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OXIDATION RESISTANCE OF STEEL SURFACE LAYER ALLOYED BY Mo AND Cr UNDER THE ACTION OF COMPRESSION PLASMA FLOWS

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The phase and element composition, microhardness of the carbon steel surface layer simultaneously alloyed with molybdenum and chromium atoms under the impact of compression plasma flows and subsequent annealing in air were investigated in this work. An X-ray diffraction analysis, scanning electron microscopy, energy dispersion microanalysis, and microhardness measurements were used as investigation techniques. The findings showed that the alloyed layer contained solid solutions on the basis of α-Fe and γ-Fe. An alloyed steel surface layer possessed better oxidation resistance at 400°C being compared with initial steel. Annealing resulted in the formation of an oxidized layer consisting of Fe_2O_3 and Fe_3O_4 phases. The presence of alloying elements like Mo and Cr was observed in this layer.

KEY WORDS: *carbon steel, compression plasma flows, annealing, oxidation resistance, microhardness*

1. INTRODUCTION

Nowadays ion, laser, and plasma beams are widely used for modifying the properties of the surface layers of materials in different ways (Ivanov et al., 2017; Mikhalev et al., 2019; Ramesh et al., 2018; Savastenko et al., 2017). The material surface layer alloying by additional elements is a prospective direction of high-energy particle beams application. Alloying is carried out by preliminary deposition of an alloying element film or a coating and subsequent treatment by high-energy particle beams (Cherenda et al., 2018; Zhang et al., 2019). Compression plasma flows (CPF) generated by quasi-stationary plasma accelerators are of

