

MODIFICATION OF THE SILUMIN STRUCTURE AND PROPERTIES BY ELECTRON-ION-PLASMA SATURATION OF THE SURFACE WITH ATOMS OF METALS AND GASES

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The results of modification of the composition of eutectic silumin doped with titanium by means of a high-intensity pulsed electron-beam irradiation of the film (Ti)/substrate (silumin) system and subsequent nitrogen saturation in the plasma of low pressure arc discharge are presented. Such complex electron-ion-plasma treatment can increase the wear resistance of silumin by multiphase surface layer formation with a submicron and nanosized structure.

KEY WORDS: *silumin, low-pressure discharge plasma, intense pulsed electron beam, film/substrate system, nitrogen saturation, structure, properties*

1. INTRODUCTION

Cast aluminum alloys created on the basis of an aluminum–silicon system are called silumin (Belov, 2008). The dual aluminum–silicon eutectic has a very rough structure, with silicon being in the form of large plates (or in the form of needles in the cross section) (Fig. 1a). These alloys possess poor mechanical and tribological properties. Therefore they are subjected to modification, e.g., by means of sodium introduction (which comes from an exchange reaction with a flux containing sodium fluoride) into