COMPLEX LIGATURES OBTAINED BY SHS-METALLURGY FOR IRON-CARBON ALLOYS

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Abstract - By SHS-metallurgy method in Fe-Mn-B system complex ligatures with a wide range of alloying elements content have been developed and obtained. Traditional methods of obtaining ligatures, ferroalloys or modifiers are associated with the duration of the process, loss of valuable products, high energy consumption and environmental pollution. SHS-metallurgy method is devoid of these disadvantages and at the same time allows forming the target product consisting of both refractory and light-melting elements in one technological stage.

In the process of synthesis of materials the effect of self-purification – thermo-desorption of volatile impurities is manifested and the resulting products are cleaner than the initial reagents. In addition, technological methods of SHS metallurgy, centrifugal force and gas pressure lead to reduced losses of the target product. This leads to minimization of environmental pollution, which is very important in the current trends of environmental pollution.

The content of alloying components varied widely. As iron, steel rolling waste in the form of magnetite was used. In addition, the carbide-forming elements V, W and Mo, both together and separately, were introduced into the complex ligature by SHS. Dosed introduction of the required amount of alloying elements allows to achieve the required structure and properties of iron-carbon alloys due to the formation of strengthening phases in the structure of the metal matrix.

Carbide-forming elements V, W, Mo, Mn and B will significantly improve physical and mechanical properties such as wear resistance and corrosion resistance of iron-carbon alloys. This is achieved through the formation of dispersed nitrides, complex carbides, carbonitrides and intermetallides, which are located at grain boundaries, strengthening them and reducing diffusion permeability. In addition, manganese as an alloying element is of greatest interest for unstable austenitic steels capable of hardening under deformation.

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