

## Corrosion performances of polyaniline and poly(N-methylaniline) coated stainless steel by impedance spectroscopy

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Electrochemical depositions of polyaniline (PAni) and poly(N-methylaniline) (PNMA) coatings on 304 stainless steel (SS) electrodes were carried out potentiodynamically between  $-0.2$  V and  $1.1$  V vs SCE with a scan rate of  $20$  mV/s by using cyclic voltammetry technique from aqueous oxalic acid electrolyte solution. Properties of adhesive and electroactive PNMA coatings were successfully investigated using cyclic voltammetry technique. On the other hand, electrochemical impedance spectroscopy (EIS) was used to investigate long-term corrosion performance of PAni and PNMA coated electrodes separately in  $0.5$  M NaCl and  $0.5$  M HCl solutions. EIS measurement results showed that PAni and PNMA coatings improved the protection for SS in neutral and acidic corrosive solutions. Also, PAni and PNMA coatings were able to offer the protection to SS electrodes for longer immersion period in NaCl solution when compared to HCl. While PAni coating on steel was insufficient to prevent corrosion after 168 hours of immersion in NaCl, PNMA coating lost its protective properties after 240 hours.

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**Keywords:** Electrochemical synthesis, Polyaniline, Poly(N-methylaniline), Stainless steel, Impedance spectroscopy

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