Microstructure evolution and texture development of hot form-quench (HFQ) AZ31 twin roll cast (TRC) magnesium alloy


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The present study on the microstructure evolution of hot form-quench (HFQ) AZ31 twin roll cast magnesium alloy attempt to provide an understanding on the grain structure and heterogeneous intermetallic phase formation in the alloy and texture development following the HFQ process. Grain recrystallization and partial dissolution of eutectic $\beta$-Mg$_{17}$Al$_{12}$ phase particles were occurred during the solution heat treatment at 450°C, leaving the alloy consists of recrystallized grains and discontinuous or random $\beta$-Mg$_{17}$Al$_{12}$ phase particles distribution with small volume fraction. The particles act as effective nucleation sites for new grains during recrystallization and variation of recrystallization occurrence contributed to texture alteration. The partial or full $\beta$-Mg$_{17}$Al$_{12}$ phase dissolution following the HFQ induces void formation that act as fracture nucleation site and the corresponding texture alteration in the recrystallized grains led to poor formability in TRC alloy.