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Functional dendritic curing agent for epoxy resin: processing, mechanical performance and curing/toughening mechanism

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Abstract: A functional curing agent was synthesized with imidazole blocked 2,4-tolulene diisocyanate (TDI) by using dendritic polyester polyol as branching unit and toughening segment, which toughening and curing the bisphenol A type epoxy resin (E-44). The effect of dendritic polyester polyol content on the morphology of fracture surface and properties of the cured epoxy resin was investigated, which results in the multiple curing mechanism for the curing process. With the increasing of dendritic polyester polyol content, the surface fracture of the cured epoxy turns to more ductile. The mechanical properties from tensile shear and impact strength tests showed that 1% of dendritic polyester polyol (the molar percentage of isocyanate) was the optimum content to get cured epoxy with desired tensile shear strength and impact strength. The curing and toughening mechanism was proposed based on the experimental results.

Key words: Epoxy resin; Toughening; Blocked isocyanate; Dendrimer

1. Introduction

Epoxy resins are commonly used as protective coatings, structural adhesives, high-performance composite matrices, insulating materials and moulded articles etc. in a wide variety of areas such as

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