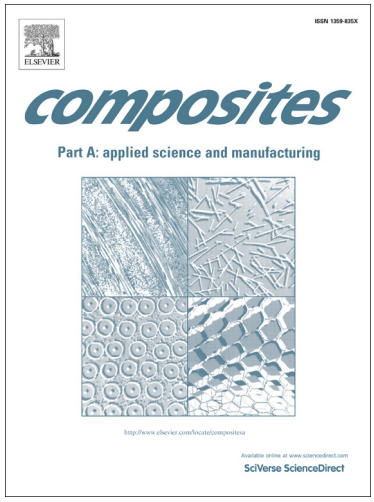

Towards Multi-functional Polymer Composites through Selectively Distributing Functional Fillers

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Towards Multi-functional Polymer Composites through Selectively Distributing Functional Fillers

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ABSTRACT: The distribution of functional filler is known to have significant influence on various functionalities, yet, not been systematically investigated. Herein, we use a blends system based on PA12/PA6 containing SiC and low-temperature expandable graphite (LTEG) to study it. The effect of filler distribution in such blends on various functionalities including: thermal conductivity, electrical conductivity, electromagnetic interference (EMI) shielding ability, has been systematically studied. Further study on altering filler distribution with polished PA6-LTEG and PA6-LTEG in different sizes reveal that, polished particle surface results in reduced electrical and thermal conductivity; and smaller particle size leads to enhanced electrical conductivity, thermal conductivity and EMI shielding ability. Finally, thoretical approach on thermal conductivity demonstrates that the system illustrate very effective contribution in thermal conductivity from large PA6-LTEG "filler" comparing to much smaller traditional fillers. Such study could provide a guideline for the processing of functional polymer composites.

KEYWORDS: Multifunctional composites; Polymer-matrix composites (PMCs); Thermal properties; Electrical properties.

1. INTRODUCTION

The preparation of functional polymer composites requires the incorporation of functional filler into polymer matrix. It is often reported that the morphology of these functional fillers have important influence on the final functionalities of polymer composites. Therefore, many efforts have been devoted to fabricate functional polymer composites through morphology control of filler network. [1-7] For