Short Communication

Study on Characteristics and Microstructure of Ni-AlN Thin Coatings Prepared via Different Electrodeposition Techniques

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In this work, pulse-current (PC), direct-current (DC), and deposition of ultrasonic-assisted pulse-current (UAPC) were used to produce Ni-AlN thin coatings. X-ray diffractometer (XRD), scanning electron microscopy (SEM), scanning probe microscopy (SPM), Vickers hardness assessment, as well as electrochemical station were used to examine the microhardness, microstructure, and erosion properties of Ni-AlN thin coatings. The coatings based on Ni-AlN, generated using UAPC deposition had a fine compact morphological property. The respective mean grain sizes of the particles of Ni and AlN were about 97.4 and 40.1 nm, according to the SPM data. The thin coatings comprise Ni and AlN phases, according to the XRD data. The thin coatings of Ni-AlN produced using PC, DC and UAPC deposition techniques, respectively, demonstrated optimum microhardness values of 939, 902, and 986 HV when the current density was 4.5 A/dm². When compared to the corrosion resistance of the coatings obtained through UAPC deposition with the other two types of thin coatings, the results showed that the coatings obtained through UAPC deposition manifested the highest value of corrosion resistance.

Keywords: Electrodeposition; microstructure; Ni-AlN thin coating; corrosion

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