Performance of GO/SiO₂, GO/TiO₂, and GO/ZrO₂ Nanocomposites Coatings as a Corrosion Barrier Layer on Al-Si-Cu-Mg Alloy in 3.5 % NaCl Solution

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The research target aimed to design of anodic oxide film layers on Al-Si-Cu-Mg alloy by modifying phosphoric acid anodizing and reinforcement by subsequent impregnation with graphene oxide (GO) nanosheets deposition effects (SiO₂, TiO₂ and ZrO₂). The corrosion inhibition efficiency on the anticorrosion behavior of the coating layer (GO/SiO₂, GO/TiO₂, and GO/ZrO₂) nanocomposites were deposited by electro-deposition in 3.5 % NaCl solution. Complementary electrochemical measurements including estimate of weight reduction, chronoamperometric current-time and potentiodynamic polarization techniques showing the ability of the improved oxide layer with GO/ZrO₂ were more successful in preventing corrosion, which acts as a self-cleaning coating with a novelty few-layer GO nanosheets with GO/ZrO₂. The surface morphology and elemental analysis of GO/SiO₂, GO/TiO₂ and GO/ZrO₂ nanocomposites coating were evaluated by SEM, EDS and mapping of elemental distribution.

Keywords: Al-Si-Cu-Mg Alloy, Anodic oxidation, Graphene oxide, Nanocomposites, Corrosion resistance.

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