Effect of surface roughness on the characteristics of passive film formed on 5083 Al alloy in pH 8.4 Borate Buffer Solution

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In this paper, the effect of surface roughness on the characteristics of passive film formed 5083 Al alloy was investigated, by using potentiodynamic polarization curve, electrochemical impedance spectroscopy (EIS), Mott–Schottky analysis and point defect model (PDM). It was found that the 5083 Al alloy shows satisfactory passivation performance in the borate buffer solution. The formed passive films exhibit p-type semiconductor characteristic. The smaller surface roughness can promote passive film to form less carrier density and smaller diffusion coefficient, which improved the quality of passive film and enhance its corrosion resistance.

Keywords: 5083 Al alloy, Surface roughness, Passive, Corrosion resistance, Point defect model

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