Ceramic ferrule manufacturing method



Overview

CN116854466A The invention discloses a ceramic ferrule, a preparation method and application thereof, wherein the ceramic ferrule is prepared from raw mate.

Key Takeaways

Ceramic ferrules are manufactured through a combination of powder preparation, injection molding, high-temperature sintering, and precision grinding to achieve sub-micron accuracy.

Raw Material Preparation

The process begins with yttrium-stabilized nano-zirconia powder, which is specially treated and granulated to ensure uniformity and optimal flow during molding. This step is critical for achieving high density and avoiding defects in the final ferrule.

Molding

The granulated powder is injection molded into a ferrule shape using high-pressure, low-speed injection techniques. This ensures compactness and eliminates air pockets. The molding process may include preforming and crushing steps to improve material homogeneity.

The ferrule blank is formed with precise dimensions, including a micro-hole for the optical fiber, often as small as 0. 125 mm in diameter and 12–15 mm in length.

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Thermal Debinding and Sintering

After molding, the ferrule undergoes thermal debinding to remove any organic binders used in the molding process. It is then sintered at high temperatures, which densifies the ceramic, enhances mechanical strength, and stabilizes the dimensions. Sintering also controls the grain size to achieve sub-micron precision.

Precision Machining

Once sintered, the ferrule blank is processed through precision grinding and polishing to achieve the required dimensional accuracy, roundness, and surface roughness. The end face of the ferrule is carefully shaped depending on the application: PC (Physical Contact), APC (Angled Physical Contact), or UPC (Ultra Physical Contact), which affects optical performance. Bore diameter measurement and sorting into grades ensure proper alignment of optical fibers, especially for singlemode applications where tolerances are extremely tight.

Quality Control

Throughout the process, strict quality control is maintained to ensure the ferrule meets optical and mechanical specifications. This includes checking the bore diameter, surface finish, and end-face geometry to minimize insertion loss and back-reflection in fiber optic connections.

Summary

The production of ceramic ferrules is a high-precision process combining advanced materials science and engineering. Key steps include powder preparation, injection molding, thermal debinding, high-temperature sintering, and precision grinding, all of which ensure the ferrule provides reliable alignment and performance in fiber optic systems.

Article Content

CN116854466A

The invention discloses a ceramic ferrule, a preparation method and application thereof, wherein the ceramic ferrule is prepared from raw materials including ceramic powder; the ceramic powder

Zirconia Ceramic Ferrules | Advanced Ceramics | Edgetech Industries

The premise of precision ceramic ferrule production operation is the matching use of precision ceramic ferrule mold and ceramic ferrule core needle (PIN needle).

Ceramic Ferrules

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Standard Ferrules Our Standard Ferrules are typically used as sub-components within fiber optic connectors, but can also be integrated in various specialized applications. They are made of zirconia

Production Process of a Ferrule | Blog FORTAPS

The production of the ferrules for pipes is based on the previous manufacture of the characteristic molds of each supplier. This involves a specialized design process developed according to the diameter

Zirconia Ceramic Ferrules | Refractory Metals & Advanced Materials ...

The premise of precision ceramic ferrule production operation is the matching use of precision ceramic ferrule mold and ceramic ferrule core needle (PIN needle).

Ceramic Ferrules Explained: Applications, Materials, and Manufacturers

While some industrial applications use ceramic ferrules for high-temperature stud welding, the primary, high-technology market is focused on fiber optics. This guide provides a definitive look at these high

Ceramic Ferrules / Sleeves | Ceramics for Optical Connectors

Kyocera''s extrusion molding process creates ferrules with excellent coaxiality, and our precision machining ensures excellent concentricity with precise inner and outer diameters.

Ceramic Ferrule

Since the blank of the ceramic ferrule contains a small hole of 0.1mm, and the requirements for the size concentricity are very high, it is only possible through ceramic injection molding (Ceramic Injection

Ceramic ferrule manufacturing method based on penetrating core and ...

The invention belongs to the technical field of ceramic ferrule manufacturing, and particularly relates to a ceramic ferrule manufacturing method based on penetrating a core and

DEVELOPMENT OF FERRULE MOULD FOR CERAMIC INJECTION

Ceramic injection moulding (CIM) now represents an alternative way compared to traditional manufacturing process of ferrules, bringing both time and money with high-precision process5.

Ferrule fabrication for the MT-type optical fiber ...

Compared to conventional transfer molding technology, the present method for microinjection reduces the cycle time to about 35 s and saves on raw material. The 12 ports in the

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Zirconia ceramic ferrule and production process thereof

The cycle is long, the production efficiency is low, and the performance of the produced ceramic ferrule is not good The Chinese invention patent application specification with the application

DEVELOPMENT OF FERRULE MOULD FOR CERAMIC INJECTION MOULDING PROCESS

The ferrule can be classified as a micro component with 2.5 mm outer diameter and 10 mm length, has critical and co mplex shape designs which is bene ficially producing by injection moulding

ceramic ferrule fiber optic ferrules

Fiber Optic Ferrules our ceramic machining technologies produce high-precision connector components for fiber optic communications systems, available both with custom and

Ceramic Ferrules Providing Secure and Efficient Pipe Connections

Ceramic Ferrules Provide Secure and Efficient Pipe Connections Kyocera ceramic processing technologies enable reliable connections across a range of pipe materials for chemical

Mold for injection molding and ceramic ferrule ingot of optical ...

Here, the manufacturing method of the ceramic ferrule for optical connectors by a prior art is demonstrated. 1 is a cross-sectional view showing a mold for manufacturing a ceramic ferrule for an

JPH07287145A

A method for producing a ceramics ferrule, comprising: According to the ceramic ferrule and the manufacturing method thereof of the present invention, L / By making D an appropriate value, it is

JPH0724811A

(57) In the method for manufacturing a ceramic ferrule, A method of manufacturing a ceramic ferrule, comprising the following second step. 2. A second step of passing a

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