Simple Fabrication of Superhydrophobic Nickel Surface on Steel Substrate via Electrodeposition

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doi: 10.20964/2017.01.15

Received: 23 September 2016 / Accepted: 9 November 2016 / Published: 12 December 2016

Preparation of artificial superhydrophobic surfaces are in urgent demand in a specific domain. In the study, we obtained superhydrophobic nickel surface on steel substrates via electrodeposition nickel process and stearic acid modification, which are facile, time-saving and eco-friendly. The surface wettability, morphologies and chemical composition were analyzed by contact angle measurement, scanning electron microscope and Fourier transform infrared spectrometry. The results indicated that the $-CH_2-$ and $-CH_3$ groups of low surface energy were introduced into rough surface by modification with stearic acid, the rough surface was modified from superhydrophilic to superhydrophobic. When electrodeposition current density was 60 A/dm^2 , the as-prepared nickel surface showed excellent superhydrophobicity with a contact angle of 154.4° and a sliding angle of about 2.0° , and possessed micro-nano rough structures. Besides, the superhydrophobic nickel surface also had a good anti-corrosion performance. It is believed that the presented approach should have a prosperous future in industrial applications for the superhydrophobic surface fabrication on steel substrates.

Keywords: superhydrophobic; steel; electrodeposition; modification; anti-corrosion

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