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XD合成 Al_2O_3 , TiB_2/Al 复合材料的热力学分析

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摘要: 从热力学的角度讨论了原位反应生成 Al_2O_3 和 TiB_2 陶瓷粒子增强铝基复合材料的合成机理。结果表明, 在Al-TiO₂-B体系中, 以一定的加热速率加热至1 073 K左右时, Al与TiO₂之间首先发生铝热反应, 反应产生出活性钛原子并形成Al-Ti-B反应系; AlB_2 和 Al_3Ti 均系反应中间产物。 AlB_2 在1 200 K左右时分解为Al和B, Al_3Ti 被B还原, 当B的加入量(摩尔)是TiO₂的两倍左右时, Al_3Ti 基本消失, 最终生成 Al_2O_3 和 TiB_2 陶瓷颗粒增强的铝基复合材料。

关键字: 原位反应; 陶瓷粒子; 热力学

Thermodynamics analysis of $Al_2O_3, TiB_2/Al$ composites fabricated by exothermic dispersion method

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Abstract: The thermodynamics of in situ reaction from the reaction system of Al-TiO₂-B to form $Al_2O_3, TiB_2/Al$ composites was studied. The results show that under the condition of certain heating rate, aluminum reacts with TiO₂ firstly at 1 073 K and then forms Al-Ti-B reaction system. The phases of AlB_2 and Al_3Ti occur during the reaction process as medi-products and the AlB_2 phase is decomposed into Al and B at the temperature of about 1 200 K, meanwhile, Al_3Ti is deduced by B to form TiB_2 . When the mole ratio of B/TiO₂ is about two, the Al_3Ti phase is almost eliminated completely.

Key words: in-situ reaction; ceramic particles; thermodynamics

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