Electrodeposition of Superhydrphobic Surfaces and its Corrosion Resistance

Tengfei Xiang [a], Shihong Zhang [a]

a Key Laboratory of Green Fabrication and Surface Technology of Advanced Metal Materials (Ministry of Education), Research Center of Modern Surface and Interface Engineering, Anhui University of Technology, Ma'anshan 243002, China

Abstract: Superhydrophobic surfaces have attracted lots attentions of researchers due to their excellent water repellency, and are widely used in the fields such as anti-corrosion, anti-icing, anti-fouling, and self-cleaning. Herein, the authors used simple electrodeposition method to construct a series of superhydrophobic coatings on the surface of low-carbon steel, such as nickel (Ni), zinc nickel alloy (Zn Ni), porous zinc nickel cobalt (Zn Ni Co), multi-layer Ni/Cr, and other superhydrophobic surfaces. The porous nickel coating was also constructed by one step using the hydrogen bubble template method. The authors utilized electrodeposition technology to achieve a controllable construction of superhydrophobic coatings from one to multiple elements, from single to multiple layers. The influence of current density on the microstructure and wettability of the coatings was systematically investigated, and the relationship between microstructure and wettability was clarified. The corrosion resistance and long-term protection performance of superhydrophobic coatings were studied, and the anti-corrosion mechanism of superhydrophobic coatings was ultimately revealed.

Keywords: Superhydrophobic Surface, Electrodeposition, Wettability, Corrosion Resistance