

Atmos. Meas. Tech. Discuss., referee comment RC2
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Comment on amt-2022-109

Anonymous Referee #1

Referee comment on "Design and fabrication of an electrostatic precipitator for infrared spectroscopy" by Nikunj Dudani and Satoshi Takahama, Atmos. Meas. Tech. Discuss., <https://doi.org/10.5194/amt-2022-109-RC2>, 2022

The manuscript describes a method for direct collection of submicron particles onto a circular ZnSe window using a custom designed radial electrostatic precipitation device. This appears to be a promising method that overcomes a number of disadvantages involved with other methods of particle collection and allows functional group analysis with transmission FTIR spectroscopy.

There are many grammar errors in the manuscript that added to the review time and prevented my understanding in several places. In addition, there are many typos that also added to the review time. It became clear throughout the manuscript that the authors did not proofread their work, including their supplemental material. I do believe the method is interesting and the effort on the analysis is useful.

Overall questions and comments:

1. Line 34-35 – You may also want to cite the following more recent and relevant papers that use ATR crystals for impaction substrates:

Kidd et al., PNAS, 111, 2014, "Integrating phase and composition of secondary organic aerosol from the ozonolysis of α -pinene", doi: 10.1073/pnas.1322558111

Yu et al., J. Environ. Sci., 7, 2018, "Fast screening compositions of PM_{2.5} by ATR-FTIR: Comparison with results from IC and OC/EC analyzers", doi: 10.1016/j.jes.2017.11.021

2. Line 135 – Does this sentence mean every diameter between 100 and 800 had 75% collection efficiency? The mention of 200 nm and then a listing of other diameters is confusing.

3. Line 326 – Can the authors clarify where the number of elementary charges come from? Are these values measured? They state they had approximately 1 charge per every 20 nm, but it looks like it has a trend.

4. Line 325 – the authors say 75% collection efficiency for these particles earlier in the text and then 82% in another place. Can you clarify?

5. Line 333 – the optical images are in Figure S3, not Figure 4a.

6. Line 374-382 – I'm not sure I understand why the resolution of an older dispersive instrument would matter. If you are concerned that the peak position measurements were made with a dispersive instrument but yours were made with an FTIR, can you not compare the peak positions of (NH₄)₂SO₄ in newer references using FTIR? In addition, measuring your own reference peak positions by putting (NH₄)₂SO₄ on the surface in a different manner would help. If the description on line 400 is similar to this suggestion, maybe you can begin that section by explaining there was a comparison made to homogeneously deposited (NH₄)₂SO₄ to show that it is consistent before you present your analysis. However, I'm not sure I understand what you mean by homogeneous medium.

Minor comments:

- Use electrostatic precipitator as a keyword, spelled out in addition to abbreviated.
- Line 7 – extra word "aerosol" here?
- Line 36 – spell out ESP the first time it is used.
- Line 60 – your reference formatting needs some attention. These should be in parentheses.
- Line 84 – you need to define PEBS. Change this to "the personal electrostatic bioaerosol sampler/ing (PEBS) and the PEBS's wire-to-wire electrode ..."
- Line 87 – What does factor of safety 3 mean? Do you mean "three times over the theoretical breakdown?"
- Line 94 - Rewrite this sentence; grammar issue; it is not clear what you are describing here.
- Line 96 – The supplemental figures are out of sequence. They should be numbered in the same order as they are described in the text.
- Line 117 – what is meant by a scrupulous flow field?
- Line 125 – the correct terminology is slip correction factor.
- Line 126 – you may also want to see the book "Aerosol Technology: Properties, Behavior, and Measurement of Airborne Particles" by W. C. Hinds, 1999 for information

relevant to this work.

- Line 135 – Line 122 states that you believe there is one charge for every 20 nm, but the 200 nm particles were estimated to have 8 charges instead of 10. How many charges were on each of the other diameters?
- Line 348-349 – grammar issues in this sentence, not sure what this is trying to say.
- Line 384, 396 – there are several places where NH_4^- has been used instead of NH_4^+ including in the supplemental and figures!
- Line 391 - I don't understand this format shown in several places. What is 1.11, 1.52? Is there something missing?