To professional reviewer,

Thanks for your time in reviewing the manuscript and pointing out the valuable comments. All the comments have been revised point-by-point accordingly in the revised manuscript.

Reviewers’ comments:

(1) Alternative flame retardants – in general – were developed due to the toxic products produced from thermal decomposition of the commonly deployed brominated flame retardant (see for example Progress in Energy and Combustion Science 2019, 70, 212-259). This should be mentioned in the introduction.

Response: The article has been mentioned in the introduction (line 40) and cited in the order reference number [2]. Thank you.

(2) Thickness and Expansion rate should be plotted in two separate figures. Likewise, please improve quality of Figure 2, you may use Origin software. The quality of Figures overall is rather poor.

Response: The thickness and expansion rate have been changed to stacked column in 3-D to better describe the char layer formation of the intumescent coatings when exposed to fire. Thank you.

(3) Would it be possible to describe chemical events that accompany heat release for formation of residue?

Response: Thank you for the suggestion. Chemical events that accompany heat release for formation of residue for each coating formulations will be examined in the next paper. In this research project, authors are mainly focused on chemical events of the influences of flame-retardant fillers for intumescent coatings when exposed to heat as follows:

\[
\begin{align*}
\text{CaCO}_3 (s) & \rightarrow \text{CaO} (s) + \text{CO}_2 (g) \\
2\text{Al(OH)}_3 (s) & \rightarrow \text{Al}_2\text{O}_3 (s) + 3\text{H}_2\text{O} (g) \\
\text{Mg(OH)}_2 (s) & \rightarrow \text{MgO} (s) + \text{H}_2\text{O} (g)
\end{align*}
\]

However, the degradation products of flame-retardant additives can easily react with flame-retardant fillers contain oxides (Mg(OH)₂, TiO₂, Al(OH)₃, etc) during burning to yield a ceramic-like material, which enhances the char structure formation by giving a stronger and more cohesive char layer, which could isolate the steel substrate from fire and provide better fire protection have been analyzed and explained.

(4) How HR values compare with other similar materials? Please elaborate more into this.

Response: In this research work, the different of the intumescent coating formulations are the contents of the flame-retardant fillers. There are > 93 wt% of each coating formulation has same content of flame-retardant ingredients (such as flame-retardant additives, polymer binder and flame-retardant fillers). This research work is mainly to examine the effect of the addition of ES content on the HR values compare with other coating formulations without the addition of ES bio-filler.