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Fire hazard reduction of hollow glass microspheres in thermoplastic polyurethane composites

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Abstract:

Nowadays, reducing the fire hazard of thermoplastic polyurethane (TPU) is an important research direction in the fields of fire safety materials. In this article, hollow glass microsphere (HGM) was used to reduce the fire hazard of TPU in combustion process. The fire characteristics including smoke and heat production of TPU composites were evaluated using smoke density test (SDT) and cone calorimeter test (CCT). And the thermal decomposition and flammable properties were further studied using thermogravimetric analysis/infrared spectrometry (TG-IR) and limiting oxygen index (LOI), etc. The SDT results showed that the luminous flux (LF) of TPU4 containing 2.00 wt% HGM was up to 24% at the end of test without flame, which is much higher than that of TPU0 (5%). And, the CCT results indicated that 2.00 wt% HGM could make the total smoke release (TSR) decrease from 1019 m^2/m^2 (TPU0) to 757 m^2/m^2 (TPU4), reduced by 26%. The TG-IR results confirmed that HGM could improve the thermal stability of composites and reduce the production of some toxic gases. The above results illustrated HGM had a good prospect in reducing the fire hazard for TPU.

Keywords: Fire hazard; Flame retardant; Thermoplastic polyurethane; Hollow glass microsphere

1. Introduction

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