The Role of Mixed Graphene/Carbon Nanotubes on the Coating Performance of G/CNTs/Epoxy Resin Nanocomposites.

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There is no doubt that, epoxy resin is one of the most important materials that has been widely used in coating technology. The present work is aimed to fabricate a new series of epoxy resin nanocomposites in the form of G/CNTs/EPY₁₋₄ using simple dissolution method and ultrasonic assistance. The expected nanocomposites have been fabricated using 10% loading of different mixed ratios from G/CNTs. Four different G/CNTs mixed ratios were used 20/80%, 40/60%, 60/40%, and 80/20%. The structure of the G/CNT/EPY₁₋₄ nanocomposites has been investigated and confirmed by normal characterization techniques including: X-ray diffraction (XRD), Fourier transforms infrared spectroscopy (FT-IR), Thermogravimetric analysis (TGA), Differential Thermal gravimetry (DTG) and field emission scanning electron microscopy (FE-SEM). T₂₅ and T₅₀ values for G/CNT/EPY₁₋₄ nanocomposites were slightly higher than elegant epoxy. R₅₀₀ values for the fabricated materials were in the range of 8.98 – 10.04 %. Furthermore, the role of mixed G/CNTs on the coating properties of epoxy resin was determined using electrochemical impedance and technique. The coating resistance of epoxy composites in the form of G/CNT/EPY₁₋₄ was larger than that observed for elegant epoxy coating. G/CNT/EPY₃ and G/CNT/EPY₁ showed highest and the lowest coating impedance values respectively. In addition to that, the water sorption technique has been used as a complementary method for such coating behaviour. The water uptake was efficiently decreased in all the formulations compared to the epoxy due to the presence of G/CNTs reinforcing agents.

Keywords: Epoxy resin, Mixed Graphene/Carbon nanotubes, Coating performance, Electrochemical impedance

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