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Atmospheric Measurement Techniques Discussions

Interactive comment on "Aqueous particle generation with a 3D printed nebulizer" *by* Michael Rösch and Daniel J. Cziczo

Anonymous Referee #2

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This is a rather short manuscript on the 3D printing of a nebulizer. The novelty might justify publication but the manuscript clearly needs to be improved to be more rigorous and discuss more critically even the data shown.

Issues:

The manuscript keeps insinuating a "low cost" nebulizer (e.g. L44).. but does not provide any cost reference neither for the competition nor for the actual set-up. In terms of competition, depending on the particle range of the aerosols that are actually being generated, medical nebulizers are «100$ with the actual disposable nebulizer being ∼3$. Your 3D printed ones are not that cheap as they 1) require a 5K printer 2) the raw plastic material and 3)in your set-up a brass nozzle at ∼10$.. Therefore it would be critical to have a more nuanced discussion. Also the commercial (expensive)

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devices might have a much better performance (see next point).

The data analysis of the particles generated is very superficial. Only focus is on number concentrations generated (again context of commercial and alternative systems is inexistent). There is no significant discussion in the manuscript on the actual distributions generated and their stability. Number concentrations is one aspect but what about distributions. Also the “heatmaps” provided the distributions are very confined to a small area and no effort was made to quantitatively analyze that data... e.g. how does the mode of the distribution changes over time.. or does not? What is the broadness of the distribution? any quantitative distribution metric and how this relates to commercial systems or applications. For the very least the discussion on figure 5 needs to be extended... Saying that they are similar is not true, there is a lot of difference (y axis is log) and it does matter.

Related the PSL “calibrations” seem disconnected to what can be achieved with the salt solutions?

All experiments except the comparison were done with the brass nozzle? This id stated a little bit as an aside given that the whole paper makes it sound as it whole nebulizer was 3D printed when in fact the most critical part (nozzle) was not.. but it was brass and purchased. One wonders why if the conclusion of figure 5 is that they are equivalent? Could you comment on this?

Other issues

Abstract: would be more informative to actually say what that the comparison with the brass orifice revealed rather than just say it was done. Results should be summarized in the abstract not just written what was done.

On the other hand the typical last paragraph of the introduction, where one typically says that will eb discussed in the manuscript is missing...

Then again the first paragraph of the results (L112-115) is actually just that: saying

what will be done... and this would belong as last paragraph of the intro. This is just an odd way of writing a manuscript.

L21 Please use comma for thousands to ease reading

Please be precise on the brass nozzle and diameter used. The cat number for McMaster-Carr shows orifices in inch (of various sizes).... Does the 0.5mm mean you used the 0.02 inch one?

L122 use center dot as multiplication sign not a star

L120: please explain double distilled deionized.? Millipore systems do not distill? Where does tht DDI come from?

L149 "will be sufficient enough" can you be more quantitative.. what do you consider sufficient?

Figure 1: what is the rationale behind the numbering.. why does (2) jump to pane d....

Figure 4 there is no discussion at all why the time scale varies so much between panels a,b and c... Please discuss in the text what you want to show going from a) 1800sec to b) 450 sec to c) 20000 sec

Figure 4 and 5. I suggest that the top panels with number concentrations should present the same extent of range.... To have a visual meaning.

Right now the resolution is so poor in the figures that the legend of the top panels (fig 4 and 5) are hardly readable.

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