutionized telecommunications and internet connectivity due to high-speed and secure characteristics. In this article, we will learn about Optical

Optical Fiber Sensors and Sensing Networks: Overview of the Main

Optical fiber sensors present several advantages in relation to other types of sensors. These advantages are essentially related to the optical fiber properties, i.e., small, lightweight,

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Here we demonstrate that single crystals of the amino acid L-threonine could be used as optical waveguides and filters with high mechanical and thermal robustness for transduction of

(20EC0433) OPTICAL FIBRE COMMUNICATION

Learn the basic elements of optical fiber transmission link, fiber modes configurations and structures. Understand the different kind of losses, signal distortion in optical wave guides and other signal

UNIT – I

1.1 INTRODUCTION An optical fiber is a glass or plastic fiber that carries light along its length. Fiber optics is the overlap of applied science and engineering concerned with the design and application of

Optical Fiber : Working Principle, Types, Advantages

What is Optical Fiber? A cable which is used to transmit the data through fibers (threads) or plastic (glass) is known as optical fiber cable. This cable includes a

Fiber-optic communication

Modern fiber-optic communication systems generally include optical transmitters that convert electrical signals into optical signals, optical fiber cables to carry the

Optical fiber

A bundle of optical fibers A TOSLINK fiber optic audio cable with red light shining in one end and out the other An optical fiber, or optical fibre, is a flexible glass or

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