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## INVESTIGATION OF NONLINEAR SUPRATRANSMISSION IN THE $A_3B$ STEHIOMETRY CRYSTAL AT INTENSIVE EXTERNAL EXPOSURE

Modes of modification of near-surface layers of materials are very often based on surface treatment by high-intensity external influences in the form of plasma discharge, annealing, current pulses, etc. Energy flows from the surface of crystals affect the structural and energy transformations of materials, thus ensuring the modification of the near-surface layers of matter. In this article we have considered the effect of energy transfer during periodic exposure to the crystal surface of the stehiometric composition  $A_3B$ , which has a forbidden band in the phonon spectrum of the crystal. The effect was carried out over a wide range of frequencies both in the phonon spectrum and outside the phonon spectrum of the crystal. The effect of energy transfer at frequencies outside the phonon spectrum of a crystal is called a nonlinear supratransmission [1]. The model we are considering is a three-dimensional FCC crystal of  $A_3B$  stehiometry, using the example of  $Pt_3Al$ , which contains  $32 \cdot 10^3$  particles (Fig. 1) interacting via the potential obtained by the immersed atom method (EAM potential) [2].

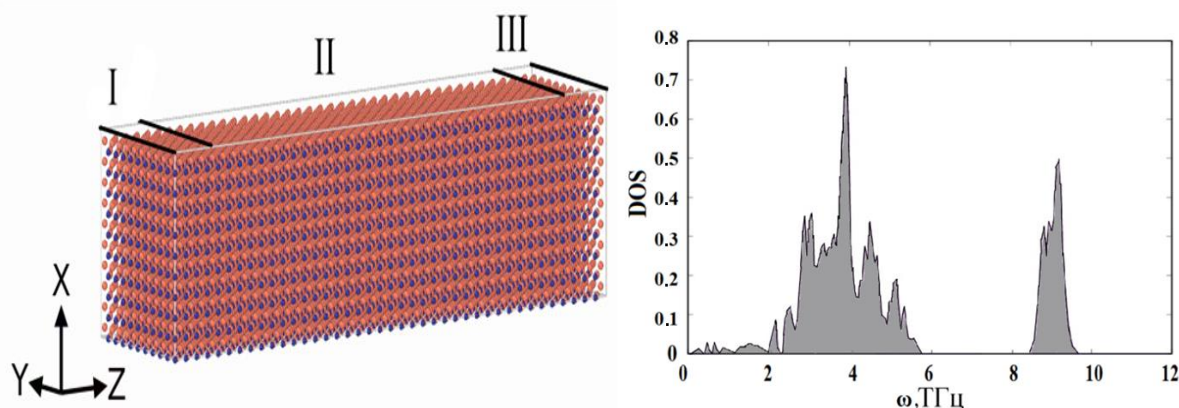


Fig. 1. a) The three-dimensional model of the  $Pt_3Al$  crystal, the X axis is directed along the crystallographic direction  $\langle 100 \rangle$ , Y –  $\langle 010 \rangle$ , Z –  $\langle 001 \rangle$ . The number I indicates the region of periodic impact, II - the region of energy absorption, III - rigidly fixed atoms; b) the density of the phonon states of the crystal  $Pt_3Al$ .

The simulation was carried out using the LAMMPS package [3]. It was shown that energy transport by this mechanism is possible along the directions corresponding to the crystallographic directions of the existence of a quasi-breather in a crystal. We note that quasi-breathers mean high-amplitude nonlinear oscillations of atoms of the light component of an alloy at frequencies outside the phonon spectrum of the crystal.

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