

Influence of the Equal Channel Angular Pressing (ECAP) processing on stress corrosion cracking (SCC) of AA5083 aluminium alloy

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Abstract

Aluminium (Al) alloy is the most useful material for several technological purposes, mainly due to the good combination of intermediate-to-high mechanical strength with low density, good formability and high stress corrosion cracking resistance. In this present work a severe plastic deformation through equal channel angular pressing (ECAP) upto three passes was given on Al5083 alloy using route-BC at room temperature. Stress Corrosion Cracking (SCC) resistance was evaluated by 10⁻⁴/sec strain rate and the constant load tests performed in an aqueous environment of 3.5 wt.% NaCl. For more understand on the SCC susceptibilities of the Al alloy shown by the ECAPed and as received samples, microstructural characterization was carried out of the fracture surfaces by SEM (Scanning Electron Microscopy) and EBSD (Electron Back Scattered Diffraction). Improvement of the SCC resistance of the Al alloy subjected to 1st pass of the ECAP compared to the as received Al alloy but after 2nd and 3rd passes susceptibility of SCC reduces. The dimple of the fracture surface after 1st pass of the ECAPed Al samples is shown finest type, that is shown to the best ductility of Al samples. The propagation of the cracks towards the grain boundaries with {100}//RP orientation of the grains and the grain boundaries related to {111}//RP and {110}//RP orientated grains slowed down the SCC of the Al alloy.

Biography:

Dr. Asiful Hossain Seikh has completed his Ph.D. in Materials Engineering from Jadavpur University, Kolkata, India in 2005. Dr Seikh has a professional background comprising 17 years of research, teaching and supervisory experience in materials, corrosion, physical and mechanical metallurgy. He is working as an Associate Professor in King Saud University, Riyadh, Saudi Arabia. Before that he was working in UAE University, AL Ain, UAE

and KACST, Riyadh in his professional career. He has published more than 50 ISI papers.

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