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Fabrication of transparent MgAl_2O_4 from commercial nanopowders by hot-pressing without sintering additive

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Abstract

Transparent magnesium aluminate spinel (MgAl_2O_4) ceramics were successfully fabricated for the first time using commercially available nanopowders without sintering additive by a single hot-press step process. This method does not involve all the complexity of powder, green body pre-treatment and post-treatment, which are commonly used in the fabricating process. Effects of holding time (3-12 h) at the sintering temperature 1500°C on the transmittance, microstructure and Vickers microhardness are investigated. The highest transmittance is achieved for the sample hot pressed at 1500°C for 12 h, which exhibits 80.2% at the wavelength of 1100 nm. These results may provide a guide for understanding the microstructural development of transparent spinel without sintering additive.

Key words: MgAl_2O_4 ; Transparent ceramic; Hot pressing

1. Introduction

In recent years, intensive research attention has been paid to MgAl_2O_4 ceramics because of their combination of properties, like high strength, hardness and high temperature stability, which are well suited for infrared

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