The Structure-Phase Compositions of Ni - Cr and Co-Cr Based Powder Alloys Coatings Deposited by Plasma-Detonation on Steel Substrates

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The plasma detonation method is modern; it allows obtaining coatings from high-melting metal powder in air medium. One of the main problems of plasma detonated thick coatings (100-500 µm thick) is their porosity and high roughness of surface. These result in insufficient corrosion and wear resistance of such coatings.

Practical experience of the use of combined technologies of coating deposition by plasma detonation with the subsequent modification by e-beam or plasma jet allows to claim that mechanical properties of such coatings (microhardness, nanohardness, wear resistance, corrosion resistance) are very high.

However, we should clearly constitute the structure-phase coating composition for coatings with expected properties by added irradiation. There are not enough published TEM-data about structure-phase composition of coatings deposited by plasma detonation.

This paper presents new results of transmission electron microscopy (TEM), X-ray diffraction (XRD) and atomic force microscopy (AFM) investigation of the structure-phase composition of thick (150 µm) powder composite coatings on the base of Ni-Cr and Co-Cr deposited by plasma-detonation on steel substrates. The phase structures and morphology of precipitation from solid solution are defined. The microstructure model of a thick plasma detonation coating on steel substrate is developed. The main aim of carrying out these investigations is developing science based recommendations for modification of plasma-detonation coatings by plasma-jet or e-beam.

Keywords
plasma detonation coatings
structure-phase composition
transmission electron microscopy