ABSTRACT

The high strength, wear and corrosion resistance, and fine microscopic texture of the nickel-phosphorus alloy render it as a potential candidate for replacing the cadmium or hard chromium plating mostly employed in automotive, aerospace and printing industries. In this study, the pulse current was adopted to be the power source of the electroplating in the sulfamate bath. It can raise the phosphorus content in the deposition, improve the current efficiency of the process and reduce the deposition stress as well. The corrosion and wear characteristics of an electrodeposited Ni-P coating were studied using block-on-ring wear tester. The testing environments included dry wear and immersion wear in 5% NaCl water solution at 25°C and 50°C to simulate the corrosive atmosphere. The wear behaviors in friction coefficient, wear rate and surface roughness were discussed. Under the boundary lubrication circumstance, it is found that the wear mechanism originates from both adhesive and abrasive wear for dry contact to abrasive wear dominant situation for corrosion wear. The corrosion film formed at accelerated corrosion wear testing not only lowers the friction coefficient but also the wear rate.

Keywords: Ni-P coating; residual stress; corrosion wear; boundary lubrication; corrosion film.

[37]. 張仁威, "矽晶圓輪磨表面粗糙度預測模型之研究", 大葉大學機械工程研究所碩士論文, 2007年6月。