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Effect of severe plastic deformation on microstructure and mechanical properties of magnesium and aluminium alloys in wide range of strain rates VLADIMIR SKRIPNYAK, EVGENIYA SKRIPNYAK, VLADIMIR VLADIMIROVICH SKRIPNYAK, IRINA VAGANOVA, NATALIYA SKRIPNYAK, National Research Tomsk State University — Results of researches testify that a grain size have a strong influence on the mechanical behavior of metals and alloys. Ultrafine grained HCP and FCC metal alloys present higher values of the spall strength than a corresponding coarse grained counterparts. In the present study we investigate the effect of grain size distribution on the flow stress and strength under dynamic compression and tension of aluminium and magnesium alloys. Microstructure and grain size distribution in alloys were varied by carrying out severe plastic deformation during the multiple-pass equal channel angular pressing, cyclic constrained groove pressing, and surface mechanical attrition treatment. Tests were performed using a VHS-Instron servo-hydraulic machine. Ultra high speed camera Phantom V710 was used for photo registration of deformation and fracture of specimens in range of strain rates from 0,01 to 1000 1/s. In dynamic regime UFG alloys exhibit a stronger decrease in ductility compared to the coarse grained material. The plastic flow of UFG alloys with a bimodal grain size distribution was highly localized. Shear bands and shear crack nucleation and growth were recorded using high speed photography.

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