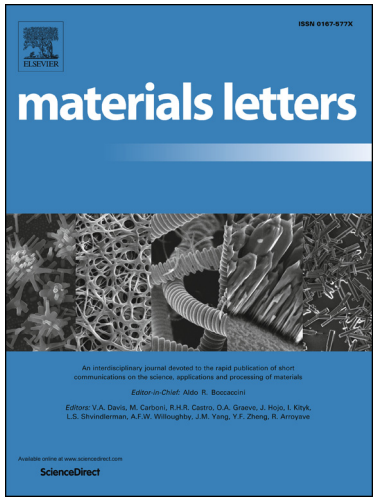

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Chemical compatibility between $Ln_2Zr_2O_7$ (Ln = Nd, Sm, Gd) and tetragonal yttria stabilized zirconia after annealing at high temperatures

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Key words: LnZ/YSZ, composite, chemical compatibility, reaction, TBCs

Abstract

This letter shows the chemical compatibility between LnZ and YSZ after heat treatment at high temperatures. It was found that LnZ would react with YSZ, and a reaction zone with relatively large grains formed after high temperature treatment, which would usually destroy the structural and compositional stability of the composite specimens. The reaction between LnZ and YSZ was caused by the element interdiffusion due to the chemical potential difference, and a higher sintering temperature would lead to a higher reaction rate. The common tangent law was used to analyze the phenomenon, and a solution was proposed to solve the issue.

1. Introduction

$Ln_2Zr_2O_7$ (LnZ, Ln = La, Nd, Sm and Gd) usually with a pyrochlore structure are regarded as important promising candidates for developing the next generation thermal barrier coatings (TBCs) due to their remarkably thermophyscial and mechanical properties, such as extremely low thermal conductivity, high thermal expansion coefficient and excellent phase stability [1-4].