

عنوان مقاله:

On the reactions in ilmenite, aluminum and graphite system

محل انتشار:

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خلاصه مقاله:

Al₂O₃/TiC composites are used as cutting tools for machining gray cast iron and steels. The addition of iron improves the toughness of Al₂O₃/TiC composites. Ilmenite, aluminum and graphite can be used to produce in-situ Al₂O₃/TiC–Fe composites. However, the formation mechanism and reaction sequences of this system are not clear enough. Therefore, the present research is designed to determine the reactions mechanism of the first step of reactions that may be occurred between raw materials. In this research, pure ilmenite was synthesized to eliminate the effects of impurities available in the natural ilmenite in the system. The milled and pressed samples, prepared from the synthesized ilmenite, aluminum and graphite mixture with a molar ratio of 1:2:1, were heat treated at 720°C for 48h. In addition, two samples one containing ilmenite and aluminum with a molar ratio of 1:2 and ilmenite and graphite with a molar ratio of 1:1 were heat treated at 720°C for 48h. The final products were analyzed with XRD. It was found that at 720°C, aluminum reacts with FeTiO₃, forming Fe, TiO₂ and Al₂O₃. Since the aluminum content used in the mixture was more than the stoichiometry for reaction of ilmenite and aluminum, some unreacted aluminum remains. Therefore, the residual aluminum reacts with the reduced Fe to form Fe₂Al₅

کلمات کلیدی:

Ilmenite, Aluminum and Graphite, first step mechanism

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