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Comment on amt-2021-62

Anonymous Referee #2

Referee comment on "The nano-scanning electrical mobility spectrometer (nSEMS) and its application to size distribution measurements of 1.5–25□nm particles" by Weimeng Kong et al., Atmos. Meas. Tech. Discuss., https://doi.org/10.5194/amt-2021-62-RC2, 2021

The nanoscaning electrical mobility spectrometer is a very useful instrument because of its response time and sensitivity for small particles.

Few questions or methods are not discussed in the text or are not clear. I listed few of them below. That will help the readers to have the responses. It will help to precise that the particles used to calibrate the instrument are electrically (positive) charged. Sizing sub 2 nm whith a charger dma cpc is another problem to my opinion. Indeed the chemistry of the particles is changed by the attached ion on the particle. And the chemistry is important for the activation of sub 2 nm particles, see Kangasluoma et al (2013) in Aerosol Sci Technol.;

Jiang et al. 2011 in the same journal have used by the way the concept of SMPS to detect neutral particles in the sub 2 nm range. You should cite their work.

1°/ Why this 'precise' diameter of 1.5 nm? Is it a limit of the detector or the classifier or the charger. Tetraethylammonium bromide produces 1.11 nm (mobility diameter) has been used by Attoui (2018 Journal of aerosol science).

2°/ The charger is the weak point of the study since there is no experimental work on the charging state of sub 3 nm with a bipolar charger. The authors are not giving lot of details about the charger they have used in terms of size of their chamber, concentration of ions nor residence time of the ions in the chamber.

3°/The important flowrate of 4.6 lpm is coming without any explanation about the charging state nor residence time.

4°/ Same thing about the losses versus the particles size in the charger, in the conditioner after the dma?

5°/ Likewise about the mixing chamber of the mixing type cpc activator. There are no details on terms of size nor activation nor losses.

6°/ Likewise about the growth tube (if there is a growth tube) of the mixing type CPC. In page 7 line 47, the authors are talking about the growth tube used by Sgro and Fernandez de la Mora indeed. There are no details about the residence time the inner diameter nor length. Is the growth tube what they call 'condenser'? What is its length and inner diameter?

7°/ Same thing for the flow rate of '1, 5 lpm'. Why this particular value?

8°/ A hot wire is used for the calibration of the instrument but there are no information nor reference of this method. Is it the same method used by Peineke et al 2009 (Journal of aerosol science)? If yes why the authors are using a charger in the figure 5. Peineke and Schmidt Ott 2007 (Journal of Aerosol Science) claim that the particles are self-charged in negative and in positive mode.

9°/ Why the charger (neutralizer) is not used any more in the figure 5 for the same hot wire generator?

10°/ The PSM as a sizer has been introduced by Gamero and Fermandez de la Mora (paragraph 3.2 in Gamero 2000 Journal of aerosol science). Not by Sgro and Fernandez de la Mora (2004) as said the authors.