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Synthesis of an Organic-Inorganic Hybrid Strontium Hydroxystannate Nanorod and Application as novel Flame Retardant

Chong Zhang¹, Xiaodong Guo¹, Shuman Ma¹, Xiongrui Liu¹, Jianzhong Xu^{*1}, Haiyun Ma^{*1,2}

1. School of Chemistry and Environmental Sciences, Hebei University, Baoding 071002, China;

2. Key Laboratory of Analytical Science and Technology of Hebei Province, Baoding 071002, China

Email of corresponding author: coffee1123@126.com

Abstract: A novel sulfonyldiphenol-containing polyphosphazene derivative (PZS) wrapped strontium hydroxystannate (PZS-SrSn(OH)₆) nanorods with rich N, P, Sr, Sn elements was prepared and used as an efficient flame retardant. PZS-SrSn(OH)₆ exhibited high flame retardant efficiency and smoke suppression to the epoxy (EP) composites. Compared with EP, under merely 3% of addition of PZS-SrSn(OH)₆ nanorods, the LOI value was increased to 29.6% from 26.2%. Furthermore, the combustion properties of treated EP were assessed by cone calorimeter (CONE) and it demonstrated that the EP/PZS-SrSn(OH)₆ obtained better flame retardancy which was confirmed by the reduction of heat release rate (HRR) and total smoke release (TSR). The peak HRR values and TSR for EP/PZS-SrSn(OH)₆ were reduced by 30.2% and 23.1%, respectively. It was confirmed that the core/shell structured PZS-SrSn(OH)₆ could significantly enhance the synergistic effect between PZS and SrSn(OH)₆, and thereby resulting higher flame retardant efficiency.

Keywords: SrSn(OH)₆; Polyphosphazene; Nanoparticles; Microstructure; Epoxy resins; Flame retardancy

1. Introduction

Epoxy resin (EP) is considered to be a crucial thermosetting polymer with various superior properties [1-3]. These performances endow it suitable for extensive range of applications [4,5].

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