Nanostructured surfaces

The influence of vacuum treatment of different range on size hardened subsurface layers of the HFE-1 hafnium alloy

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High affinity Hafnium to oxygen influences on the functional properties of products [1-2]. Results influence composition of medium annealing on properties plates (~ 1 mm) HFE-1 hafnium alloy it was showed. It was found that annealing ($\boldsymbol{T}$ = 850°C, τ = 2 h) in oxygen-containing atmosphere at $\boldsymbol{P}$ = $1.33 \cdot 10^{-2}$ Pa is accompanied by the formation of a diffusion hardened subsurface layers of 30000 to 35000 nm with the ΔHV = 100 hardness gradient (fig. 1).

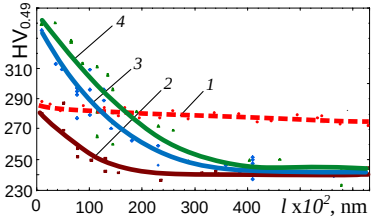

Fig. 1 The distribution of micro hardness over the cross-section of hafnium specimens after treatments ($\boldsymbol{T}$ = 850°C, τ = 2 h) in depending on the vacuum: *1* – initial state, *2* – $\boldsymbol{P}$ = $1{,}33 \cdot 10^{-3}$ Pa, *3* – $\boldsymbol{P}$ = $1{,}33 \cdot 10^{-2}$ Pa, *4* – $\boldsymbol{P}$ = $1{,}33 \cdot 10^{-1}$ Pa

Was found that the hardness gradient in the surface of the metal layer of the samples after the treatment decreases monotonously from the surface to the middle of the sample, indicating the absence of dense phase films. The metal core hardness is decreased relative to the original state because of relaxation of residual stresses from rolling. As expected the highest hardness gradient is observed for the highest vacuum.

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2. *Vyvchennya* vlastyvostey kaltsiyetermichnoyu hafniyu / A.A. Afanasyev K.V. Kovtun, P.N. Khurtovyny, I.M. Neklyudov // VANT. Seriya: fizyka radiat. ushkod. i radiats. material. (77). - 1999. - №2. - S. 19-20.