

The effect of extract stevia addition on nanocrystalline SiC powder prepared by sol gel method using tetraethoxysilane as precursor

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Abstract

Silicon carbide (SiC) Nano powder was synthesized by sol-gel method using TEOS (tetraethoxysilane) and extract stevia as precursor materials. Primary materials were mixed and then stirred with the speed of 250 rpm at 30°C for 4 hours, the process was done at pH=4.5. Prepared solution was kept in an isolated place for 18 hours in order to finish hydrolysis reaction. Resultant gels were kept in the extraction fan for 4 hours in 60°C to dry. In order to investigate carbothermal reduction process, samples were kept in furnace with argon atmospheres at 650, 900, 1400 and 1500°C for 1.5, 2, 1 and 0.5 hours respectively. To remove remained Si and SiO₂, pickling by HF was performed. The characterizations of the samples were performed using XRD and SEM analysis. The results shown the formation of β-SiC with the average grain size of 35 nm and spherical morphology. Increasing heating temperature from 900°C to 1500°C leads to an increase in the intensity of β-SiC peaks and eliminating Si and SiO₂ contaminations.

Keywords: Sol-gel, Silicon carbide, Nano powder, Stevia

1 INTRODUCTION

Silicon Carbide (SiC) is one of the most important none oxide ceramics which is produced in the powder form in a wide range. Because of having excellent mechanical property, high electron conductivity, high thermal conductivity and high chemical resistance against oxidation possess wide range of application in industry such as high thermal application, semiconductors and so on. The main process of SiC production is carbothermal reduction which is known as Acheson process. Produced powder through this process is coarse-grained [1].

Micro and nano-structured SiC materials have novel properties including improved strength, wear resistance, corrosion resistance and toughness. Several methods invented for producing fine-grained SiC powder including sol-gel, plasma, laser and microwave synthesis. Nanopowder production through sol-gel process is a quite new process which will possess high potential in industry in future [1].

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