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RSE-SEE

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Second Regional Symposium on Electrochemistry

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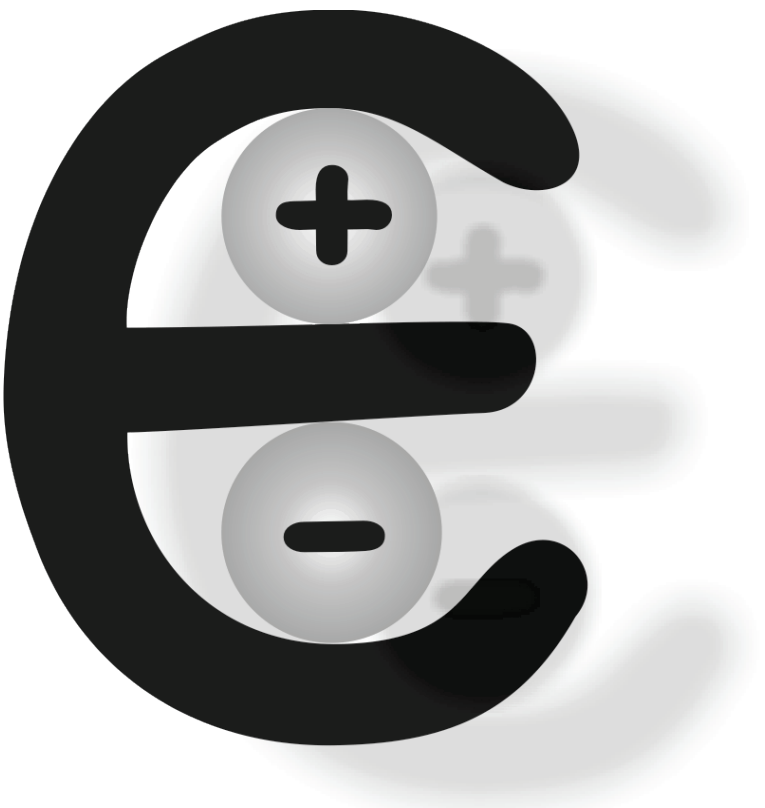

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CPA-P-05

The study of the iron phosphate coatings porosity in bufered borate solution

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The iron phosphate layers on the low carbon steel surface slows steel corrosion in aggressive environments. The quality of the iron phosphate layer depends on the fraction of the total surface area covered by phosphate coating. Various factors affect this coverage fraction, in particular the composition of the deposition bath, bath temperature and additives used in the electrolyte[1]. In this study phosphating was carried in the phosphate solution ($NaOH + H_3PO_4 + NaNO_2$, pH 3.8) at different temperatures (30-70^oC). The porosity of phosphate coatings on low carbon steel was determined using VAD technique[2] in the borate solution. Surface morphology of the steel was studied using SEM and AFM technique.

Anodic polarization showed that phosphate coatings formed on the steel surface resulted in the decrease of the steel dissolution rate. This effect of the phosphate coatings was more pronounced for coatings deposited at higher temperatures of phosphate solution. The decrease in the steel dissolution rate is caused by the decrease of coating porosity. The addition of $NaNO_2$ in the phosphate solution significantly decreased phosphate coating porosity. The lowest porosity of phosphate coating (35.1%), for deposition time of 5 min, was obtained with 1.0 g dm^{-3} $NaNO_2$ in the phosphate solution, at 50^oC.

The study of the phosphate coatings morphology showed that coating was evenly dispersed on the whole steel surface. There were two characteristic forms of phosphates present: laminated structure with needle-like forms. The average concentration of specific elements in the phosphate coatings were: oxygen 37.6%, phosphor 3.26% and iron 59.14%.

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2. H.A.Ponte, A.M.Maul, E.A.Alvarenga, *Materials Research*, **5** (2002) 439-446.

CPA-P-06

Analysis of corrosion parameters in conditioned water-steam cycle in the power plants

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One of the primary concerns of all power plants is to ensure that the high-purity water used for power generation is of sufficient quality to maintain plant chemistry parameters. Suppressed ion chromatography (SIC) is a fundamental technique for monitoring water quality with respect to corrosive ions. In this paper, we report a new ion chromatography (IC) method that utilizes the recent advances chromatographic methods for the determination of target ions at sub-to low-μg/L levels in power plant water samples which are causers and indicators of corrosion as well. In this method, the water sample is injected using the large-loop direct injection technique, the analyte ions are separated on an IonPac ion-exchange column using high-purity eluents and detected using the suppressed conductivity detection method. The performance of the new method was evaluated by analyzing water-steam samples from the power plant. It was shown that the SIC technique provides a suitable means for preventing possible corrosion damage to generating equipment in power plants.