THE FEATURES OF PHASE FORMATION ON THERMAL SYNTHESIS OF Fe-B4C POWDER LIGATURE

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Boron-containing iron-based alloys are characterized by high hardness, strength and wear resistance. Alloying powder systems advantageously carried out by the introduction of ligatures.

In this study patterns of formation of phases during the thermal synthesis of Fe-B4C powder alloys were investigated. For alloys of different composition ПЖР3.160.28 (ГОСТ 9849-86) and 6 - 15 wt. % boron carbide dispersion is less than 63 micrometers with a content of 20.7% C and 77.2% B were mixed in a tumbler mixer for 1 hour.

From the resulting mixture under pressure of 400 MPa porous briquettes were compressed that briquettes were sintered in a muffle furnace at temperatures of 1050, 1100 and 1200 ° C for 1 hour with the container shutter. X-ray diffraction analysis was performed on a DRON-3 diffractometer in the filtered cobalt radiation in the angular range 20-1300. According to study [1] in the presence of Fe_3C cementite and carbide type $Me_{23}(B, C)_6$ boron dopant Fe_3C carbide and $Me_{23}(B, C)_6$. carbide with forming of $Me_3(B, C)$ borocementite and $Me_{23}(B, C)_6$ type karboborida. Boron can substitute up to 80% carbon in cementite, without changing its orthorhombic lattice.

On the formation of the phase composition of the synthesized powder alloys in the temperature range 1050-1200 ° C significant influence has the content of boron carbide in the starting burden, and an increase in temperature activates the formation of phases. When the content of 6% in the burden of boron carbide during sintering intensive formation of Fe_3C and $Fe_{23}C_6$ iron carbides proceeds, which actively doped with boron to form $Fe_3(B_{0,7}C_{0,3})$ borocementite and $Fe_{23}(C,B)$ iron borocarbide. Fe_2B iron borides and FeB are not detected (Fig. 1a). The process of synthesizing of powder alloys with 10% B_4C in the burden proceeds with the preferential formation of complex carbides: $Fe_3(B_{0,7}C_{0,3})$ borocementite and Fe_{23} (C, B)$_6$. borocarbide iron. In small amounts of Fe_2B iron borides Fe_2B and FeB (Fig. 1b) are present. Increase of boron carbide in the burden to 15% dramatically changes the phase composition of the powder alloys. The main phases are FeB iron borides and Fe_2B with predominance Fe_2B. Borocarbides are present as traces. (Fig.1c).

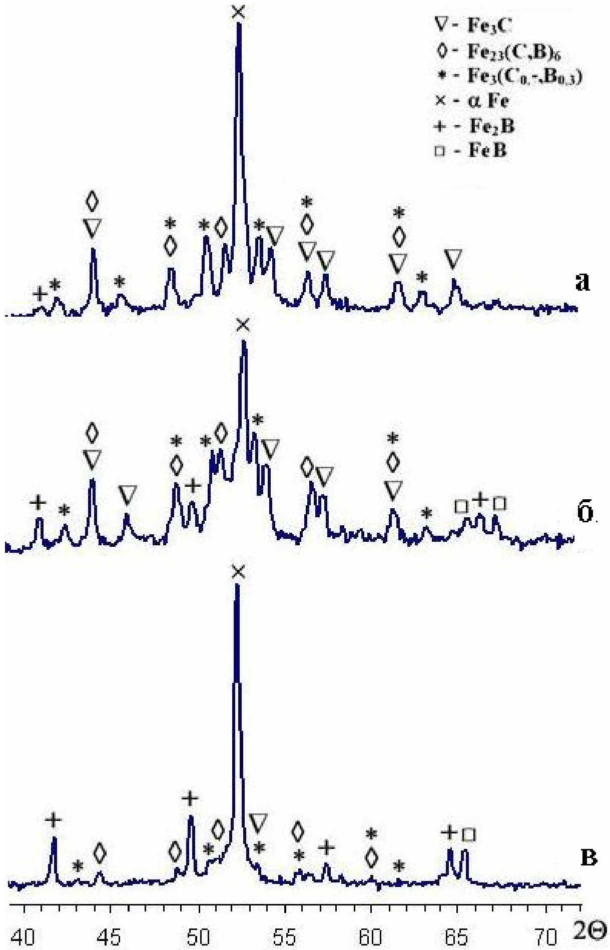

Fig. 1 Fragments of diffractograms ligatures. Fe +6% of B_4C (a), Fe +10% B_4C (b), Fe +15% B_4C (c) synthesized at 1200 ° C

1. Кофман И.С., Егоршина Т.В., Ласкова Г.В. Рентгенографический анализ бороцементита МиТОМ, № 2, 59, (1969).