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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<sub>2</sub>N<sub>2</sub>O) composites were fabricated by pressureless sintering at 1650 °C with Li<sub>2</sub>O as sintering aid. The influence of Li<sub>2</sub>O and hexagonal boron nitride (h-BN) contents on phase, microstructure, mechanical, dielectric and thermal properties of the resulting porous BN/Si<sub>2</sub>N<sub>2</sub>O composites was investigated. Increasing Li<sub>2</sub>O content facilitated densification and decomposition of Si<sub>2</sub>N<sub>2</sub>O into Si<sub>3</sub>N<sub>4</sub>. The apparent porosity of the composites increases with the h-BN content increases and Si<sub>2</sub>N<sub>2</sub>O 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<sub>2</sub>N<sub>2</sub>O ceramic composites with 4 mol% Li<sub>2</sub>O 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<sub>2</sub>N<sub>2</sub>O) ceramics are considered as outstanding structural/functional components, widely used at high temperatures, due to excellent

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