



High performance PLA composite with toughness and flame retardancy

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Introduction

Designing polylactic acid (PLA) composites featuring both flame retardancy and excellent mechanical toughness is a great approach to broaden their applications. The halogen-based flame retardants is a efficient choice to improve the flame retardancy of PLA composites. But the pernicious gases and other harmful substances generated from the combustion of halogen-based flame retardants can pollute the environment. To increase its toughness, PLA always blends with bio-based elastomeric polymers and maintain its biodegradability.

Experimental

The dual-2D graphene-derived complex (d2D-Gc) that consisted of polyester modified graphene(PG) and Layered double hydroxide(LDH) was used to improve the flame retardancy of the PLA composite. The Polybutylene succinate (PBS) was used to improve the toughness of PLA composite. Mechanical testing machine and microcalorimeter were used to analyze the effects of the complex of polyester modified graphene (PG) and Layered double hydroxide (LDH) and Polybutylene succinate on PLA composite.

Discussion

As shown in Fig.(a), with the addition of PBS, the elongation at break of PLA-PBS/5d2D-Gc was higher than PLA. As shown in the Fig.(b), the d2D-Gc had obviously effect on the flame retardancy of the PLA composite, the heat release rate (HRR) was lower than the PLA. Due to the graphene and LDH were halogen-free flame retardant, the harmful gas was not generated form the combustion of PLA composite. The PBS and d2D-Gc were also consistent with the idea of sustainable development

Results

