

# Deformation and fracture of Ti–Nb alloys with a grain size distribution

† \*Vladimir A. Skripnyak<sup>1</sup>, Natalia V. Skripnyak<sup>1</sup>, and Evgenia G. Skripnyak<sup>1</sup>

<sup>1</sup>Department of Mechanics of Solids, National Research Tomsk State University, Russia.

\*Presenting author: skrp2006@yandex.ru

†Corresponding author: skrp2006@yandex.ru

## Abstract

This article presents the results of modelling of the mechanical behaviour of coarse grained (CG) and ultrafine-grained (UFG) Ti–Nb alloys in the range of strain rates from  $10^{-3}$  to  $10^3$  s<sup>-1</sup> at temperatures from 297 K to 1273 K. Modification of the micro-dynamical model was proposed for the description of Ti–Nb ultrafine grained and coarse grained  $\alpha+\beta$  and  $\beta$  alloys. It was shown that the HCP  $\rightarrow$  BCC phase transformation in Ti–Nb alloys leads to a sharp changing in resistance to plastic flow and kinetics of growth of damage. The results can be used for engineering analysis of designed constructive elements of technical and biomedical applications.

**Keywords:** computer simulation, mechanical behavior, ductility, titanium-niobium alloys, high strain rate, grain size distribution