

**EFFECTIVE CORROSION BARRIER OF CINNAMON LEAF OIL
INCORPORATED POLYPYRROLE LAYERS FOR MILD STEEL**

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Mild steel, a type of steel commonly used in industry, is prone to corrosion under certain environmental conditions, which has limited its industrial applications, necessitating intensive study into corrosion prevention techniques. In recent years, conducting polymers and green corrosion inhibitors have been independently identified as corrosion inhibitors, and less consideration has been given over the past years on the combined effect of polymers and natural inhibitors. This study aimed to investigate the corrosion inhibition efficiency by cinnamon leaf oil embedded polypyrrole layers. The electrodeposition of polypyrrole on mild steel was employed using cyclic voltametric scans from -0.2 V to 1.0 V in oxalic acid medium and polymer-coated specimens were subsequently dipped in cinnamon leaf oil to incorporate into the polymer film. Under moderate acidic conditions of HCl medium, mass loss measurements of rectangular mild steel specimens embedded with cinnamon leaf oil, polypyrrole, and the combination of both over one-week period were obtained. The results revealed a superior corrosion inhibitory behaviour of the combined layer having the decreasing order of corrosion inhibition efficiency: polypyrrole and cinnamon leaf oil > polypyrrole > cinnamon leaf oil. Polarization resistance determined by electrochemical impedance spectroscopy, a more reliable method, further supports the strong corrosion inhibitory action of the combined layer on mild steel when compared to polypyrrole and cinnamon leaf oil alone. Open circuit potential measurements also indicate a lower corrosion rate when mild steel specimens are coated with the polymer and cinnamon leaf oil.

Keywords: Corrosion, Inhibition, Mild steel, Polarization resistance, Polypyrrole