features of deformation and fracture of crystals and polymers at various length scales corroborate the universality of the micromechanisms of plastic flow and fracture in crystals and polymers due to same dislocation-like defects.

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## FEATURES OF SUPERPLASTIC FLOW OF NANOSTRUCTURAL ALLOYS


**Myshlyaev M. M.[1,2], Mironov S. Yu.[3], Medvedev M. M.[1], Zolotarev A. K.[1], Isaev V.V.[1], Myshlyaeva M. M.[1], Travkin A. A.[1]**

[1] *Institute of Solid State Physics, RAS, Chernogolovka, Russia,* myshlyae@issp.ac.ru
[2] *Baikov Institute of Metallurgy and Material Science, Moscow, Russia*
[3] *Institute of Metal Superplastisity Problems, Ufa, Russia,* s-72@mail.ru



The structure and phase state of rods subjected to the equal-channel angular (ECA) pressing under different conditions have been studied by X-ray diffraction analysis, transmission and scanning electron microscopy, including back electron scattering diffraction and orientation image microscopy, technique. A fine-grained structure has been shown to form in the process of pressing. A largest number of grains demonstrate the formation of a dislocation substructure involving subgrains.

A mechanical behaviour has been studied for ECA pressed samples having different structure states. Temperature and strain rate conditions to attain ultimate strains to failure have been defined for samples of each structural state. It has been shown that samples with a developed substructure are subject to a superplastic (SP) straining. Contrary to the expectations the ductility of finest-grained samples turned out low.

Mechanical behaviour of the alloys has been studied in SP straining conditions. Multistage high strain rate SP straining has been shown. Dependencies of the true strain rate on temperature, the true stress and true strain for the straining during hardening stage and softening stage have been established. The activation energies and the coefficients of strain rate sensitivity of stress, which characterize these stages, have been determined. Structural behaviour during SP straining has been studied.