Nanoscale corrosion investigation of surface nanocrystallized 7150 Al alloy in 3.5 wt% NaCl solution by using FIB-TEM techniques

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Abstract: Nanocrystalline grains were fabricated on the surface layer of 7150 Al alloy by using ultrasonic shot peening treatment. The nanoscale corrosion behavior of this surface nanocrystallized 7150 Al alloy in 3.5 wt% NaCl solution was studied by combining focused ion beam (FIB) and transmission electron microscopy (TEM) techniques. It was found that, compared with the untreated substrate alloy, pit corrosion is largely inhibited and intergranular corrosion (IGC) is eliminated on the surface nanocrystallized layer. The transition from IGC to uniform corrosion caused by ultrasonic shot peening can be attributed to the disappearance of precipitate free zone (PFZ) along grain boundaries.

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