

Effect of nano-copper additives on the physical properties of porous alumina ceramics using graphite waste as a pore-forming agent

ABSTRACT

Solid state and sacrificial techniques were used to prepare the porous alumina ceramics. The target of the present research is to investigate the effect of Cu metal addition of nanoscale particle size on the physical properties of porous alumina ceramics using graphite waste as a pore-forming agent. X-Ray Diffraction (XRD), a Field Emission Scanning Electron Microscope (FESEM) and a Transmission and Electron Microscope (TEM) were used to analyse the microstructure and ceramic phases. Different ratios of Cu metal were added (3, 6, 9 and 12 wt.%) at different ratios of graphite waste. The results of this investigation show that with increasing ratios of Cu metal, the porosity decreased while the shrinkage and densities increased. Increases in the density and decreases in the porosity of porous alumina ceramics and the formation of the tenorite (CuO) phase due to sintering at high temperature (1600°C) may lead to improving the strength of porous alumina ceramics. Some potential applications include gas filtration components and as thermal insulation materials.

Keyword: Porous alumina; Graphite waste; Nano-copper; Physical properties; Alumina ceramics; Thermal insulation materials