

Article Overview

Hollow-core single-mode fibers (HCFs) offer ultra-low latency, minimal nonlinear effects, and high-power transmission, making them a promising alternative to conventional single-mode fibers for advanced optical modules.

Overview of Hollow-Core Single-Mode Fibers

Hollow-core fibers guide light through an air-filled central core rather than a solid glass core, using photonic bandgap (PBG) or anti-resonant (AR) structures to confine light. This design allows light to propagate at nearly the speed of light in vacuum, reducing latency to approximately 3.3 us/km, compared to 4.9 us/km for conventional SMFs, and drastically reduces nonlinear effects such as Kerr, Brillouin, or Raman scattering. Single-mode operation in HCFs is achieved by suppressing higher-order modes (HOMs) through careful cladding design. For example, anisotropic anti-resonant tubes elongated radially in the cladding can enhance coupling between cladding modes and HOMs, achieving an extinction ratio over 1000 between HOMs and the fundamental mode while maintaining low leakage loss (

Both fiber types have a cladding diameter of 125 μ m or microns. Single Mode Fiber Single mode fiber has a much smaller core which

Abstract A wide bandwidth hybrid-structured Hollow-Core Single-Polarization Fibers (HC-SPF) with high bending

Single-mode fibers support only one guided mode per polarization direction, ensuring a constant output beam profile.

Hollow-core fiber (HCF) replaces the glass core of conventional single-mode fiber (SMF) with an air-filled center. In

An example of such a structure is the Kagome type^[18]. Recently, single-ring structures formed by capillaries surrounding the

A hollow-core optical fibre which surpasses silica fibre's long-standing limits and provides an attenuation below 0.1

A hollow-core antiresonant fiber (HC-ARF) using nested hybrid silica/silicon cladding is proposed for single-polarization

In this paper, a hollow-core anti-resonant optical fibre containing a semi-elliptical nested tube is proposed, which has

A 5-tube nested hollow-core fiber has been proposed to simultaneously achieve ultra-low loss ($<1\text{dB/km}$), broader transmission

In the paper, a hollow-core anti-resonant fiber (HC-ARF) that can support SPSM beam transmission with an average

Here, we propose a novel IC-HCPCF for achieving low-loss and effective single-mode operation. The fibre is endowed

Kagome structure It was determined that a certain type of optical fiber is particularly well-suited for UV light: a

Abstract A broadband single mode single polarization metal wires-embedded hollow core anti-resonant fiber for

We characterized the transmission of UV laser light through a single-ring hollow-core optical fiber which is designed for low-loss,

Although hollow-core fibers are intended to be single-mode, they can potentially carry slightly higher-order mode

Hollow-core fibre technologies provide an exceptional platform for applications in sensing, communications and higher

Web: <https://www.kremgroup.co.za>

