**Abstract**

Corrosion and wear of materials are the two most important mechanisms of degradation in industries. Tribocorrosion is a term used to describe the material degradation due to the combination of electrochemical and tribological processes and contrary to the wide applications, is not very well known. In the other hand, electroless nickel-phosphorus coatings have been the subject of many researches due to their unique properties (high corrosion and wear resistance). The aim of this thesis is to study the tribocorrosion behavior and mechanism of the nickel-phosphorus electroless coatings. For this purpose, nickel-phosphorus coating with about ١٣ wt.% phosphorus was deposited on the AISI ١٠٤٥ steel substrate by the electroless process and after heat treatment at ٣٠٠-٦٠٠ °C for ١ hour, the corrosion and tribocorrosion behavior were investigated. The surface analysis of the polarized coatings in ٣,٥ wt.% NaCl solution showed that there is a difference between the type of passive layers in the as-plated and heat treated coatings. The surface film on as-plated coating was a phosphorus rich layer as a diffusion layer and it could inhibit the anodic dissolution of nickel. In comparison, the nickel oxide layer was formed on the annealed coatings. The cyclic polarization curve of as-plated coating included of a wider passive range than that of annealed coatings. The heat treated coating at ٤٠٠°C (HT٤٠٠) due to the many micro-cracks was very prone to the localized corrosion. In contrary, annealed coating at ٦٠٠°C (HT٦٠٠) did not show any localized corrosion effects. However it had a smaller passive potential range in comparison with as-plated coating. The tribocorrosion tests showed that the highest resistance was achieved for HT٦٠٠ coating because of higher corrosion resistance than that of HT٤٠٠ coating and higher wear resistance than that of as-plated coating. However, in the tribocorrosion conditions with on-off rubbing process, the minimum material loss belonged to the as-plated coating due to the lowest repassivation rate. In addition, the material loss due to the mechanical removal was predominant for all coatings and increase the current density in the presence of sliding could be negligible. For HT٤٠٠ coating, as a result of the brittle and cracked structure, the material loss due to the corrosive environment was several times higher than mechanical removal in the wear track.

**Keywords:** Tribocorrosion, Electroless Coating, Nickel, Heat treatment