High Performance Electrospinning Fiberous Membranes for Infrared Stealth Camouflage

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Abstract

Fibrous membranes of polyamide 6 (PA6) modified with Al nanoparticles and 0.5 wt % of multiwall carbon nanotubes (named as *x*Al/MWNTs/PA6, *x* is the weight percentage of Al content), are prepared by electrospinning. As a comparison, membranes of PA6 modified with Al nanoparticle only (referred to as *x*Al/PA6) are also prepared. The infrared emissivity and stress-strain behavior of the fibrous membranes are characterized. For *x*Al/MWNTs/PA6 fibrous membranes, the infrared emissivity firstly decreases with the Al content increases, reaches a minimum of 0.69 for 0.3Al/MWNTs/PA6, and then increases further. For Al/PA6 fibrous membranes, the infrared emissivity decrease monotonically with the Al content, and the same minimum value of 0.69 is obtained for 0.5Al/PA6. Stress-strain behavior reveals that for 0.3Al/MWNTs/PA6 and 0.5Al/PA6 fibrous membranes with the same infrared emissivity, the ultimate tensile strength and fracture strain of the former is about twice of that of the later. Microstructure observation demonstrates clustering of Al nanoparticles for *x*Al/MWNTs/PA6 with $x>30$ wt %. It is revealed that when $x \leq 30$ wt %

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