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Title: Antibacterial Characteristics of Electroless Plating Ni-P-TiO₂ Coatings

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Antibacterial Characteristics of Electroless Plating Ni-P-TiO₂ Coatings

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Abstract :

Electroless Ni-P coatings have been widely used in the chemical, mechanical and electronic industries due to their excellent corrosion and wear resistance. Many studies reported that the incorporation of nano-sized particles TiO₂ into Ni-P matrix greatly improved their anti-corrosion and anti-wear resistance. However no studies have been reported on their anti-bacterial property. In this paper, the Ni-P-TiO₂ nano-composite coatings were prepared on stainless steel 316L using electroless plating technique. The experimental results showed that the Ni-P-TiO₂ coatings reduced the adhesion of three bacterial strains (*P. fluorescens*, *Cobetia* and *Vibrio*) by up to 75% and 70% respectively, as compared with stainless steel and Ni-P coatings. The electron donor surface energy of the Ni-P-TiO₂ coatings increased significantly with increasing TiO₂ content after UV irradiation. The number of adhered bacteria decreased with increasing electron donor surface energy of the coatings.

Keywords: Ni-P-TiO₂; nano-composite coatings; surface energy; bacterial adhesion

1. Introduction

Electroless nickel–phosphorous (Ni–P) coatings have been widely used in the chemical, mechanical and electronic industries due to their excellent corrosion and wear resistance [1, 2]. In recent years, the incorporation of nano-sized particles within Ni-P matrix coatings greatly improved their properties and added entirely new

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