Investigating the Effects of the current density on the properties of Ni-P-La₂O₃ composite coatings

Qingdong Lv¹, Xiuqing Fu^{1,2,*}, Xinxin Chen¹, Jinran Lin¹, and Hongbing Cao¹

¹ College of Engineering, Nanjing Agricultural University, Nanjing 210031, China;

² Key laboratory of Intelligence Agricultural Equipment of Jiangsu Province, Nanjing 210031, China

*E-mail: fuxiuqing@njau.edu.cn

doi: 10.20964/2020.11.76

Received: 6 August 2020 / Accepted: 12 September 2020 / Published: 30 September 2020

In the present study, the jet electrodeposition technique is applied to improve the wear resistance, electrochemical corrosion resistance and surface hardness of 45# steel. In order to prepare a certain concentration of La₂O₃ particles in the plating solution, properties of Ni-P-La₂O₃ composite coating are investigated by changing the current density from 16 A/dm² to 48 A/dm². After the experiment, physical characteristics of the workpiece, including the surface morphology, chemical composition, hardness and electrochemical corrosion resistance of the composite are analyzed by SEM, EDS and microhardness measuring instruments. Obtained results show that the best performance of the composite coating can be achieved for the current density of 32 A/dm². In this case, the hardness is 822.83HV_{0.1} and the corresponding minimum and maximum self-etching current densities are 5.61E-7 A·cm² and 1.46E-5 A·cm², respectively.

Keywords: Jet electrodeposition; Current density; La₂O₃ particles; Ni-P-La₂O₃ composite coating

[FULL TEXT](#)

© 2020 The Authors. Published by ESG (www.electrochemsci.org). This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution license (<http://creativecommons.org/licenses/by/4.0/>).