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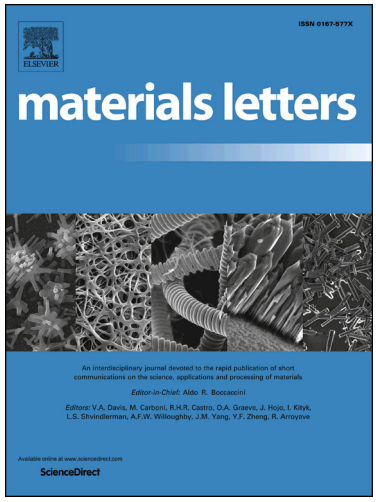

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Self-similar arrays of carbon nanotubes and nonwoven fibers with tunable surface wettability

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Abstract

Self-similar materials can assist in the transition of hydrophobic to hydrophilic state in a well-controlled manner. Herein, we report an ensemble of carboxylic functionalized carbon nanotubes (CNTs) decorated on the self-similar nonwoven surface using a facile, scalable and inexpensive vacuum filtration process for tunable surface wettability. Increasing the amount of CNTs combined with the vacuum assisted nonwoven material reduced the apparent equilibrium contact angle systematically. A simple analytical model has been proposed to predict the apparent equilibrium contact angle by formulating a direct relationship with the structural parameters of CNTs and nonwoven materials. In general, a satisfactory agreement was observed between the theoretical and experimental apparent equilibrium contact angle of CNT decorated nonwoven materials.

Keywords: carbon nanotubes; surfaces; nonwoven; self-similar; wettability; contact angle

Introduction

Self-similar materials are attractive candidates for facilitating the surface wettability in a well-controlled manner. Using self-similar approach, the wetting states of carbon nanotubes (CNTs) can diversify the existing range of applications [1-4]. For an ensemble of CNTs, the protuberances are created by the defined regions covered by overlapping nanotubes such that the liquid either follows or suspends on the topmost part of protuberances resulting

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