EGUsphere, referee comment RC2
https://doi.org/10.5194/egusphere-2022-913-RC2, 2022
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Comment on egusphere-2022-913

Anonymous Referee #2

Referee comment on "Reconsideration of surface tension and phase state effects on cloud condensation nuclei activity based on the atomic force microscopy measurement" by Chun Xiong et al., EGUsphere, https://doi.org/10.5194/egusphere-2022-913-RC2, 2022

The manuscript by Xiong et al. discussed the impact of surface tension reduction on CCN activity of dicabocylic acid-inorganic salt mixtures. CCN activity was quantified using the CCN counter, and surface tension was measured using the AFM. The data suggested that observed kappa values for adipic acid (AA) and octanedioic acid (OA) cannot be well explained by chemical composition when surface tension of water is assumed. The AFM data demonstrated that the values of surface tension for these particles were significantly lower than that of water. The result makes sense, and the output of the study will be useful for future studies on CCN activity. I have some comments on the manuscript that needs to be considered for making it to be acceptable to the journal. I also suggest the authors to ask a native speaker of English for checking grammatical issues on the manuscript.

Major comments

The manuscript qualitatively connected reduction in surface tension and kappa. However, these two parameters are not quantitatively connected in the current manuscript. For instance, it would be possible to develop a multicomponent Kohler model considering water-solubility of pure organic compounds, and investigate sensitivity of the measured kappa values on the assumed value of surface tension. If the measured values of surface tension can explain the experimentally constrained value of kappa, this study could be more quantitative. The reviewer would imagine that the quantitative study could have been easier if information about particle water contents were to be available for the AFM data. Would the authors provide comment on it?

Minor comments

Title

Researchers in the area already know that dicarboxylic acids are important contributors to CCN. It is better to stress the novelty of the study in the title better.

L33

Add references to support the statement.

2.1.2 CCN activity measurements

Qualities of the compressed air and water for the atomizer are very important for CCN activity studies of acidic chemical species. Ammonia ubiquitously exists in an indoor environment. Based on the reviewer's experience, it has never been easy to generate ammonia-free dicarboxylic acid particles. I suggest adding further details about particle generation in the revised manuscript.

L93

Is there any reason why the authors selected the hydrophobic silicon wafer as a substrate? What would be the advantages/disadvantages of the substrate when compared with other types of substrate?

L99

I checked the datasheet of SHT 85. The accuracy of the sensor is +- 1.5%. The authors mentioned in the manuscript that the AFM measurement was conducted at 99.5% of RH. The uncertainty of 1.5% for the high RH region influences significantly influences thermodynamic properties. The potential influence of uncertainties in RH measurements on the AFM data would need to be discussed in detail.

L103

Ideally, this manuscript should be published after the publication of the procedure for making the nanotip. At least, the name of the potential first author needs to be stated so that the readers will be able to search for the corresponding paper if necessary.

L122

OVF needs to be defined.

L133

Although the authors mention that the data are consistent with previous results, they are actually slightly different, as discussed in the following sentences in the same paragraph. The expression should be updated for representing the comparison more accurately.

L144

It is not clear to me how the criteria for highly- and slightly- soluble compounds were developed, and why it is important for the present study. Further information is needed.

L172 – 174

I could not understand what this long sentence means well. It would be great if the authors could update the description.

Table 1

What does ‘guaranteed reagent’ mean? Would you provide the detailed information about what is specifically guaranteed?

Table 2

Please use “Not Available” when a previous study does not exist, rather than mentioning ‘this study.’