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Corrosion Behaviour of Al-Mg-Si Alloy Matrix Hybrid Composite Reinforced with Cassava Peel Ash and Silicon Carbide

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Abstract : The prospect of improving the corrosion property of Al 6063 alloy based hybrid composites reinforced with cassava peel ash (CPA) and silicon carbide (SiC) is the target of this research. It seeks to determine the viability of using locally sourced material (CPA) as a complimentary reinforcement for SiC to produce low cost high performance aluminum matrix composite. The CPA was mixed with the SiC in the ratios 0:1, 1:3, 1:1, 3:1 and 1:0 for 8 wt % reinforcement in the produced composites by double stir-casting method. The microstructures of the composites were studied before and after corrosion using the scanning electron microscopy which reveals the matrix (dark region) and eutectic phase (lamellar region). The corrosion rate was studied in accordance with ASTM G59-97 (2014) using an AutoLab potentiostat (Versa STAT 400) with versaSTUDIO electrochemical software which analyses the results obtained. The result showed that Al 6063 alloy exhibited good corrosion resistance in 0.3M H_2SO_4 and 3.5 wt. % NaCl solutions with sample C containing the 25% wt CPA showing the highest resistance to corrosion with corrosion rate of 0.0046 mmpy as compared to the control sample which has a value of 13.233 mmpy. Sample B, D, E, and F also showed a corrosion rate of 3.9502, 2.6903, 2.1223, and 5.7344 mmpy which indicated a better corrosion rate than the control in the acidic environment. The corrosion rate in the saline medium shows that sample E with 75% wt CPA has the lowest corrosion rate of 0.0422 mmpy as compared to the control sample with 0.0873 mmpy corrosion rate.

Keywords : Al-Mg-Si alloy, AutoLab potentiostat, Cassava Peel Ash, CPA, hybrid composite, stir-cast method
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