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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Ice nucleation efficiency of AgI: review and new insights" *by* C. Marcolli et al.

Anonymous Referee #2

Received and published: 19 April 2016

General comment:

The paper summarizes results about the ice nucleating efficiency of silver iodide in different modes obtained by various experimental techniques. Studies from several decades are summarized and explanations about the reasons of the efficient ice nucleating ability of silver iodide are described in molecular levels. Such a review gives important scientific insights and findings and is of high scientific relevance.

However, representing such a review is not a trivial task. The descriptions of the utilised techniques are not given in a way that the reader could easily follow (which is, of course, a challenge). I see some weaknesses in defining the different ice nucleating processes in their differences. The discussion about the stochastic nature of freezing processes and the neglecting of time dependence should be more detailed. Furthermore, I find

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it critical that the paper mixes the review of previous findings with new experimental results which have not been published elsewhere. This should be treated separately in the paper, such as starting with an experimental part with new results, and then continue with the review part.

To my opinion, major revisions regarding the presentation quality are requested before publishing the manuscript in APC.

Specific comments

1. The paper should be rearranged so that previous findings are clearly separated from new experimental results which have not been published elsewhere, such as starting with an experimental part with new results, and then continue with the review part.

2. Clear definitions of the treated freezing modes should be given in a section in the Review part.

3. The descriptions of the utilised techniques should be completely reworked. Maybe it would be better not to describe too many details in the text which are listed in the tables.

4. In the text the use of the terms ice nuclei and IN, ice nucleating particles and INP is not consistent. Please correct this.

5. Temperatures are sometimes given in °C, sometimes in K. Please change this consistently.

6. Abstract: Including full references with all details in a paper is not usual; the same is the case for including references at all in the Abstract.

7. Abstract, page 2, line 10: Deposition freezing: What about experimental results from deposition freezing with AgI particles?

8. Abstract, and Introduction, page 3: The remark that “this paper is one of three papers that present and analyse contact freezing experiments with AgI” is somehow

confusing. Unpublished results should be clearly presented in the paper as suggested, previous results should be treated equally all together.

9. Introduction, page 2, line 8: There are recent studies showing that the freezing temperature in the contact mode is dependent on the particle size, e.g., Hoffmann et al., 2013, Faraday Discuss, 165. Therefore, only for large particle sizes contact freezing temperatures are higher than for immersion freezing.

10. Introduction, page 2, line 15: I would suggest to start a new paragraph here.

11. Page 3, line 21, and many other places: In the text, there is often written something like “range from x – y” or “diameters of x – y”. Please avoid using “– “ in the text and write, e.g. “range from x to y”.

12. Page 8, line 10: The sense of the last sentence of this paragraph is not clear.

13. Page 8, line 14: What is meant by “even stronger dependence”?

14. Page 10, line 27: Please reformulate the sentence “ simulations . . . were able to simulate . . .“.

15. Page 11, Section 3.4, and other places: Please replace “totally” by “completely” or “entirely”.

16. Figure 1: At least some short explanations of the symbols included directly in the figure would help the reader.

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