

Characterization of Corrosion Protective and Mechanical Properties of Electrodeposited CoWP Coatings

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Amorphous Co containing films show potential properties as a coating material such as corrosion protective, hardness, and wear resistance. In this work, the characterization of corrosion protective and mechanical properties of electrodeposited CoWP coating was carried out and a comparison is made with chromium coatings which are widely used as coating material.

Electrochemical analyses were performed using a three-electrode cell. For voltammetry experiments, a glassy carbon electrode of geometrical area of 0.0707cm^2 was used as a working electrode. The electroplating of CoWP has been performed from a citrate bath containing CoSO_4 , Na_2WO_4 , and NaH_2PO_2 on plain carbon steel.

The electrochemical analyses suggest that the deposition occurs under mass transfer control and via an instantaneous nucleation. It is investigated that CoWP consists of 81% Co, 10% W, and 9% P by EDX analysis and it has an amorphous structure. CoWP coating shows nobler corrosion potential (-0.54V) than Cr (-0.60V). The hardness of CoWP increases with annealing temperature from 200 to 600°C .