Optical Fiber Chromatography Arrangement



Overview

In this work, 3D-printed microfluidic devices are designed and fabricated for optical chromatography and sorting.

Key Takeaways

Optical fiber chromatography can refer to either the standardized color-coded arrangement of fibers in cables or the use of optical fibers for particle separation in microfluidic systems.

Chromatographic Arrangement in Optical Fiber Cables

In multi-core optical cables, fibers are arranged according to international color standards to ensure proper identification and connectivity.

The BELLCOR

E standard sequence for fiber cores is: Blue, Orange, Green, Brown, Gray, White, Red, Black, Yellow, Purple, Pink, Cyan. This sequence is applied both to individual fibers within a loose tube and to the loose tubes themselves in multi-tube cables ( ). Loose Tube Sequencing: For cables with more than 12 fibers, multiple loose tubes are used.

The starting loose tube is typically red, followed by green, then white series tubes. For example, a 144-core cable may use 12 loose tubes, each containing 12 fibers ( ). Special Cases: If a cable contains a filler rope, it is placed near the red tube.

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Single-tube cables are generally green unless specified otherwise ( ). Color Coding Compliance: The color codes follow the Munsell color scale, widely implemented globally for consistency ( ).

Optical Fiber in Chromatographic Systems

Optical fibers are also used in optical chromatography, a technique for passive particle sorting in microfluidic devices. Here, a laser beam is directed coaxially against the fluid flow, and particles experience a force due to optical radiation pressure. The particle reaches a rest point where the optical force balances the viscous drag, and the retention distance depends on particle size, refractive index, and shape ( ).

Photonic Crystal Fibers (PCF): These fibers allow on-chip delivery of laser beams for simultaneous optical sorting and fluorescence excitation. They are inserted into microfluidic channels aligned with the sorting path ( ). Applications: Optical chromatography has been applied to colloidal particle separation, biological cell sorting, and immunoassay reaction monitoring ( ).

Limitations: The technique requires highly stable fluid flow and precise laser alignment with the microfluidic channel ( ).

Summary

Cable Arrangement: Standardized color-coded sequencing ensures proper identification and management of multi-core optical fibers. Optical Chromatography: Optical fibers enable precise particle separation in microfluidic systems using laser-induced optical forces. Both applications rely on the precision and consistency of optical fiber placement, whether for connectivity in telecommunications or for controlled particle manipulation in analytical systems.

Article Content

Design and Fabrication of 3D-Printed Lab-On-A-Chip Devices for

To demonstrate optical chromatography in a 3D-printed microfluidic system, a LOC device was designed and fabricated to implement the opposing optical and Stokes forces on micron-sized

Design and Fabrication of 3D-Printed Lab-On-A-Chip

In this work, 3D-printed microfluidic devices are designed and fabricated for optical chromatography and sorting. Optical chromatography is

Do you know the chromatographic order of fiber optics?

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The chromatographic arrangement of the loose tube within a general fiber optic cable and the chromatographic arrangement of the fiber within the loose tube is shown below:

Complete Explanation of Optical Fiber Color | Yingda

If the number of optical fibers in a cable exceeds 12, how are they colored? When the number of optical fibers in a loose tube exceeds 12, the fiber

Color Arrangement Rules For Optical Fiber

The color arrangement for optical fiber cables is standardized to ensure consistent identification of individual fibers during installation, splicing,

Connector having arrangement of fixing optical fibers without using ...

Typically, a plurality of connectors of optical fibers, interconnected the branch and the end user, are provided for increasing the transmission distance. A conventional connector 2 of a bundle 1 of optical

Integrated optical chromatography chip. PCF is inserted

In this work, we designed and fabricated a 3D printed lab-on-a-chip device for fiber-based dual beam optical manipulation.

Fibre optical scanning with high resolution in thin-layer ...

In this paper a high-performance thin-layer chromatography (HPTLC) scanner is presented in which a special fibre arrangement is used as HPTLC plate scanning interface.

Toward Waveguide-Based Optical Chromatography

The theory is used to investigate how optical forces within hollow waveguides can be used to sort particles in “optical chromatography” experiments in which particles are optically

OPUS 4 | New components for fiber-optic thin-layer chromatography ...

In thin-layer chromatography, fiber-bundle arrays have been introduced for spectral absorption measurements in the UV-region. Using all-silica fiber bundles, the exciting light will be detected after

Optical chromatography using a photonic crystal fiber with on-chip ...

Abstract: We describe the realization of integrated optical chromatography, in conjunction with on-chip fluorescence excitation, in a monolithically fabricated poly-dimethylsiloxane (PDMS) microfluidic chip.

Towards integrated optical chromatography using photonic crystal fiber ...

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Optical chromatography is a powerful technique, capable of separating micron-sized particles within a fluid flow, based on their intrinsic properties, including size, shape and refractive index. Briefly,

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(a) Schematic of the characterization setup. (b)

Download scientific diagram | (a) Schematic of the characterization setup. (b) Arrangement of the fiber array, the photonic chip, and the electrical probe tips.

Towards integrated optical chromatography using photonic crystal fiber

We present a new advance in optical chromatography potentially enabling the unique beam delivery properties of photonic crystal fiber (PCF) to be employed and integrated into

Optical arrangement

Figure 7.10 Typical optical arrangements employed for detection of (a) vapour phase (b) liquid phase and (c) solid chromatographic phases. After White , Reprinted from R. White (ed.),

Microsoft Word

We present a new advance in optical chromatography potentially enabling the unique beam delivery properties of photonic crystal fiber (PCF) to be employed and integrated into microfluidic chips.

Optical chromatographic sample separation of hydrodynamically

In recent optical chromatography research, 13–17 a lightly focused laser has been used to fractionate, concentrate, and/or collect the sample. 19,20 The goal with this new implementation of

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