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EIS study on corrosion behaviour of AA 5083-H321 Aluminum-Magnesium alloys in stagnant NaCl solution.

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Abstract- In this research, EIS technique was utilized to study the corrosion behaviour of AA5083-H321 aluminum-magnesium alloy in 3.5% NaCl solution. Impedance spectra were obtained during 240 hours of exposure of the sample to the test solution. The surface and cross section of the samples were studied by scanning electron microscopy (SEM) and EDAX analysis.

The results indicated the impedance of the surface is controlled by the reactions that occur in the passive layer on top of intermetallic particles and substrate. Intensification of cathodic and anodic reactions at the first 24 hours decreases the impedance of the surface. However, accumulation of corrosion products inside the pits and subsequently suspension of cathodic reactions on top of intermetallic particles tends the impedance of the surface to decrease. Meanwhile pitting corrosion provides inhomogeneous surface, which prevents the capacitors to behave ideally. Therefore, capacitors are substituted by constant phase element.

Keywords: Pitting Corrosion, AA5083-H321 Aluminum-Magnesium Alloy, Electrochemical Impedance Spectroscopy, intermetallic Particle, Passive Layer



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AA5083-H321

Mg	Si	Mn	Cr	Fe	Cu	Zn	Ti	Al
/	/	/	/	/	/	/	/	

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Solution





Time (hr)	R _{int} (ohm.cm ²)	C_{int} (μ F.cm ⁻²)	R _{np} (ohm.cm ²)	$\begin{array}{c} T_{np} \\ (\mu F.cm^{-2}.s^{n-1}) \end{array}$	n _{np}
		/		/	/

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Time (hr)	R _{int} (ohm.cm ²)	C_{int} (μ F.cm ⁻²)	R _{np} (ohm.cm ²)	T_{np} (μ F.cm ⁻² .s ⁿ⁻¹)	n _{np}	
		/	C Y		1	
		/		/	/	
		/			1	
NaCl % /						

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Time (hr)	R _p (ohm.cm ²)	T_{p} (μ F.cm ⁻² .s ⁿ⁻¹)	n _p	R _{ct} (ohm.cm ²)	T_{dl} (μ F.cm ⁻² .s ⁿ⁻¹)	n _{dl}
	C	1	/		/	/
			/			/
		/	1			/
	5	/	/			/
		/	/			/
		/	1			1
		/	1			1
		/	1			/
		/	1			/











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