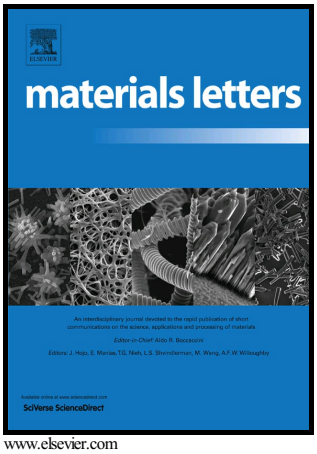

Novel Wettability of Cu_3SnS_4 (CTS) Surface for Superamphiphilic or Hydrophobicity-Superlipophilic

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Novel Wettability of Cu_3SnS_4 (CTS) Surface for Superamphiphilic or Hydrophobicity-Superlipophilic

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Abstract:

Novel surface wettability of superamphiphilic or hydrophobicity-superlipophilic has been firstly realized on I-IV-VI p-type ternary Cu_3SnS_4 (CTS) thin films, which were deposited on glass substrates by simple spin-coating method using nontoxic chemicals. The surface wettability varied with the annealing temperature, and showed superamphiphilic with contact angle of $< 1^o$ under 500^oC treatment. Being modified with stearic acid, the surface turned hydrophobicity (contact angle of 109 ± 2^o) but superlipophilicity (contact angle of $< 1^o$), which means a change of surface wettablity, and the surface can recover to its initial superamphiphilic state once remove the modification. The surface wettability could be mainly ascribed to character of material and surface microstructure. Such surface wettability of CTS is promising in designing new technologies to novel applications in moisture or in dusty environment, and can also be expected in assisting water-oil separation in future researches.

Keywords: ternary compound; novel surface wettability

1. Introduction

Inspired by the amazing superhydrophobic behaviors of natural lotus leaves and other such objects, researches on surface wettability have attracted great interest for their potential applications [1,2] in self-cleaning, anti-fouling, anti-fogging, corrosion protection, drag reduction, microfluidic devices and intelligent membranes. To achieve a satisfactory surface wettability, methods of constructing material components, designing surface micro/nano-structures or regulating the surface energy have been developed to fabricate the films [3]. In research fields of photovoltaic and catalysis, higher light-harvesting efficiency and larger photoactive contact area are key factors that affect the conversion efficiency, especially in the complicated application conditions or environments for the devices and the photocatalyst. Thus, to meet the demand of deeper practical application, it is essential for light-sensitive layer to have a satisfied surface wettability in special circumstances, such as moisture,