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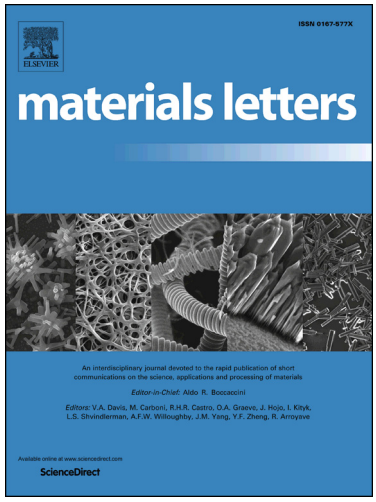

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N-phenyl Maleimide Grafted MWNT/Bismaleimide-Allyl Bisphenol A Nanocomposites: Improved MWNT Dispersion, Resin Reactivity and Composite Mechanical Strength

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Abstract: Due to the high thermal resistance property and low moisture absorption, bismaleimide (BMI) resin has gained great interests in aerospace industries. However, materials made of pure BMI resin often encounter high brittleness and relatively low mechanical strength. In this investigation, N-phenyl maleimide (N-PMI) functional groups were grafted to acidified multi-walled CNTs (MWNT-COOH) to form MWNT-N-PMI through a series of grafting including the Michael addition reaction. MWNT-N-PMI can be uniformly dispersed in BMI/allyl bisphenol A (BMI-BA) resins only with a hand stirring. The addition of N-PMI-MWNT enhanced the reaction activity of BMI-BA resin and mechanical properties of N-PMI-MWNT/BMI-BA composites was significantly higher than that of BMI-BA reinforced by MWNT-COOH.

1. Introduction

Carbon nanotubes (CNTs) have been widely used as the reinforcement of polymers for engineering applications such as aerospace engineering [1]. However, these applications have been restricted due to severe CNT aggregation. To solve this issue, appropriate CNT surface modification is needed. For thermoplastics, CNTs are often grafted with polymer chains to alleviate the CNT sedimentation and aggregation. By contrast, for thermosets, excellent CNT dispersion and uniform distribution should be achieved before the pre-polymers are cured/crosslinked. Since most monomers/pre-polymers of thermosets are small molecular compounds, the dispersion of CNT in these liquefied environments can be achieved by grafting micromolecular functional groups which are structurally similar to the monomers/pre-polymers to the CNT surface. To date, high performance