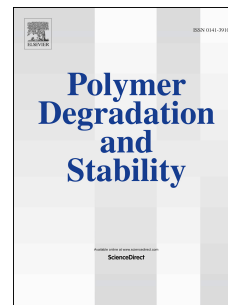


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Unique liquid multi-maleimide terminated branched polysiloxane and its flame retarding bismaleimide resin with outstanding thermal and mechanical properties

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**Unique liquid multi-maleimide terminated branched polysiloxane and its flame retarding
bismaleimide resin with outstanding thermal and mechanical properties**

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ABSTRACT

Developing halogen-free and phosphorus-free flame retardants with good processing characteristic for heat-resistant polymers is still a great challenge. A unique multi-maleimide terminated branched polysiloxane (PMI-HSi) was synthesized, which is liquid, reactive and does not volatilize, overcoming the disadvantages of available liquid flame retardants. PMI-HSi was added into bismaleimide/diallyl bisphenol A (BD) resins to prepare a series of modified resins (PMI-HSi/BD), which were found to have desirable flame retardancy and remarkably increased mechanical properties while maintaining outstanding thermal resistance. For the PMI-HSi/BD resin with 15 wt% PMI-HSi, its impact and flexural strengths are more than 1.8 and 1.3 times of those of BD resin, respectively, while the initial decomposition and glass transition temperatures are severally as high as 399 °C and 316 °C. Attractively, a small addition of PMI-HSi effectively increases limited oxygen index, greatly reduces the risk of catching fire and combustion intensity, and remarkably decreases the smoke production, demonstrating that PMI-HSi is a multi-functional flame retardant. The origin behind these attractive properties was revealed.

Keywords: liquid flame retardant; bismaleimide; branched polysiloxane; mechanical properties; mechanism

1. Introduction

As functional materials, flame retardants are growing with faster and faster speed owing to their wide prospects in lots of industries and daily life, such as architecture, electronics, communication, insulating, transportation, aerospace, and so on [1-3]. Because of the urgent environmental protection

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