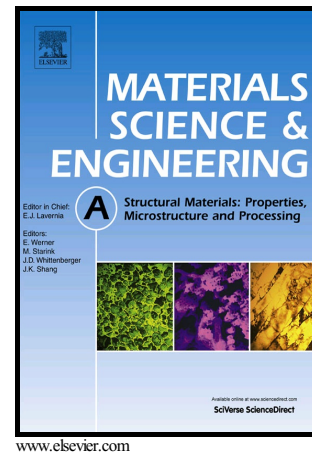


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Effect of strain rate on the mechanical properties of magnesium alloy AMX602

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Abstract

In the present work, the effect of strain rate on the mechanical properties, particularly the plastic deformation behavior of a magnesium alloy, AMX602 (Mg-6%Al-0.5%Mn-2%Ca; all wt.%), fabricated by powder metallurgy, has been investigated under both quasi-static (strain rate $1 \times 10^{-3} \text{ s}^{-1}$) and dynamic (strain rate $4 \times 10^3 \text{ s}^{-1}$) compressive loading. The alloyed powder was extruded at three different temperatures. The microstructure of the alloy was examined by scanning electron microscopy (SEM) and transmission electron microscopy (TEM). It was found that AMX602 exhibits an impressive mechanical behavior but with a slight anisotropy along different directions in both strength and compressive ductility (or malleability). The strength was found to be nearly independent of the extrusion temperature, particularly, under dynamic loading. Nanoindentation strain rate jump test reveals a strain rate sensitivity of ~ 0.018 to ~ 0.015 , depending on the extrusion temperature. Sub-micrometer-scale particles of the intermetallic

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