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## Synergistic effects of synthetic phosphonium sulfonates with expandable graphite on flame retardancy for EVA rubber blends

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### ABSTRACT

Synergistic effects of synthetic phosphonium sulfonates (PhSs) bearing different groups with expandable graphite (EG) on flame retardancy properties in poly(ethylene-co-vinyl acetate) (EVA) rubber blends have been studied by limiting oxygen index (LOI), UL-94 test, cone calorimeter test (CCT), and thermogravimetric analysis (TGA). The EVA/EG/PhS composites revealed excellent flame retardancies. Upon adding 2.5 wt.% of PhSs and 20 wt.% of EG to EVA matrix, V-0 rating can be achieved. The heat release rate (HRR) and the total heat release (THR) of EVA/PhS-2(2.5 wt.%)/EG(20 wt.%) and EVA/PhS-4(2.5 wt.%)/EG(20 wt.%) blends decreased remarkably based on CCT. In addition, the thermal stabilities and mechanical properties of EVA/EG/PhS composites did not deteriorate comparing with those of EVA/EG composites.

*Keywords:* phosphonium sulfonates; expandable graphite; flame retardancy; poly(ethylene-co-vinyl acetate); synergistic effect

### 1. Introduction

Poly(ethylene-co-vinyl acetate) (EVA) rubber is widely used in cable and wire industry as cable sheathing due to its excellent physical and mechanical properties [1].

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