Atmospheric Measurement Techniques Discussions

Atmos. Meas. Tech. Discuss., referee comment RC1
https://doi.org/10.5194/amt-2022-185-RC1, 2022

Comment on amt-2022-185

Anonymous Referee #1

Referee comment on "Characterization of a modified printed optical particle spectrometer for high-frequency and high-precision laboratory and field measurements" by Sabin Kasparoglu et al., Atmos. Meas. Tech. Discuss., https://doi.org/10.5194/amt-2022-185-RC1, 2022

General comments:

This paper introduces a modified version of a Handix POPS and demonstrates the performance improvement in measuring the aerosol number concentration, particle size and signal time responses. The improvement is promising and very important to expand the current POPS capability. In addition, the authors presented a very useful application to monitor the particle phase transition with the high-resolution light scattering amplitude data. Thus, the reviewer recommends publication after addressing the below concerns.

- What is the modified POPS's total weight, power requirement, and cost? What is the targeted application of the modified POPS? Is it maintained the current lightweight and low-cost sensor application?
- When the modified POPS was integrated into a dual tandem DMA, how were the multiple charges treated in the data reduction? How does the RH affect the light scattering calculation? Considering the complex light scattering responding curve, please estimate the uncertainty caused by the multiple change and RH in your results, such as in fig. 4. Additional information should be provided to quantify the sizing capability of the modified POPS.

Specific comments:

Line 63, What time and bin resolution do the DMA-OPC experiments need? How does the 10 Hz data improve the result compared with the 1 Hz data?

Line 97, What is the uncertainty caused by the sheath flow variation?

Figure 2, At what locations does the author monitor the phase transition temperature? Will the particle temperature decrease when transferring from SMPS to POPS?

Line 155, Can the author distinguish the multiple charged particles with a POPS? If so, what is the size resolution of the modified POPS?

Line 157, Do we expect the refractive index to change during this particle transition? If so, how can it affect the mode diameter determination?

Line 160, The viscosity of what chemical compound? Under what temperature?

Can the author quantify the enhancement?

Line 265, does it suggest that the MCA modification narrows the size detection range of POPS? If it is true, that will limit the application of POPS. Is there any solution for that?

Fig 8. Does the author have a plot of the temperature scans of MCA-PH response? Is it different or similar to digitizer-PH?

The nominal 166 nm is based on the electrical mobility size, right? If so, what is the corresponding optical size of the particles? Line 275, at 72 C, the mobility size is around 210 nm, similar to the doubly charged particles. How does the author separate the coalescence and the doubly-charged particles?