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Effect of Multi-pass Equal Channel Angular Pressing on the Microstructure and Mechanical Properties of a Heterogeneous $\text{Mg}_{88}\text{Y}_8\text{Zn}_4$ Alloy

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The microstructure evolutions and mechanical properties of a heterogeneous $\text{Mg}_{88}\text{Y}_8\text{Zn}_4$ (in at.%) alloy during multi-pass equal channel angular pressing (ECAP) were systematically investigated in this work. The results show that four phases, i.e. α -Mg, 18R long period stacking ordered (LPSO) phase, Mg_{24}Y_5 and Y-rich phase, are present in cast alloy. During ECAP, dynamic recrystallization (DRX) occurs and the diameter of DRXed α -Mg grains decreases to 0.8 μm . Moreover, precipitation of lamellar 14H LPSO structure is developed within α -Mg phase. Both the refinement of α -Mg grains and precipitation of 14H LPSO contribute to the increasing in micro-hardness from 98 HV to 135 HV for α -Mg. In addition, a simplified model describing the evolution of 18R LPSO phase is established, which illustrates that 18R undergoes a four-step morphological evolution with increasing strains during ECAP, i.e. original lath $\rightarrow$ bent lath $\rightarrow$ cracked lath $\rightarrow$ smaller particles. Compression test results

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