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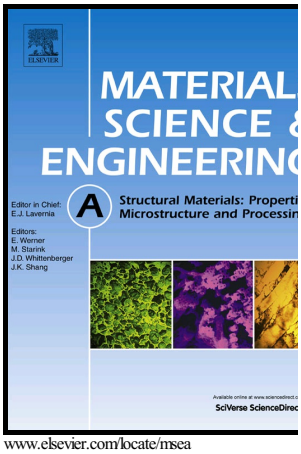

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High temperature mechanical behavior of an extruded Mg-11Gd-4.5Y-1Nd-1.5Zn-0.5Zr (wt%) alloy

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Abstract

The microstructure-property relation of an extruded Mg-11Gd-4.5Y-1Nd-1.5Zn-0.5Zr (wt %) alloy was investigated by conducting hot compression and high temperature creep at temperatures up to 250 °C. The alloy exhibits an average compressive yield strength (σ_{CYS}) of 363±1 MPa and an average elongation to failure (ε_{CF}) of 10.5±0.2 % at room temperature, 301±13 MPa and 12.8±1.1 % at 200 °C. In creep the minimum creep strain rate ($\dot{\varepsilon}_{min}$) is 1.94 × 10^{-9} s^{-1} at 175 °C/160 MPa and 6.67 × 10^{-9} s^{-1} at 200 °C/100 MPa, The obtained stress exponent n is in the range of 3.7 - 4.7, suggesting that the creep is controlled by the dislocation climb mechanism. The improvement in compressive strength and creep resistance is attributed to the fine recrystallized grains, SFs in the grain interior, Mg_5RE and LPSO phases at grain boundaries. The alloy exhibits a bimodal texture with <0001> and <$10\bar{1}0$> components. Its strengthening effect is determined by the competition between