ABSTRACT

The work contains 128 p., 38 fig., 34 tab., 63 sources.

ELECTRON BEAM MELTING, POWDER, ENTHALPY, ENTROPY, HARDNESS, HIGH ENTROPY COATINGS, MULTICOMPONENT PHASE COMPOSITION, STRUCTURE.

The object of research – multicomponent high entropy coatings of the Al-Co-Ni-Fe-Cr-Ti-B_x system (where x = 0; 0,25; 0,5; 1).

The aim of the work is to investigate the effect of boron additives on the formation of the structure, phase composition and mechanical properties of high entropy coatings of the Al-Co-Ni-Fe-Cr-Ti-B_x system obtained by the method of electron beam surfacing.

Multicomponent high entropy coatings of AlCoNiFeCrTi, $AlCoNiFeCrTiB_{0,25}$, $AlCoNiFeCrTiB_{0,5}$ and AlCoNiFeCrTiB was obtained by the method of electron-beam surfacing on a steel 45 substrate. The phase composition and structure of the coatings were investigated by X-ray and microstructural analyses. Characteristics of strength and plasticity of the coating (microhardness HV, offset yield point $\sigma_{0,2}$, critical fracture toughness K_{Ic}).

It was found that $AlCoNiFeCrTiB_{0-0,5}$ coatings are consist of two substitutional solid solutions with body-centered cubic structure, which differ in lattice constant. An increase in the boron content to x = 1 mol changes the phase composition, and the formation of one solid solution with body-centered cubic structure, and borides is observed in the AlCoNiFeCrTiB coating. Addition of boron increases the microhardness of AlCoNiFeCrTiB coatings up to 14 GPa against 8.8 GPa for AlCoNiFeCrTi coatings without boron.