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Abstract

Superhydrophobic surfaces with excellent abrasion resistance were obtained by the spraying method using benzoxazine/mesoporous SiO_2. Based on microstructural and nanostructural materials with low surface energy, the surfaces formed when the mesoporous SiO_2 content reached more than 15%. Relying on the re-entrant features of bulk materials, the self-similar structure of additive and an "organic-inorganic" interpenetrating network, the superhydrophobicity property was maintained after over 400 cm of abrasion at 1.6 kPa, which surpassed that of benzoxazine/nano SiO_2 system. The findings concerning mesoporous particles and benzoxazines are conducive to future development of robust superhydrophobic coating technology.

Keywords: superhydrophobic; benzoxazine; abrasion resistance; surfaces; organic-inorganic interpenetrating networks; microstructure

1. Introduction

Superhydrophobic surfaces have attracted considerable attention recently because of numerous practical applications, such as self-cleaning, metal refining and adhesion prevention [1-3]. In general, the superhydrophobic surfaces can be achieved by a combination of low surface energy and morphological structures [4, 5]. However, most superhydrophobic surfaces are vulnerable to mechanical damages because fragile micro-/nano-hierarchical structures are easily destroyable even after finger touch [6]. The robustness of superhydrophobic surfaces has been enhanced by