Growth of carbon nanotubes on carbon fibres and the tensile properties of resulting carbon fibre reinforced polypropylene composites

ABSTRACT

Carbon nanotubes were grown directly on carbon fibres using the chemical vapor deposition technique. The effects of reaction temperature (800-900°C) and hydrogen gas flowrate (100-300 ml/min) on the morphology of the carbon nanotube coating were investigated. Carbon nanotubes produced were characterized using scanning electron microscope and transmission electron microscope. The resulting fibres were compounded with polypropylene to produce carbon fibre reinforced polypropylene composites. The tensile properties of these composites were determined to investigate the effects of the carbon nanotubes on the overall performance of the composites. The optimum treatment condition that produced the thickest coating of carbon nanotubes was obtained at 800°C and 300 ml/min hydrogen gas flowrate. The composite sample obtained under these conditions demonstrated remarkable enhancement in tensile properties compared to composites made from as-received carbon fibres, whereby an increment of up to 52% and 133% was observed for the tensile strength and modulus respectively.

Keyword: Carbon nanotubes; Carbon fibre; Chemical vapour deposition; Composite; Tensile properties