Biomimetic one step fabrication of manganese stearate superhydrophobic surface as an efficient barrier against marine corrosion and *Chlorella vulgaris*-induced biofouling

Binbin Zhang, Jiarun Li, Xia Zhao, Xiuhua Hu, Lihui Yang, Ning Wang, Yantao Li, Baorong Hou

PII: S1385-8947(16)31008-7
DOI: http://dx.doi.org/10.1016/j.cej.2016.07.062
Reference: CEJ 15511

To appear in: *Chemical Engineering Journal*

Received Date: 7 June 2016
Revised Date: 14 July 2016
Accepted Date: 15 July 2016

Please cite this article as: B. Zhang, J. Li, X. Zhao, X. Hu, L. Yang, N. Wang, Y. Li, B. Hou, Biomimetic one step fabrication of manganese stearate superhydrophobic surface as an efficient barrier against marine corrosion and *Chlorella vulgaris*-induced biofouling, *Chemical Engineering Journal* (2016), doi: http://dx.doi.org/10.1016/j.cej.2016.07.062

Biomimetic one step fabrication of manganese stearate superhydrophobic surface as an efficient barrier against marine corrosion and *Chlorella vulgaris*-induced biofouling

Binbin Zhang [a, b, *], Jiarun Li [a, b], Xia Zhao [a], Xiuhua Hu [c], Lihui Yang [a], Ning Wang [a, b], Yantao Li [a, *], Baorong Hou [a, *]

[a] *Key Laboratory of Marine Environmental Corrosion and Bio-fouling, Institute of Oceanology, Chinese Academy of Sciences, Qingdao 266071, P. R. China*
[b] *University of Chinese Academy of Sciences, Beijing 100049, P. R. China*
[c] *School of Materials Science and Engineering, Jiangsu University of Science and Technology, Zhenjiang 212003, P. R. China*

Corresponding Authors and E-mails:
zhangbinbin11@mails.ucas.ac.cn (Dr. Zhang)
ytli@qdio.ac.cn (Dr. Li), brhou@qdio.ac.cn (Dr. Hou)

Abstract

Marine corrosion and biofouling on metallic materials are sticky problems. Herein, we prepared hierarchical structured superhydrophobic (SHPB) surfaces *via* a versatile one step electrodeposition approach. The synthetic SHPB surface was employed as an efficient barrier against corrosion and *Chlorella vulgaris*-induced biofouling. The surface morphology and chemical compositions were analyzed using scanning electron microscopy (SEM), atomic force microscopy (AFM), X-ray photoelectron spectroscopy (XPS), Fourier transform infrared spectrophotometer (FTIR) and Energy-dispersive spectrum (EDS). Electrochemical impedance spectroscopy (EIS), potentiodynamic polarization and immersion test in *Chlorella vulgaris*-inoculated culture medium were carried out to evaluate the anti-corrosion and anti-biofouling performance of the obtained SHPB surface. The results demonstrated that the synthetic SHPB surface exhibits great enhanced corrosion resistance and biofouling mitigation. Moreover, the as-fabricated SHPB surfaces retain superhydrophobicity in wicked environment such as strong acid and alkali conditions, showing good chemical stability. We believe that the SHPB surfaces over metallic substrates provide a potential and worthful strategy for marine corrosion and biofouling.

Keywords: Superhydrophobic surface; Marine corrosion; Biofouling; Electrodeposition

1. Introduction

Marine environmental corrosion and bio-fouling are sticky problems, which have great influences for social development, particularly for aviation, military/commercial