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Short Communication

Prediction of Corrosion Rates of Ni-TiN composite coating using a Radial Basis Function Neural Network

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In this work a radial basis function (RBF) neural network was used for predicting the corrosion rate in Ni-TiN composite coatings that were deposited via pulse electrode deposition onto the surface of T8 steel. The surface morphology and phase composition of the coatings before and after corrosion were investigated by atomic force microscopy (AFM), scanning electron microscopy (SEM), and X-ray diffraction (XRD). The results show that the RBF neural network had a 3×4×1 structure. The maximum and minimum errors of this neural network were 2.28% and 0.04%, respectively. An optimum flat, fine, and compact microstructure was detected for Ni-TiN composite coatings manufactured with a TiN concentration of 9 g/L, a bath temperature of 45°C, and a current density of 0.6 A/dm^2. Ni-TiN composite coatings obtained by using the parameters mentioned in serial number 1 manifested the strongest corrosion with a corrosion potential as high as -0.925 V. Whereas, Ni-TiN composite coatings deposited using the parameters mentioned in Serial number 9, demonstrated the lowest corrosion rate, indicating an outstanding corrosion resistance.

Keywords: RBF neural network; Ni-TiN composite coating; Corrosion rate; Prediction

FULL TEXT