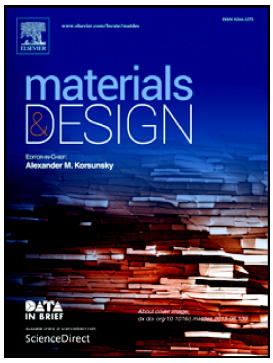

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Robust Electrical Uni-directional De-icing Surface with Liquid Metal ($Ga_{90}In_{10}$) and ZnO Nano-Petal Composite Coatings

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Abstract: A novel superhydrophobic electro-conductive coating with liquid metal ($Ga_{90}In_{10}$) and ZnO nano-petals is fabricated by integrating the methods of spraying, crystal growth and low surface energy modification. The results indicate that the paper-based surface could be superhydrophobic in cold environment and successfully realize uni-directional ice driving with the help of thermal gradient. We anticipate that the combination of excellent superhydrophobic performance of the composite structure with inherent conductive advantage of liquid metal will find a vast application prospect.

Keywords: de-icing, liquid metal, superhydrophobic, electrothermal effect.

1. Introduction

In recent years, extraordinary superhydrophobic material with multilevel topography has received a keen attention for its commercial potentials related to anti-fogging [1, 2] and anti-icing coatings [3-5]. However, in cold environment, water freeze and ice accumulation at the interface often cause many potential damages to the micro-/nanostructure of the superhydrophobic surfaces and shorten the service life of devices [6-8]. Especially on the rigid surfaces, continuous impact of supercooled droplets or icing/de-icing cycle may cause equipment performances failure [9, 10]. Great efforts have been made to develop anti-icing