

## **Microstructure and Wear Properties of Pulsed Electrodeposited Ni-WC Nano Composite Coatings**

Ni–WC composite coatings were developed by pulsed electrodeposition method from a nickel watts bath containing WC particles, and some additives. The influences of WC concentration and additives namely sodium saccharine and sodium dodecyl sulfate (SDS), on the codeposition behavior of WC particles, coatings texture as well as micro hardness and wear resistance were studied. Surface morphology, microstructure and texture of Ni–WC coatings were examined by means of scanning electron microscopy and X-ray diffraction, and also the wear and friction characteristics of the coatings were assessed by custom-made pin-on-disk friction and wear test machine. The crystal orientation of Ni-WC composite coatings was transformed from crystal face (200) to (111), as WC concentration increased, compared with pure Ni coatings, which influenced the hardness and subsequent wear resistance of coatings. Introduction of Saccharine to plating bath, led to decrease the WC concentration and intensify (111) texture, while SDS addition increase coatings WC content and impoverish (111) orientation. In addition, both WC and Saccharine deeply affected the Ni matrix grain size. All in all, wear resistance of Ni-WC composite coatings is affected by parameters such as WC incorporation and Ni matrix grain size, as well as texture.

Keywords: Electroplating, nano Composite coatings, SDS, Saccharine, Wear