Effects of SiC Particle Concentration on the Ultrasonic-Assisted Jet Electrodeposited Ni-SiC Nanocoatings

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We demonstrate here the use of ultrasonic-assisted jet electrodeposition to prepare abrasive resistant coatings of Ni-SiC on Q235 steel substrate surface. We show that SiC nanoparticle concentration has a profound effect on the morphology and performance of deposited Ni-SiC nanocoatings. We perform a series of physico-chemical characterizations to reveal their structure and morphology to better optimize their abrasion resistance. We show that the SiC contents in the coatings increased first and then decreased as the SiC concentration increased. The ultrasonic-assisted jet deposited Ni-SiC nanocoatings at 7 g/L showed fine grains, smooth and compact microstructure surface, maximum composite amount of SiC nanoparticles, uniform distribution, and no obvious agglomeration. These features results in coatings which possess high microhardness, corrosion resistance and abrasive resistance at the same time.

Keywords: ultrasonic-assisted jet electrodeposition; Ni-SiC nanocoatings; SiC concentration; abrasive resistance; corrosion resistance

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