CHANGE IN MECHANICAL PROPERTIES OF Ti-V-Al ALLOY AFTER ION IMPLANTATION WITH Cu AND Ni AND TREATMENT BY A HIGH-CURRENT ELECTRON BEAM

A. D. Pogrebnjak, A.P. Kobzev, B. P. Gritsenko, S. V. Sokolov, E. A. Bazyl, N. V. Sviridenko, A. N. Valyaev

Sumy Institute for Surface Modification
(*17, Shevchenko Av., Sumy 244030, P.O.Box 163, Ukraine*)

S u m m a r y

After the Cu (60 kV, $D = 2 \cdot 10^{17}$ cm^{-2}) and Ni (40 kV, $D = 5 \cdot 10^{16}$ cm^{-2}) ion implantation and subsequent high-current electron beam (HCEB) treatment, Ti_{41}-V_{41}-Al_{18} alloy is investigated. In addition to implanted Cu and Ni ions, the high oxygen concentration of 14 at.% and carbon of 15 at.% is found in a layer 60 nm thick. The surface layer is composed of a number of structures: grains of dislocation substructure ($2 \cdot 10^{10}$ cm^{-2}), grains with plates, and grains with packed martensite. The disorientation of regions is observed. The implanted alloy is found to have a decreased wear ability as well as an increased fatigue limit for cycling loads by 30%. After the Cu, Ni implantation and HCEB treatment, this fatigue limit increases by 60%, the subsequent furnace annealing increases it by 90%. Hardness also increases and the friction coefficient decreases by a factor of 1.8 after this double implantation and HCEB treatment.