ABSTRACT

The corrosion phenomenon in iron metal is the main problem that causes a decrease in mechanical strength and service life, as well as economic losses in the industrial sector. This study presents the development of a polymer-based composite eugenol with the crosslinker N,N'-methylenebisaacrylamide as well as the addition of reduced graphene oxide and nitrogen doped titanium dioxide as fillers in anticorrosion coatings. The eupolymer eugenol-N,N'-methylenbisaacrylamide (PE-MBA) is produced through the process of cationic addition polymerization, reduced graphene oxide (rGO) is obtained through the chemical reduction of graphene oxide through Hummer's method, and nitrogen doped titanium dioxide (N-doped TiO_2) is synthesized by the sol-gel method. PE-MBA/rGO (PG), PE-MBA/N-doped TiO_2 (PT), and PE-MBA/rGO/N-doped TiO_2 (PGT) composites were synthesized using the solution mixing method and applied to ferrous metals through a drop casting technique with a layer variation of 10, 15, and 20 layers. The performance of the anticorrosion coating was evaluated through potentiodynamic polarization testing which resulted in a corrosion protection efficiency of 65% on ferrous metals with 20 times PG3 plating. Ferrous metal with 15 times PT3 coating produces 100% protection efficiency. Iron metal with 20 times PG3T3 composite coating has a protection efficiency of 68% and shows the best performance based on SEM and XRD analysis. Hydrophilicity testing on PG, PT, and PGT composite coated metals has high hydrophobicity properties compared to iron metals without composite coatings.

Keywords*: Iron, PE-MBA, rGO, N-doped TiO_2, Composite, Anticorrosion*