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Effect of Titanium Dioxide in Superhydrophobic Coating Using Expanded Polystyrene Foam and Palm Slag

Abstract

A simple solvent casting method was proposed to prepare a superhydrophobic expanded polystyrene (EPS)/stearic acid modified palm slag (SA-PS)/titanium dioxide (TiO2) coating with excellent water contact angle. The influence of components, such as mass ratio of palm slag to TiO2 as well as the influence of TiO2 on the morphology and wettability of coating, was evaluated. The morphology, tear behavior, surface roughness, and water contact angle were observed by scanning electron microscopy (SEM), scratch tester, 3D profilometer, and ImageJ software, respectively. The results displayed that the superhydrophobic coating exhibited highest WCA of 151.93° under the optimum condition formula. Additionally, the superhydrophobic EPS/SA-PS/TiO2 showed non-wetting ability. Thus, the existence of a micro/nano-hierarchical structure of superhydrophobic EPS/SA-PS/TiO2 may provide potential practical applications that are useful in many industries such as automotive or shipping.

Keywords

Expanded polystyrene foam; Palm slag; Superhydrophobic coating; Titanium dioxide; Water contact angle