

Si3N4-SiC Composites Produced by Using C Black and Sic Powder

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Abstract : In this study, Si3N4-SiC composites were synthesized by using different raw materials. In the first method, Si3N4 and C black powder mixtures were used to fabricate Si3N4-SiC composites by in-situ carbothermal reduction process. The percentage of C black was only changed. The effects of carbon black percentage in the mixtures were analysed by characterization of SiC particles which were obtained in the Si3N4 matrix. In the second method, SiC particles were added to the matrix in different weight ratios. The composites were pressed by cold isostatic method under 150 MPa pressure and pressureless sintered at 1700-1850 °C during 1 hour in the argon atmosphere. AlN and Y2O3 were used as sintering additives. Sintering temperature, time and all the effects on in-situ reaction were studied. The densification and microstructure properties of the produced ceramics were analysed. Density was one of the main subjects in these reactions. It is very important during porous SiC sintering. Green density and relative density were measured higher for CIP samples. Samples which were added carbon black were more porous than SiC added samples. The increase in the carbon black, makes increase in porosity. The outcome of the experiments was SiC powders which were obtained at the grain boundaries of β -Si3N4 particles.

Keywords : silicon nitride, silicon carbide, carbon black, cold isostatic press, sintering

Conference Title : ICMET 2016 : International Conference on Materials Engineering and Technology

Conference Location : Melbourne, Australia

Conference Dates : February 04-05, 2016