

Sintering Atmosphere Effects on the Densification of Al-SiC Compacts

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Abstract : The influence of SiC powder addition on densification of Al-SiC compacts during sintering in different atmospheres was investigated. It was performed in a dilatometer in flowing nitrogen, nitrogen/hydrogen (95/5 by volume) and argon. Fine, F500 grade of SiC powder was used. Mixtures containing 10 and 30 vol.% of SiC reinforcement were prepared in a Turbula mixer. Green compacts of about 82% of theoretical density were made of each mixture. For comparison, compacts made of pure aluminum powder were also investigated. It was shown that nitrogen is the best sintering atmosphere because only in this atmosphere did shrinkage take place. Its amount is lowered by ceramic powder addition, i.e. the more SiC the less densification occurs. Additionally, the formation of clusters enhanced in compacts containing 30 vol.% SiC, is also responsible for limiting the shrinkage. Microstructural examinations of sintered composites revealed that sintering of compacts occurs in the presence of the liquid phase exclusively in nitrogen.

Keywords : Al-SiC composites, densification, sintering atmosphere, materials engineering

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