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Electrodeposition of a Ni-P-Ti₃C₂T_x/MoS₂ coating incorporating MoS₂ intercalated Ti₃C₂T_x particles

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Abstract: As a promising material, Ti₃C₂T_x has received much attention in recent years for brilliant performances in conductivity and lubricity. In order to modify the property of Ti₃C₂T_x, MoS₂ intercalated Ti₃C₂T_x (Ti₃C₂T_x/MoS₂) powders are made from hydrothermal reaction, which can prohibit oxidization for MoS₂ particles. Ni-P-Ti₃C₂T_x/MoS₂ and Ni-P-Ti₃C₂T_x composite coatings are prepared by electroplating technique with addition of Ti₃C₂T_x/MoS₂ and Ti₃C₂T_x particles, respectively. Compared to Ni-P composite coatings, Ni-P-Ti₃C₂T_x/MoS₂ and Ni-P-Ti₃C₂T_x composite coatings show a decrease in coefficient of friction (COF). The wear loss of Ni-P-Ti₃C₂T_x/MoS₂ composite coating is only about 0.10 mg after 5 min, under dry-grinding with the load of 2 N and circle radius of 1cm. It is worth to mention that the microhardness of the two composite coatings gets improved much, which can be up to 1200 kg mm⁻². Even though the surface roughness of Ni-P-Ti₃C₂T_x/MoS₂ composite coating increases, the surface of the composite coating is converted from hydrophilic to hydrophobic.

Keywords: Ti₃C₂T_x/MoS₂ powder; Ni-P-Ti₃C₂T_x/MoS₂ composite coating; Ni-P-Ti₃C₂T_x composite coating; microhardness; tribological property

1. Introduction

Electroplating technology is well established on the surface treatment at present, which has been studied in many papers [1-9]. In addition, Ni-P composite coating is widely used to overcome many tricky problems encountered with in industrial process [10-12]. However, pure Ni-P composite coating is difficult to satisfy all the

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