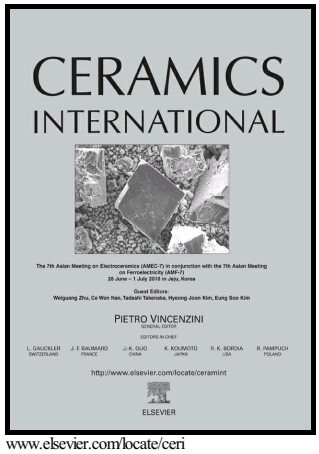

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Cordierite obtained from compositions containing kaolin waste, talc and magnesium oxide

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Abstract

The purpose of this study was to obtain cordierite from compositions containing kaolin waste (with different particle-size distributions), talc and magnesium oxide, for use in the production of refractory and insulating materials. The samples were characterized by means of the following techniques: chemical analysis by X-ray fluorescence, X-ray diffraction, particle size analysis and thermogravimetric and differential thermal analysis. The microstructure of the samples was analyzed using scanning electron microscopy. Rectangular test specimens (50mm x 15mm x 5 mm) were prepared by uniaxial pressing (13.0 MPa), dried at 110ºC/24h and sintered at temperatures of 950, 1050, 1150, 1250 and 1350ºC. The mineralogical analysis revealed the beginning of the formation of characteristic peaks of cordierite phase at 1250ºC, and more intense peaks were identified at 1350ºC. The morphological analysis revealed rose-like and hexagonal tube-like crystals.

Keywords: A. Sintering; D. Cordierite; D. kaolin waste; D. talc; D. Magnesium oxide

1. Introduction

Cordierite is an aluminum magnesium silicate that can be represented in a ternary system, containing magnesium oxide (MgO), aluminum oxide (Al_2O_3) and silicon oxide (SiO_2) in the proportions 2:2:5, respectively, with density of 2.53g/cm³ and melting temperature of 1470ºC [1,2]. This mineral has a low thermal expansion coefficient ($\alpha = (1\text{-}3) \times 10^{-6}$ ºC^{-1}), high thermal shock resistance, low dielectric constant, high resistivity ($\rho > 10^{12}$ Ω cm), high chemical and thermal stability, high refractoriness and high mechanical strength [3-9].