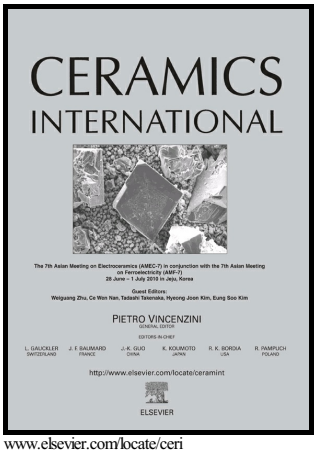

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Mechanical, dielectric and thermal properties of porous boron nitride/silicon oxynitride ceramic composites prepared by pressureless sintering

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Abstract

Porous boron nitride/silicon oxynitride (BN/Si_2N_2O) composites were fabricated by pressureless sintering at 1650 °C with Li_2O as sintering aid. The influence of Li_2O and hexagonal boron nitride (h-BN) contents on phase, microstructure, mechanical, dielectric and thermal properties of the resulting porous BN/Si_2N_2O composites was investigated. Increasing Li_2O content facilitated densification and decomposition of Si_2N_2O into Si_3N_4. The apparent porosity of the composites increases with the h-BN content increases and Si_2N_2O grain growth was restrained by the dispersed h-BN particles. The dielectric properties and thermal conductivities (TC) were affected mainly by porosity. Porous BN/Si_2N_2O ceramic composites with 4 mol% Li_2O and 25 mol% BN exhibit both low dielectric constant (3.83) and dielectric loss tangent (0.008) with good mechanical and thermal performance, suggesting possible use as high-temperature structural/functional materials.

Keywords: silicon oxynitride; boron nitride; composites; thermal conductivities

1. Introduction

Silicon oxynitride (Si_2N_2O) ceramics are considered as outstanding structural/functional components, widely used at high temperatures, due to excellent