

Interactive comment on “Ice nucleation by water-soluble macromolecules” by B. G. Pummer et al.

Anonymous Referee #2

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I completely agree with RC C8428 that this paper reads like a review article in places. I cannot comment much on whether the data are only supplementary to other published works, rather than warranting publication outright. It seems there are potentially some new findings in the paper; however, as presented results were not explained coherently enough to be able to judge.

General

- I enjoyed reading the introduction. I felt it gave a very nice introduction to the area. However, it is a little bit long for a research article and reads a little bit like

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a thesis in places. It is almost as if a table would help to summarise some of the findings for different sources of ice nucleating macromolecules.

- In general the whole of the Methods section 2.1 could be made much clearer. I found it hard to follow a lot of it. For a specific statement see, page 24282, lines 10-26 and next page lines 1-5. I struggled to understand what was being said here. What is the “proper dilution”? Also, please explain all the variables in Equation 1 and the meaning of them more clearly. nm for instance is not really defined. I would like to see an explanation of where the equation comes from.
- In the next line (page 24283, line 6) the paper then talks about the soccer ball model; however, it is not clear how equation 1 relates to this treatment. This should be made clearer. The paper then talks about 2 extra methods using drop freezing array and the LACIS. There should be some justification as to why you use these different methods, to inform the reader why you are doing this.
- Section 3 is very hard to follow. I tried to work my way through this section, but in the end I gave up trying. As an example of something that isn’t clear see page 24288, line 27 “Consequently, the ice nucleation temperatures are maximum a few Kelvin above the homogeneous freezing temperature (see Fig.4).” Figure 4, however, does not appear to show anything about maxima in ice nucleation temperatures. Does it not just show that PVA nucleates ice at just lower than 240 K?
- Section 4.1 does not really present the findings in a coherent way. It is a discussion rather than conclusion. I would suggest that, if the authors still want to present a research article, a separate / concise conclusions section is needed to present the new ideas.
- A lot of Section 4.2 is pure speculation. I was hoping for a focussed conclusions section that explained the findings, perhaps in bullet points

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Specific

- Methods, line 6. You say the mycelium was scratched off and 10 mL of high-purity water was added. What was the weight percent of the mycelium in the water? For example in experiments with mineral particles this is often quoted (e.g. in the experiments of Murray et al, 2011). Was the mycelium a powder or solid lumps?
- What was the reason for autoclaving and how do you this will affect your results?
- When you pass through the 0.1 micron filter, what do you estimate to be the mass loading?
- Page 24283, line 16. When you say CNT works perfectly, what is your metric for this statement? It should be justified.
- Page 24282, line 6 “no proteins” should be “not proteins”? There are a few typos throughout.
- Figure 2, font is too small. Legend is hard to interpret too, without delving into the text (i.e. it isn’t explained in the figure caption what the different lines mean). This makes it very difficult to follow what is being said in Sectoin 3.1, lines 1-10.
- Could the authors comment on the following point, which affects the key findings of the paper. On page 24285, line 20 you say that the filtrate are particle free, because you don’t see particles in suspension. How do you know they are indeed particle free, and it is just that you can’t see the small particles in suspension?
- Figure 3. I have the same issues with Figure 3 to Figure 2. Namely, the legend key and figure caption do not help me understand the figure. Is there really good agreement between the different methods? The 42C sample is coloured yellow for the MPIC method and red for the BINARY method and there is a large difference in the results. In fact I couldn’t follow the meaning of the legend at all.

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Interactive comment on *Atmos. Chem. Phys. Discuss.*, 14, 24273, 2014.