

Abstract

Graphene Oxide (GO) is a promising 2D nanomaterial with exceptional properties for advanced coating applications, including corrosion resistance and tribological performance. This research investigates the synthesis of GO via an improved modified Hummer's method and its deposition onto metallic substrates through optimized Electrophoretic Deposition (EPD). GO was synthesized from graphite powder using KMnO_4 and H_2SO_4 , followed by controlled H_2O_2 addition and purification steps. Material characterization included AFM, SEM, and EDS. Results demonstrate successful GO synthesis with the formation of uniform, adherent coatings on stainless steel substrates. EDS analysis confirmed elemental composition with strong signals of carbon and oxygen, validating GO deposition. This methodology provides an accessible, cost-effective approach for producing functional GO coatings with potential applications in corrosion protection and tribological applications.