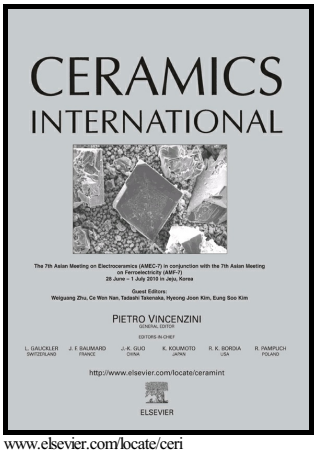

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Preparation of Si_3N_4 porous ceramics *via* foam-gelcasting and microwave-nitridation method

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Abstract

Si_3N_4 porous ceramics with improved mechanical strength were fabricated for the first time by a combined foam-gelcasting and microwave-nitridation method at 1273-1373 K. The Si_3N_4 porous samples prepared at 1373 K/20 min with the porosity of 68.9% had respectively flexural and compressive strength as high as 8.1 and 20.8 MPa, which values were comparable or even superior to those of Si_3N_4 porous ceramics prepared previously by the conventional heating technique at a much higher temperature of 1773-1973 K, indicating that present preparation strategy is feasible to prepare high quality Si_3N_4 porous ceramic at a much milder condition. Moreover, the thermal conductivity of as-prepared Si_3N_4 porous ceramics at 1073 K was as low as 1.697 W/(m·K), suggesting it could be a potentially good heat insulating material for aluminum electrolyte cells.

Key words: Si_3N_4; Porous ceramics; Foam-gelcasting; Microwave; Nitridation

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1 Introduction

Si_3N_4 porous ceramics have attracted considerable interest owing to its outstanding performance, such as low thermal expansion, high specific surface, high mechanical strength and fracture toughness,