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Effect of powder morphology on sintering kinetics, microstructure and mechanical properties of monazite ceramics.

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Abstract

This work focuses on the effect of precursor morphology on the microstructural evolution of monazite-type lanthanum-europium phosphate ceramics during sintering, including grain growth rate, as well as correlations between microstructure, texture effects and their mechanical properties. Sintering kinetics of $\text{La}_{0.5}\text{Eu}_{0.5}\text{PO}_4$ powders with two different grain morphologies (needle-shaped and spherical) was studied by an *in-situ* HT-ESEM method at 1340°C. $\text{La}_{0.5}\text{Eu}_{0.5}\text{PO}_4$ pellets with high density (99% of the theoretical density) were obtained for both precursor powders by hot pressing. Analysis of XRD data collected for the hot pressed pellets obtained from needle-shaped precursors revealed preferential orientation of the grains towards the (100) direction. Mechanical properties of the hot pressed pellets were studied by the Vickers indentation method. The dependence of microhardness and fracture toughness on microstructure and texture was investigated.

Keywords: Monazite, sintering kinetics, HT-ESEM, hot pressing, texture effects, microhardness

1. Introduction

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