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Preparation of a novel polysiloxane and its synergistic effect with ammonium polyphosphate on the flame retardancy of polypropylene

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Abstract: A novel polysiloxane (APID) containing phosphorus, nitrogen and benzene rings was synthesized as a flame retardant, which is hydrophobic and thermally stable in air (residual weight being 46.1 wt.% at 800 °C). APID is synergistic with ammonium polyphosphate (APP) in the formation of strong cross-linked intumescent char layer, resulting in improved flame retardancy, smoke suppression and dripping resistance of polypropylene (PP). With 23 wt.% of APP and APID (3:2), the flame retarded PP achieved V-0 rating at UL-94 test and its peak heat release rate was reduced by 75.7 % in the cone calorimeter test. Moreover, APID improved the compatibility of APP with PP matrix to minimize the negative effect of APP on the mechanical properties of PP. The detailed flame retardant mechanism was discussed in the text.

Keywords: Polysiloxane; Flame retardancy; Polypropylene; Compatibility

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