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Lei Niu, Zhixin Kang

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Spray Deposition Process to Fabricate Cu₂O Superhydrophobic Surfaces on Brass Mesh for Efficient Oil-water Separation

Lei Niu, Zhixin Kang*

Guangdong Key Laboratory for Advanced Metallic Materials Processing, School of Mechanical and Automotive Engineering, South China University of Technology, 381 Wushan, Guangzhou 510640, China

Corresponding author. Tel: + 86 20 87111116; Fax: + 86 20 87112111

E-mail address: zxxkang@scut.edu.cn

Abstract

Cu₂O coated meshes with “coral reef-like” micro/nanostructures have been successfully fabricated via a facile spray-and-dry method, without using low surface energy materials. The obtained Cu₂O coated superhydrophobic surface, which is similar to the “lotus leaf” structure, had a contact angle of 159.6 ° and a sliding angle of 1 °. Based on the design of a miniature apparatus, the superhydrophobic mesh can separate different kinds of oils regardless of the light oil or heavy oil in the mixture with excellent separation efficiency. It is expected that this convenient technique may open a novel approach in future development of superhydrophobic coating technology.

Keywords: Surfaces; Microstructure; Cu₂O; Spray Deposition; Superhydrophobicity; Oil-water Separation

1. Introduction

With the development of economy, humans confront increasing troubles about industrial sewage discharge and crude oil leakage accidents. Hence, an effective method of separating oily water is becoming a hotspot in the research field [1]. Inspired by the lotus leaf’s lipophilic-hydrophobic properties, novel materials with special wettability have been considered as one of the promising methods to effectively remove the oil from water [2]. Meanwhile, brass has stimulated great interest in electronic and marine industries owing to its high thermal, electrical conductivities, and mechanical work-ability [3]. Nevertheless, with the progress of society, the traditional brass needs to be “multifunctional” and more “intelligent”. To date, researchers are trying their

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