

Xiaoyan He, Xinkun Suo, Xiuqin Bai, Chengqing Yuan, Hua Li

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Functionalizing aluminum substrata by quaternary ammonium for antifouling performances

Xiaoyan He ^{a,b,&}, Xinkun Suo ^b, Xiuqin Bai ^a, Chengqing Yuan ^a, Hua Li ^{b,&}

^a Key Laboratory of Marine Power Engineering & Technology (Ministry of Transport),

Wuhan University of Technology, Wuhan 430063, China

^b Key Laboratory of Marine Materials and Related Technologies, Zhejiang Key Laboratory of Marine Materials and Protective Technologies, Ningbo Institute of Materials Technology and Engineering, Chinese Academy of Sciences, Ningbo 315201, China

& Corresponding authors.

E-mail addresses: hexiaoyan@whut.edu.cn (X. He), lihua@nimte.ac.cn (H. Li).

ABSTRACT

Due to the great loss induced by biofouling, developing new strategies for combating biofouling has attracted extensive attention. Quaternary ammonium salts are potent cationic antimicrobials used in consumer products and their use for surface immobilization could create a contact-active antimicrobial layer. Here we report the facile preparation of a contact-active antifouling coating by tethering polyethyleneimine (PEI) onto flat/nanostructured aluminum surface by hydrogen bonding between PEI and AlOOH. Quaternized PEI (QPEI) is obtained through quaternization reactions. Biofouling testing suggests excellent antifouling performances of the samples by declining the adhesion of 95% *Phaeodactylum tricornutum* and 98% of *Chlorella pyrenoidosa*. The antifouling properties of PEI/QPEI are attributed predominately to their hydrophilic and antimicrobial nature. The technical route of PEI/QPEI surface grafting shows great potential for modifying marine infrastructures for enhanced antifouling performances.

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