Effect of Deformation and Heat Treatment on Pitting Corrosion Behavior of 7050 Al Alloy

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Microstructure and pitting corrosion behavior of 7050 Al alloy under hot rolling, solution treating and aging conditions were investigated through optical microscopy, scanning electron microscope, transmission electron microscope, electrochemical measurements and 3D laser scanning microscope. The results show the as-rolled alloy exhibits an incomplete recrystallized microstructure with high dislocation density, while the solution treated alloy presents a complete recrystallized microstructure. The aging treatment leads to the formation of η' and η precipitates, and AlCuFe intermetallics always remain in 7050 Al alloy under deformation and heat treatment conditions. The electrochemical activity increases in the following order: solution-treated alloy < aging-treated alloy < as-rolled alloy, while the corrosion resistance increases in the reverse order. Potentiostatic polarization test demonstrates that the as-rolled alloy possesses higher susceptibility to pitting and faster propagation rate. Effects of microstructure on pitting formation are discussed in detail in this work.

Keywords: 7050 alloy; Pitting Corrosion; Microstructure; Hot rolling; Heat treatment

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