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Influence of electrode distance on microstructure and corrosion resistance of Ni-Cr alloyed coating deposited by double glow plasma surface metallurgy

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In this paper, in order to improve the corrosion resistance of Q235 carbon steel, Ni-Cr alloyed coatings were deposited by double glow plasma surface metallurgy (DG-PSM) at different electrode distance. The results indicated that the Ni-Cr alloyed coatings with gradient distributed composition were dense and well bonded with substrate. The main phase of the coatings was Ni2.9Cr0.7Fe0.36. With the increasing of electrode distance, the thickness of Ni-Cr alloyed layer increased first and then decreased. The electrochemical studies showed that the Ni-Cr alloyed coating exhibited a more effective corrosion resistance against the 3.5% NaCl corrosive solution due to its compact microstructure and high potential phase. In the electrochemical impedance spectroscopy (EIS) examinations, the Ni-Cr alloyed coating deposited at 15 mm electrode distance represented the best corrosion resistance compared to the uncoated Q235 carbon steel and the coatings deposited at other electrode distances.

Keywords
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