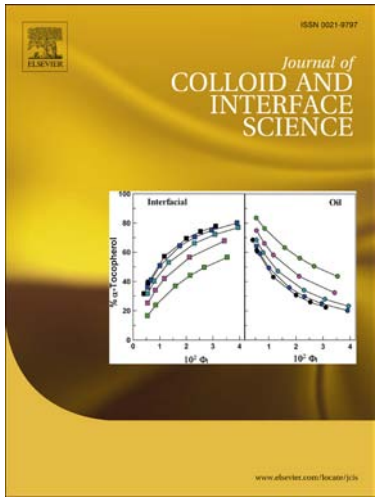

Nano-micro structured superhydrophobic zinc coating on steel for prevention of corrosion and ice adhesion

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Nano-micro structured superhydrophobic zinc coating on steel for prevention of corrosion and ice adhesion.

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Abstract

Thin films of zinc have been deposited on steel substrates by electrodeposition process and further functionalized with ultra-thin films of commercial silicone rubber, in order to obtain superhydrophobic properties. Morphological feature, by scanning electron microscope (SEM), shows that the electrodeposited zinc films are composed of micro-nano rough patterns. Furthermore, chemical compositions of these films have been analyzed by x-ray diffraction (XRD) and infra-red (IRRAS). An optimum electrodeposition condition, based on electrical potential and deposition time, has been obtained which provides superhydrophobic properties with a water contact angle of 155 ± 1^{o}. The corrosion resistance properties, in artificial seawater, of the superhydrophobic zinc coated steel are found to be superior to bare steel. Similarly, the measured ice adhesion strength on superhydrophobic surfaces, using the centrifugal adhesion test (CAT), is found to be 6.3 times lower as compared to bare steel. This coating has