On the evolution of microstructure, texture and corrosion behavior of ahot-rolled and annealed AZ31 alloy

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Abstract: The microstructure and texture evolution of an AZ31 alloy were investigated after hot rolling and subsequentannealing using electron backscatter diffraction (EBSD). First, the alloy was hot-rolled at 350 ? C up to low, medium and high strain (20, 50 and 85% of thickness reduction, respectively). The alloy samples where thenannealed at 350 ? C for 2, 10 and 60 min. The effect of strain level and annealing on corrosion behavior inseawater was also evaluated using electrochemical tests. At low strain, the microstructure was characterised bythe absence of twinning, mainly due to the prior thermo-mechanical history of the as-received alloy. However, various modes of twinning were observed at medium strain. At high strain, the dynamic recrystallization processresulted in a microstructure with a typical basal texture. The results demonstrate that twins are responsible forthe deviation of {0002} basal poles from normal towards the transversal direction. Annealing at 350 ? C for up to60 min led to normal grain growth in all the samples. In medium and highly strained samples, the deformationtexture was retained, while the low strain sample underwent noticeable changes due to the absence of dynamicrecrystallization. A synergetic effect of grain refinement and texture weakening was responsible for the alloy'senhanced corrosion resistance.AZ31 alloyCorrosionDynamic recrystallizationStatic recrystallizationRolling

Keywords : AZ31 alloy, corrosion, Dynamic recrystallization, Static recrystallisation, rolling