



Production and study nanostructure trivalent chromium by pulse plating on steel substrate and study optimal conditions pulse plating

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Abstract

Plating on metal is widely used in industry and in household appliances and appliances. According to the plating method and the factors that affect a significant impact on the quality of coating, with the appropriate plating method and use of nanoparticles in the plating bath to a leak in the coating and find the optimal conditions to improve the quality and properties of the coating. Among these coating systems, trivalent Nano chromium coatings due to their environmental properties and high mechanical properties can be a suitable replacement for hard chrome coatings containing hexavalent chromium. In this study, electroplating process with pulse current was used for producing nano chromium coating from a bath containing trivalent chromium on the steel substrate. Then, we investigated the optimal conditions of pulse plating with Taguchi experimental design as well as the morphology of coating samples containing 5 g and 15 g of chromium nanoparticles in the coating. The results of DOE shows that the sample with a current density of 10A/dm², surface roughness (Ra) of 0.325 μm and plating time of 60 minutes has been selected as the optimum sample. With the percentage of chromium nanoparticles in the coating, nano-hardness increases.

Keywords: Chrome, Nano-coating, Trivalent chromium, Pulse plating, Experimental design.