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Facile Synthesis of Powder-Based Processing of Porous Aluminum Nitride

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ABSTRACT

The use of aluminum nitride (AlN) has recently begun to be explored for advanced functional applications. For some particular applications, it is more advantageous to use porous-structured AlN, simply because it can provide a greater surface area and higher permeability. However, porous or bulk AlN is very difficult to achieve due mainly to its high melting point (2200 °C). This study proposes a new novel processing method to synthesize porous AlN through a complete transformation from porous aluminum (Al) using a remarkably low nitriding/sintering temperature (620 °C) as opposed to only the surface nitride AlN-Al core composite systems reportedly at or above 1,000 °C in the literature. A uniform microporous bead structure of porous AlN with a mean pore size of $74.0 \pm 27.7 \mu\text{m}$ was obtained that also contained nanoparticles ranging from 80 to 230 nm that covered the surface.

Keywords: *aluminum nitride; porous; nanoindentation; nitridation; sintering*

1. INTRODUCTION

Aluminum nitride (AlN), which is one of the most versatile ceramic materials, has attracted

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