

# Corrosion studies of PPy/Ni organic–inorganic hybrid bilayer coatings on commercial carbon steel

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## Abstract

Electrodeposition of polypyrrole (PPy) was achieved on AISI 1018 carbon steel (CS) using a constant potential regime and cyclic voltammetry techniques evaluating different synthesis parameters, in monomer-containing oxalic acid solutions. Thereafter, CS PPy/Ni bilayer films were produced by Ni deposition onto PPy films using a potentiostatic method. The electrochemical performance of PPy/Ni-coated carbon steel systems was investigated in 3.0 wt% NaCl solutions. For this purpose, scanning Kelvin probe (SKP), open-circuit potential ( $E_{ocp}$ ), polarization curves, and cyclic voltammetry techniques were used. The influence of electro-synthesis method and parameters were analyzed. It was found that the deviation in the Volta potentials is correlated to the interfacial interaction between the PPy/Ni bilayer coating and substrate. Considering both experimental methods to obtain PPy/Ni coatings, a more effective protection against corrosion can be formed when potentiodynamic (cyclic voltammetry) and potentiostatic techniques are combined. © 2014 Springer-Verlag Berlin Heidelberg

## Author keywords

Electrochemical measurements; Hybrid coatings; Ni-electrodeposition; Polypyrrole; Scanning Kelvin probe