

Review of Pei et al.

This work presents the morphological transformation of soot during condensation of sulfuric acid and limonene SOA. Besides the present work proposes a framework (method) to quantify the parameters of this morphological transformation, i.e. amount of material used for filling voids or diameter growth and fractions of internal/open voids. Overall, this manuscript is well organized and written, the results are clearly presented, and the scientific novelty is significant for the society. However, the MS still needs minor revision and some technical modification. After that, I believe this paper can be published on ACP.

Comments:

1. Abstract: some quantitative result should be added in the abstract rather than general description.
2. The expression “framework” is strange.
3. Line 11: “soot. This work constitutes the first study that quantitatively tracks in-situ microphysical changes in soot morphology”. I don’t think it’s true.
4. Page 1, Line 18 and in the whole manuscript. It is better to use “soot aggregate”, not “soot agglomerate” to keep consistent with most of the literature.
5. Page 1, Line 32: Change “Growth” to “growth”.
6. Page 2, Line 1-2: change ‘ ’ to “”
7. Page 5, Line 27-30: this paragraph describes the steps of the experiments, however, the experiment of soot coated with only SOA is ignored, it should be stated clearly.
8. Page 7, Line15-16: Kuwata et al (2012) did not report this 1.26 number but provide a method to calculate the density, this sentence should be checked.
9. Page 7, Line 18: change the reference format to Saathoff et al., (2009)
10. Page 11, Line 6: should be sections 3.3 and 3.4
11. Table 3. I suggest that the authors should compare their work with other studies, e.g. Khalizov et al., EST 2013 etc.
12. Figure 1. The results of SP-AMS and CCN counter were not reported in this paper, should be removed from the figure.
13. Figure 6 (a-d): in the abstract, the author state that “In fact, most of the fresh soot particles considered in this study were largely spherical (dynamic shape factor: ~ 1.1)”, however, in this figure, the dynamic shape factors of fresh soot with internal voids are around 1.5-1.9, please check the data consistency. And the black dots in the figure should be changed to blue color as other points without internal voids, or in the legend change “fresh soot” to “fresh soot without internal voids” to make it more clear.

14. The figure captions are too brief. The author should explain more to make reader better understand the figures. i.e. Figure 2 needs to explain what do S, M, L mean etc.