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Superhydrophilicity and underwater superoleophobicity graphene oxide-micro crystalline cellulose complex-based mesh applied for efficient oil/water separation

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ABSTRACT

With the aggravation of the pollution in our environment, the novel interface materials have gained more and more attention. In this work, we reported an approach to prepare graphene oxide-microcrystalline cellulose complex-based mesh with superhydrophilicity and underwater superoleophobicity. Hydrophilic groups were grafted to enhance the superhydrophilicity and improve the superoleophobicity at the same time. The modified mesh exhibited under water superoleophobicity with oil contact angle more than 150°, while water can quickly permeate the wire mesh surface with a contact angle value of 0°. In the process of oil/water separation tests, water molecules permeate the wire mesh under the force of gravity, and the oil was retained on the mesh. Thus, the oil/water mixtures with different proportions can be separated in a high efficiency up to 99.1%. In addition, our superhydrophilic meshes are robust in harsh water conditions and can be used as an efficient filtration membrane. And our superhydrophilic meshes still have high efficiency separation in poor conditions, such as alkaline,acidic or saline solutions. Thus, this modified mesh could be an ideal choice for practical oil/water separation which can satisfy the need for water body restoration.

Keywords: Superhydrophilicity; Underwater superoleophobicity; Graphene oxide; Microcrystalline cellulose; Oil/water separation

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