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ZTA复合材料的热等静压研究

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HOT ISOSTATIC PRESSING OF ZTA COMPOSITES

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摘要

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摘要 研究了热等静压对Al₂O₃-ZrO₂复合材料机械性能的影响以及热等静压烧结过程中ZTA的致密化规律。经实验热等静压烧结的ZTA材料与相应的热压试样相比,其强度和韧性提高近一倍($\sigma_b=950\text{MPa}$ 、 $K_{IC}=9.5\text{MPa m}^{1/2}$);在不同的烧结温度下,显示了不同的致密化规律,其致密速率分别由晶粒滑动和点阵扩散机制控制。

关键词: 热等静压 缺陷尺寸 缺陷尺寸 断裂韧性 致密化

Abstract: In this study, the influence of a reduction of both grain size and flaw size by hot isostatic pressing (HIP) on mechanical properties of Al₂O₃-ZrO₂(ZTA) composites and as well the densification behavior in HIP are investigated. It is shown that the high strength (950MPa) and high toughness (9.5MPa m^{1/2}) could be obtained by a high temperature-short time HIP treatment, and the main effect of HIP is in the elimination of flaws rather than in the reduction of grain size, i.e. defect healing; the densification rate in HIP is controlled by different mechanisms at low and high temperatures(1400°C and 1600°C), i.e. by relative movement of adjacent grains and lattice diffusion.

Keywords: HIP grain size flaw size toughness densification rate

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