STRUCTURE AND WEAR RESISTANCE OF SHS TiC+HSS COMPOSITE COATINGS, OBTAINED BY ELECTRON BEAM FACING[1]

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High-speed steels (HSS) are widely used as a binder in titanium carbide metal matrix composites. The most familiar are carbide-steels that made by sintering of titanium carbide and steel powder mixtures. [1]. Carbide-steels composed of titanium carbide particles uniformly distributed in a steel matrix and have much higher hardness and wear resistance as compared with rolled steels. To get similar structure in wear resistant coatings produced by cladding or sputtering titanium carbide and steel powder mixtures are commonly used. To avoid segregation in the powder mixtures it is reasonable to use composite powders, which constitute granules composed of disperse hard particles in metal matrix. Self-propagating high temperature synthesis (SHS) should be recognized to be the most cost-effective and high-performance preparation method of composite powders with carbide hardening phase [2]. The structure of TiC+Fe composite powders with wide C/Ti ratio were discussed in [3]. The effectiveness of electron beam facing (EBF) in wear resistant coating applications is confirmed by authors [4].

The microstructure, hardness and wear resistance of EBF coatings, cladded by «TiC-HSS steel binder» composite powders obtained by wave combustion mode SHS method have been studied in our work. Evolution of microstructure of the composite powder granules during the surfacing is described. The evolution consists of partial dissolution of the granules in the molten pool and subsequent crystallization of the dispersed carbide phase in dendrites from a liquid metal solution containing titanium and carbon. The heat-affected zones are observed and the hardness gradient of coating-surface areas is examined. The connection between microstructure of the coatings and their hardness and abrasive wear resistance is presented. Relations between HSS binder content in the SHS powder, hardness and abrasive wear rate (fig 1) are discussed.

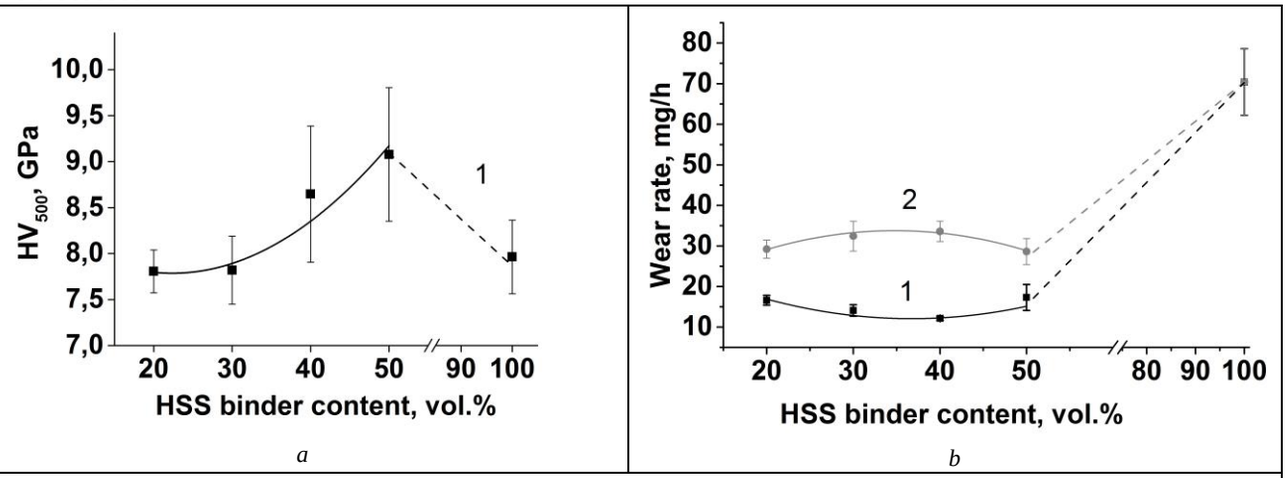

Fig. 1. Relations between HSS binder content in the SHS powder, hardness (a) and abrasive wear rate (b) of the EBF coatings.

1 – 125-200μ, 2 – 200-315μ.

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