

Metallized Ceramic Components for Emerging Applications

The constant requirement of lightweight and high dielectric strength materials in the field of electrical usage has led to customized alumina based, metallized components which can be hermetically sealed.

Introduction

The Industrial Ceramics Division Carborundum Universal Limited (CUMI), India offers a wide range of ceramic products for diverse industrial applications. CUMI also offers metallized alumina ceramics for the manufacture of vacuum interrupters used in vacuum circuit breakers. Equipped with state-of-the-art processing lines, CUMI is today one of the leading producers of metallized alumina cylinders, serving customers across the world. In addition to cylinders for vacuum interrupters, CUMI also manufactures a range of customized metallized alumina products for hermetically sealed devices for diverse applications (Fig. 1).

Metallized alumina ceramics

Ceramics are chemically inert. Well sintered alumina ceramics exhibit negligible wettability and porosity. Alumina ceramics produced at Carborundum Universal Limited (CUMI) exhibit zero porosity across a wide temperature range. They exhibit high dielectric strength making them suitable for various electrical applications for insulation. These ceramics when metallized, provide the best solution for bonding with metal, as well as maintaining its base properties. The metallization process is based on a proprietary molybdenum-manganese (MoMn) refractory ink system, and is matched to specific high-purity alumina ceramic bodies to ensure consistent high strength bonds. The glass phases in the MoMn metallization reacts with the glass phases in the ceramic to form the bond. The metallized surface receives a secondary coating of nickel to seal and improve wettability for later brazing. Developing metallized ceramics is not the

Keywords

alumina, metallized ceramics, hermetic sealing



Fig. 1
Metallized alumina components

major challenge. The major challenge lies in developing these ceramics in complex contours and close tolerances to satisfy the ever ever-rising and changing demand of customers.

Lightweight, high dielectric strength applications

The constant requirement of lightweight and high dielectric strength materials in the field of electrical usage has led to the development of alumina ceramics in image intensifier tubes, amongst many others. Image intensification, the basis of night vision, is a complex conversion of energy particles that occurs within a vacuum tube. An image-intensifier system works by collecting photons through an objective lens, converting them to electrons via a photocathode, increasing the electrical energy with a micro channel plate, converting the electrical energy back to light using a phosphor screen and presenting the image for viewing through an eyepiece lens.

A refined miniaturized power supply is used to provide the voltages between the elements of the vacuum tube that allow for the energy conversion and amplification. All of the elements within the vacuum tube are closely spaced to avoid electron scat-

ter. Maintaining this close packing and the vacuum inside the tube, called as “hermetic metal sealing” is provided by CUMI’s metallized ceramic rings. These rings require high dielectric strength, to avoid the pico-amp leakage current, which would affect the quality of intensified image focused on the eye piece lens.

Usually CUMI’s CT975 formulation does the needful. Its pearly-white surface, high dielectric strength, and coupled with the metallization strength provided by CUMI’s propriety METZ paste, makes it the best option available for all delicate applications in general. With sharp edges and dimensions going as low as 1,00 mm in height, the challenge to manufacture such delicate product was a tough one. But with CUMI’s experience in metallized ceramics for over two decades and its exposure to dynamic markets and products, CUMI’s night vision rings (NVR) is one of CUMI’s regular product line-ups.

Carborundum Universal Ltd (CUMI)
Industrial Ceramics Division
Hosur – 635126

India

www.cumi.murugappa.com