under isothermal loading, martensite transformation must to begin in grains on the surface of specimen with subsequent forming mezzo-bands localization of martensite transformation under tension concentration in neighboring grains.

The experimental investigations of martensite transformation by method of optical metallography in situ at tension deformation of submicrocristalline alloy $Ti_{49,4}Ni_{50,6}$ confirmed predicted two-stage development of in-elastic martensite deformation at the initial stage of loading. In the first stage of deformation localization mezzo-bands of martensite deformation of two orientations first of all grow up in length. In the end of this stage it formers macro-band of martensite transformation with front under exemplary 60° to axis of tension. On second stage front of macro-band moves, but first of all martensite transformation develops in a form mezzo-bands. With this the value of non-elastic martensite deformation in the macro-band on stage of his spreading keeps invariable and equal to deformation of specimen in the end of second stage. However martensite transformation in macro-band is not complete and it concludes on third stage of deformation.

Accordance between structural-scale localization level of martensite transformation and deformation behaviour of submicrocristalline and coarse-grained alloy $Ti_{49,4}Ni_{50,6}$ at isothermal loading was established. It was showed the similarity of deformation behaviour on the initial stages of martensite transformation and plastic deformation at isothermal loading submicrocristalline alloys. Physical nature of this similarity was substantiated.

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HIGH-STRENGTH SUBMICROCRYSTALLINE TITANIUM ALLOYS WITH A NANOCOMPOSITE ANTIFRICTION COATING

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High specific strength at high ductility, heat resistance and corrosion stability in various corrosive medium are typical for α – and (α+β) – titanium alloys. That is why they are extensively applied in aviation and aerospace engineering, shipbuilding and chemical industry. At the same time they exhibit high friction coefficient and low wear resistance which make their application for kinematic and tribotechnical coupling unfeasible.

In order to simultaneously increase the strength and significantly improve the mechanical and tribotechnical properties of titanium and (α+β) – titanium alloys, Ti–Al–V (BT6) and Ti–Al–V–Mo (BT14), a two-stage technological cycle to manufacture the desired product is proposed and studied in this work. In the first stage the material specimen is subjected to severe plastic deformation to form submicrocrystalline structure that ensures higher strength. In the second stage a nanocomposite coating is synthesized in order to significantly improve the tribotechnical properties of the surface layer and remain the parameters of sample bulk submicrocrystalline structure unaltered.

The method of gradient nanocomposite coatings formation employing ion-plasma technology and a multicomponent target for magnetron plasma sputtering has been developed. In this method the processes of ion-plasma surface cleaning, ion-plasma coating surface doping and magnetron-plasma spray coating are combined in an overall cycle. The given method and the sputtering target Ti–C–Mo–S application enabled to form a gradient nanocomposite structure with a surface layer containing carbide TiC, silicide MoS_2 and an X-ray amorphous phase, each one is less than 100 nm. Such a surface layer presence decreased the friction coefficient by a factor of ten, considerably increased wear resistance and resulted in friction pairs running-in as well.

The results of our work are relevant for the development of submicrocrystalline titanium alloys friction pairs used in dry friction conditions.

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SPALL FRACTURE GENERAL REGULARITIES AND PATTERNS OF COARSE-GRAINED AND SUBMICROCRISTALLINE Ni–Al ALLOY EXPOSED TO NANOSECOND RELATIVISTIC HIGH-CURRENT ELECTRON BEAM

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According to existing models, spall fracture of metal materials is described as generation, growing and conjunction of micro-pores and cracks, and that caused formation of main crack. As a rule, grains and twins boundaries, accumulations of dislocations and second phase particles are the places of