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Production and characterization of a composite deposit on steel Nickel-Alumina

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Abstract : The need for improving the coatings with better corrosion resistance has been developed by the use of composite electrodeposits, which consists on adding solid particles in the structure of nickel, such as aluminium oxide (Al). The objective of this research is the study of the resistance of nickelaluminacomposite coatings on steel substrates (black plate), obtained from electroplating bath, at different levels of Al concentrations. The characterization is made by tests of corrosion in two different electrolytic solutions 0,5M K and 0,5M NaCl, and physicochemical analyzes such as the X-rays diffraction (XRD) and scanning electron microscopy (SEM) with the microanalysis (EDAX). The electrochemical behavior of composite coatings in corrosive solutions was checked by methods of potentiodynamic polarization and electrochemical impedance spectroscopy (EIS). The various tests, carried out in theses conditions, revealed that the particles of Al added to the bath decrease the corrosion tendency of covered steels. They also determined the concentration of Al_2O_3 , added to the bath, which provided the optimal protection against corrosion.

Keywords : electrodeposition, Composite coating Ni-Al $2O_3$, Electrochemical impedance spectroscopy (EIS), Potentiodynamic polarization