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Effect of Aging on Hardness and Corrosion Resistance of WE43 Magnesium Alloy

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Abstract : This study investigates the effects of aging heat treatment on corrosion resistance and mechanical properties of WE43 Magnesium alloy. The heat treatment of alloys was conducted by solutionizing at 525oC for 16 h, followed by aging at 190, 210 and 230oC for up to 48 h. The type and the size of precipitates formed upon aging have influenced both the mechanical properties and corrosion behavior of the alloy. Solutionized alloy displayed the worst corrosion resistance in simulated body fluid, while peak hardness and the best corrosion resistance were observed in the alloy aged at 210oC for 24 h as a result of β' precipitate formation. Longer aging duration at 210oC decreased the corrosion rate due to the coarsening of the precipitates and formation of precipitate-free zones. The increased corrosion resistance of the peak aged samples was attributed to the slowing down effect of the $Mg(OH)_2$/MgO corrosion layer by the pinning effect of β'-precipitates.

Keywords : WE43 magnesium alloy, simulated body fluid, corrosion, mechanical properties
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