

## ***Interactive comment on “Experimental methodology and procedure for SAPPHIRE:a Semi-automatic APParatus for High-voltage Ice nucleation REsearch” by Jens-Michael Löwe et al.***

**Anonymous Referee #2**

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Review of "Experimental methodology and procedure for SAPPHIRE: a Semi-automatic APParatus for High-voltage Ice nucleation REsearch" by Löwe et al.

General comment: The SAPPHIRE is an interesting apparatus that can be used to improve the current understanding on how high-voltages and/or electric fields can impact ice nucleation. The authors were careful to evaluated the capabilities of the new apparatus; however, additional experiments are needed to proof that SAPPHIRE can actually evaluate if electric fields can affect ice nucleation. The following points need to be properly addressed before the manuscript can be accepted for its publication.

Major comments: 1. The logic of the Introduction is not the best. The authors move

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back and forward with the same topic (e.g., ice nucleation). 2. The main goal of the SAPPHIRE is that it can be used to investigate the effect of high-voltages (or electric fields) on ice nucleation; however, the authors did not provide a single experiment in this direction. The provided ice nucleation results are in the absence of electric fields. How can we be sure that SAPPHIRE can actually do what this? 3. The author claim they can run heterogeneous ice nucleation experiments with their setup, but it is not mentioned what heterogeneous ice nucleation modes can be studied with the present setup and how the experiments will be performed.

Minor comments: 1. The English needs to be improved. 2. The authors are not citing correctly. This needs to be fixed along the manuscript. 3. Please change " nucleation" to "ice nucleation" along the text. 4. In the Introduction the following needs to be added: 1) What has been reported in the literature about the potential effects of electric fields on ice nucleation? 2) Introduce the devices previously built to study this phenomena. 5. In several places the authors talk about ice nucleation without a clear distinction between heterogeneous ice nucleation and homogeneous ice nucleation. It has to be clearly stated that they are not the same. 6. P1 Line 40: Add a reference after "risks". 7. P1 Line 44: "impurities". Do the authors mean "aerosol particles"? 8. P1 Lines 43-44: How about ice supersaturation? 9. P1 Line 56: Add a reference after "sheds". 10. P1 Line 58: Add a reference after "field". 11. P2 Line 2: Add a reference after "field". 12. P2 Line 43: "contamination on". Please clarify this. 13. P3: Define PMMA 14. P3 Line 18: I suggest to use older and pioneering references here. 15. P3 Line 49: What is the temperature uncertainty? 16. P3 Line 50: "heterogeneous". What heterogeneous modes can be run here? 17. P4 Line 41. "Figure 4". 18. P5 Line 32: "ice nucleation". Heterogeneous or homogeneous? 19. P6 Line 19: "Figure 7". 20. P8 Line 64: "Figure 10". 21. P9 Line 57: "Figure 11". 22. P10 Line 81: A referee is missing. 23. P11 Lines 20-26: Why are the authors talking about "heterogeneous" if these experiments were run for pure water? Did you use INPs? what type? 24. P11 Line 46: "Figure 12". 25. P11: Figure 13 is not mentioned in the main text.

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