Abstract Submitted
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Influence of Grain Size Distribution on the Mechanical Behavior of Light Alloys in Wide Range of Strain Rates[1] VLADIMIR A. SKRIPNYAK, NATALIA V. SKRIPNYAK, EVGENIYA G. SKRIPNYAK, VLADIMIR V. SKRIPNYAK, Tomsk State University — Inelastic deformation and damage at the mesoscale level of ultrafine grained (UFG) Al 1560 aluminum and Ma2-1 magnesium alloys with distribution of grain size were investigated in wide loading conditions by experimental and computer simulation methods. The computational multiscale models of representative volume element (RVE) with the unimodal and bimodal grain size distributions were developed using the data of structure researches aluminum and magnesium UFG alloys. The critical fracture stress of UFG alloys on mesoscale level depends on relative volumes of coarse grains. Microcracks nucleation at quasi-static and dynamic loading is associated with strain localization in UFG partial volumes with bimodal grain size distribution. Microcracks arise in the vicinity of coarse and ultrafine grains boundaries. It is revealed that the occurrence of bimodal grain size distributions causes the increasing of UFG alloys ductility, but decreasing of the tensile strength. The increasing of fine precipitations concentration not only causes the hardening but increasing of ductility of UFG alloys with bimodal grain size distribution.

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Vladimir Skripnyak
Tomsk State University

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