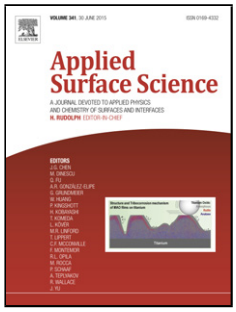

Title: Facile Fabrication of Iron-based Superhydrophobic Surfaces via Electric Corrosion without Bath

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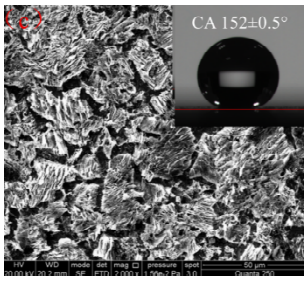
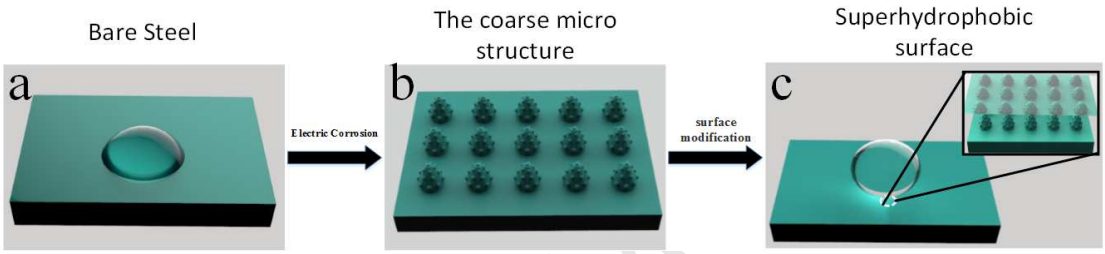
Graphical Abstract

Abstract: Superhydrophobic surface is of wide application in the field of catalysis, lubrication, waterproof, biomedical materials, etc. The superhydrophobic surface based on hard metal is worth further study due to advantages of high strength and wear resistance. This paper investigates the fabrication techniques towards superhydrophobic surface on carbon steel substrate via electric corrosion and studys on the properties of as-prepared superhydrophobic surface. The hydrophobic properties were characterized by a water sliding angle (SA) and a water contact angle (CA) measured by the Surface tension instrument. A Scanning electron microscope was used to analyze the structure of the corrosion surface. The surface compositions were characterized by an Energy Dispersive Spectrum. The Electrochemical workstation was used to measure its anti-corrosion property. The anti-icing performance was characterized by a steam-freezing test in Environmental testing chamber. The SiC sandpaper and 500g weight were used to test the friction property. The research result shows that the superhydrophobic surface can be successfully fabricated by electrocorrosion on carbon steel substrate under appropriate process; the contact angle of the as-prepared superhydrophobic surface can be up to 152 ±0.5°, the sliding angle is 1-2°; its anti-corrosion property, anti-icing performance and the friction property all show excellent level. This method provides the possibility of industrialization of superhydrophobic surface based on iron substrate as it can prepare massive superhydrophobic surface quickly.





Keywords: superhydrophobic; electric corrosion; hard metal; the contact angle; corrosion resistance