Responses to Reviewers' Comments:

Reviewer #1:

This manuscript has investigated the contribution of three common combustion pollutants to the ambient urban $PM_{2.5}$ health effects. The results are interesting, which showed that particles from different combustion processes at the same concentration exert different toxic effects on the A549 cells. The English language needs to be polished to further improve the quality of this work.

Reply and revision:

We appreciate your kindly evaluations very much for our manuscript. This manuscript has been revised thoroughly according to your following advices. To improve the language, we have polished the English carefully overall again. The point-to-point replies and explanations for all revisions are listed below for easy reference.

Other comments are as follows:

lines 24-26: is there any difference between the two words "toxicity" and "toxicogenic" when the authors here used them for different types of samples? Generally, toxicogenic indicated the toxin production activity of bacteria or other organisms.

Reply and revision:

Thanks very much for your reminding. Yes, the word "toxicogenic" is inappropriate in current study, and have unified the term by using "toxicity" or "toxic".

line 102: was the Teflon filter also baked in the muffle furnace at 500℃?

Reply and revision:

Sorry for the confusion, we describe it more clearly in the revised manuscript. Before being used for sampling, the inorganic quartz filters were incinerated by a muffle furnace at 500 °C for 3 h to remove any possible organic matters, therefore, the parallel $PM_{2.5}$ samples collected by quartz filters could be used for analyzing carbonaceous species. The organic Teflon filters used for collecting parallel $PM_{2.5}$ samples of inorganic analysis were not baked by so high temperature.

Although the air sample information was referred to a literature, it would be better some brief information could be provided here. For example, how about the duration of the air sample?

Reply and revision:

Thanks for your reminding. We add some detailed sampling information about the ambient air $PM_{2.5}$ samples in the revised manuscript. As the actual mixture of various source particles in real environment, totally 16 representative ambient air $PM_{2.5}$ samples (each time lasting 23h) covering a year monthly were collected from December 2019 to October 2020 in an urban site surrounded by traffic, residential and commercial quarters of Nanjing city, Yangtze River Delta of eastern China, using a high-volume air sampler (800 L min^{-1}) with quartz microfiber filters.

line 136: how about the $PM_{2.5}$ concentrations for the cell stimulation experiments? If 80 mg/L, was the cellular supernatant removed before the addition of $PM_{2.5}$ elution? Cell viability test: has the authors treated the cells with other lower or higher concentrations in addition to the one concentration here (80 mg/L)?

Reply and revision:

Yes, the selected concentration of $PM_{2.5}$ suspension is 80 mg L^{-1} based on our pre-experiments covering lower and higher concentrations designed for the dose-response curves. Finally, under this dose, the oxidative stress and inflammation response sensitively, while the cell viability can keep sufficient. The cellular supernatant was removed before the addition of $PM_{2.5}$ elution, so the cells were exposed to the same $PM_{2.5}$ dose.

Correlations between $PM_{2.5}$ components and toxicity: has the authors measured other biological components., e.g., LPS, which is a very strong inflammation inducer and is a common component in the air?

Reply and revision:

Much thanks for your nice suggestions. Lipopolysaccharide (LPS) as a common endotoxin in the ambient air is really a strong inflammation inducer, and should be a

significant component from natural sources posing health risks. Because our current study focus on the $PM_{2.5}$ emitted directly from combustion sources, the biological components including LPS in these anthropogenic $PM_{2.5}$ was not measured. But it's sure an important parameter in our future bioaerosols work.

Figure 1: it is not clear the percentage of species in what?

Reply and revision:

Thanks for the reminding. We have modified the Figure 1 to indicate the proportion (%) of each component from each source accounting for the corresponding component in urban ambient air $PM_{2.5}$ more clearly.

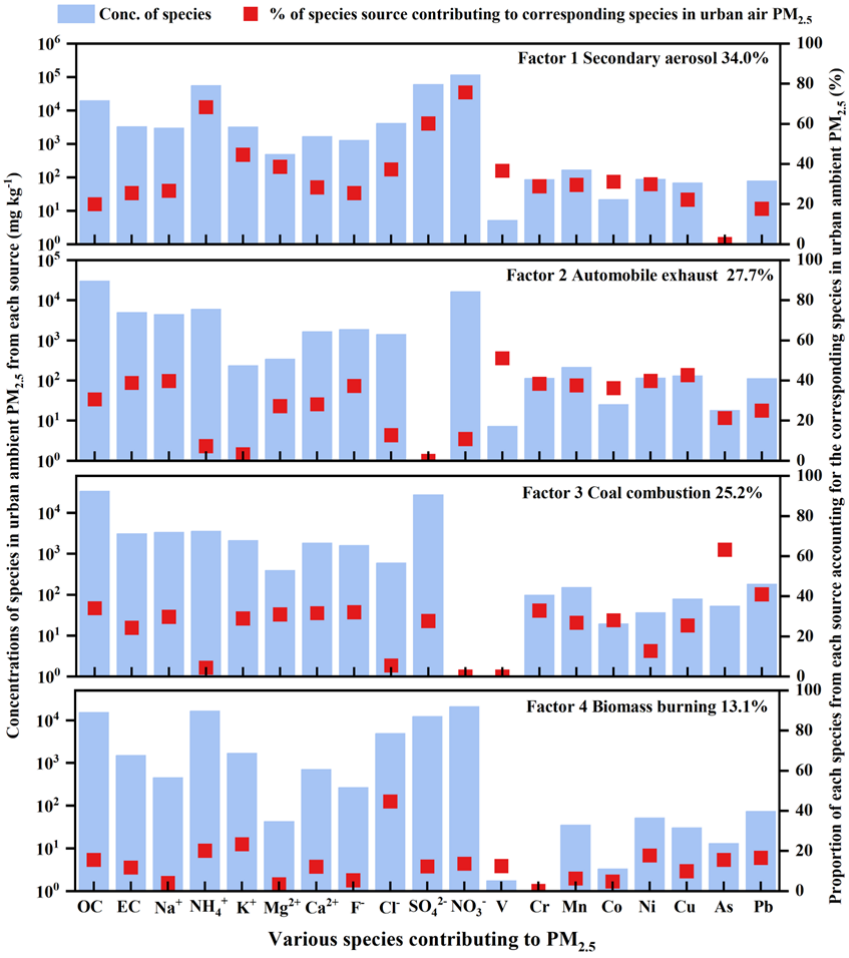

Figure 1. The PMF factor profiles of various components and source percentages of secondary aerosol, automobile exhaust, coal combustion, and biomass burning contributing to the urban ambient air $PM_{2.5}$.

Figure 5: were there any statistically significant difference for each component in different types of samples?

Figure 6: similar to the last question, statistical test?

Reply and revision:

Thanks very much for the reminding. We performed a significance analysis based on the Kruskal-Wallis test to modify Figure 5 and 6 in the revised manuscript.

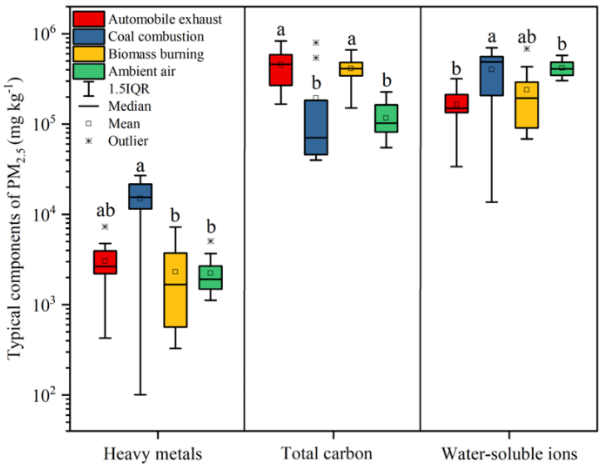

Figure 5. Cumulated typical measured components (mg kg^{-1}) in $PM_{2.5}$ from various specific sources (n=10 for each combustion source and n=16 for urban ambient air). The letters a and b are significant groups classified by Kruskal–Wallis test, $p < 0.05$.

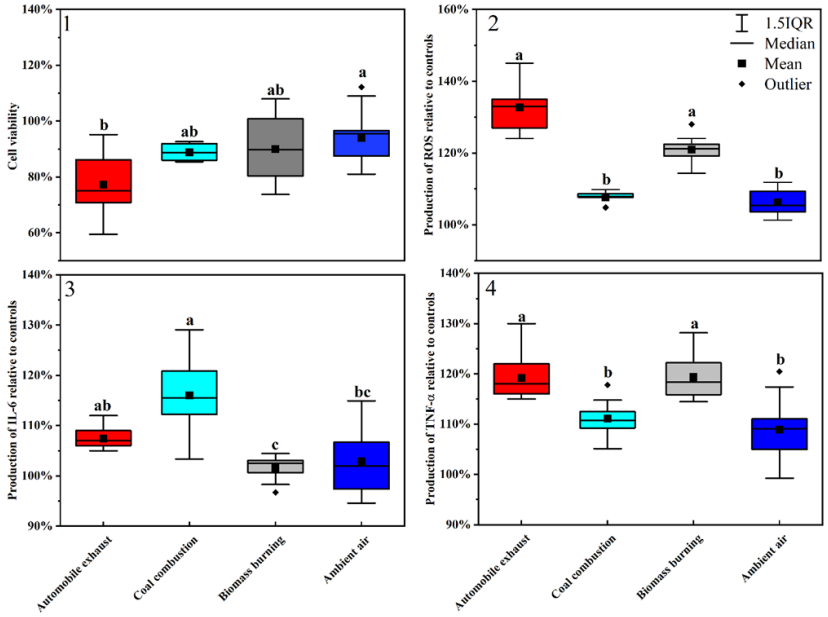

Figure 6. Cell viability, oxidative stress and inflammation levels of human alveolar epithelial cell lines (A549) exposed to $PM_{2.5}$ suspension (80 mg L^{-1}) from various specific sources (n=10 for each combustion source and n=16 for urban ambient air). The letters a, b and c are significant groups classified by Kruskal–Wallis test, $p < 0.05$.