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Effect of deposition time on properties of ZrO_2 coating prepared using electrolytic method

Abstract

AISI 440C martensitic stainless steel is one of the most widely studied engineering materials for its tribological properties. It is capable of attaining the best mechanical properties such as high strength and hardness compared to other martensitic grades. Unfortunately, the corrosion resistance of this 440C steel is the lowest among the stainless group, which results in the precipitation of carbide phases. AISI 440C were coated using electrolytic ZrO_2 layer deposition method in $ZrO(NO_3)_2$ aqueous solution. In order to preserve the high mechanical properties of this steel, various heat treatment processes applied to the coated samples. After drying and annealing, the ZrO_2 coated samples were evaluated using SEM, hardness tests and corrosion tests. Some mudcrack had been indicated in all samples. However, it become more homogeneously on the sample which undergoes longer deposition time. This difference resulted in a significant improved on corrosion resistance of ZrO_2 coated sample.

Keywords — 440 stainless steel, electrolytic coating, tafel extrapolation method.