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Jian Li, Mengke Cui, Haifeng Tian, Yanxia Wu, Fei Zha, Hua Feng, Xiaohua Tang

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Facile fabrication of anti-corrosive superhydrophobic diatomite coatings for removal oil from harsh environments

Jian Li *, Mengke Cui, Haifeng Tian, Yanxia Wu, Fei Zha, Hua Feng, Xiaohua Tang

Key Laboratory of Eco-Environment-Related Polymer Materials, Ministry of Education of China, College of Chemistry and Chemical Engineering, Northwest Normal University, Lanzhou 730070, China

Abstract

The separation of oil/water mixtures under acidic, alkaline and salty conditions remains a great challenge. Facile, low-cost and easily scale-up processes for the fabrication functional materials to effective oil/water separation under harsh environment are urgently desired. Herein, a superhydrophobic diatomite coating was successfully fabricated by a facile one-step spray-coating process for the gravity driven separation of oil/water mixtures in strong acidic, alkaline and salty environments. In addition, the as-prepared superhydrophobic diatomite-coated meshes can separate a series of oil/ water mixtures with separation efficiency up to 99.8 %. Moreover, the as-prepared coated mesh still maintained a separation efficiency exceeding 99.5 % and stable recyclability after 40 separation cycles. Meanwhile, the electrochemical corrosion test results indicated that the superhydrophobic coating maintained excellent chemical stability and corrosion resistant effect in 3.5 wt% NaCl solutions. Therefore, our work provides a facile method to fabricate the superhydrophobic diatomite coatings with outstanding anti-corrosive property that can be used for removal oils from harsh environment.

Keywords: Diatomite; Superhydrophobic coatings; Oil/water separation;

* Corresponding author. Tel.: +86 931 7971533; fax: +86 931 7971989.
E-mail address: jianli83@126.com; lijian@nwnu.edu.cn (J. Li).

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