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Comment

## ***Interactive comment on “Deposition mode ice nucleation reexamined at temperatures below 200 K” by E. S. Thomson et al.***

### **Anonymous Referee #1**

Received and published: 15 November 2014

This manuscript concerns laboratory studies of deposition mode ice nucleation on several substrate materials at temperatures from  $\sim 150 - 200$  K. While this is somewhat lower than atmospherically relevant it is a good study of ice nucleation fundamentals and adds important data to our understanding of this atmospheric process. It is well written and clear and deserves to be published in ACP. Minor comments follow.

Results : Perhaps most importantly, this technique appears similar to previous Knudsen cell work e.g. by the heavily referenced Tolbert group (e.g. Fortin et al., etc.). Can a paragraph with references regarding previous work in this area be made? My concern here is that the paper reads as if this is the first time this type of work has been performed, which isn't true. Indeed, the reader also has to read the references to understand this work expands upon a large body of work. This should be clearly stated

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and referenced. It is the authors' choice where to do this but Intro or Results seems good locations.

Regarding the aforementioned references, most substrate work appears to contain a discussion of the difference between a macroscopic substrate and a freely suspended atmospheric particle. This paper is surprising in that almost no discussion is made of the difference between macroscopic substrate and particle suspensions, specifically experimental limitations. This is briefly mentioned on 23728 and I believe this work would benefit from an expanded (a paragraph or paragraphs) discussion.

Introduction : “Heterogeneous ice nucleation may occur when (1) supercooled liquid water contacts a foreign body and subsequently freezes, or (2) when H<sub>2</sub>O...” – requires rewording. It sounds like only contact freezing and deposition are considered whereas next sentence says immersion. Perhaps a 3rd category (supercooled liquid water containing a foreign body)

I concur with the comment by Reviewer #2 about the desirability of a heterogeneous curve in Figure 3 analogous to 5.

Analysis : “how can surfaces with widely dissimilar hygroscopic behavior all 20 require high supersaturations for vapor deposition ice nucleation.” – if this is a question shouldn't this actually be followed by a “?” ?

In conclusion, this is a nice addition to the ice nucleation literature and will make for a welcome addition to ACP.

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Interactive comment on Atmos. Chem. Phys. Discuss., 14, 23711, 2014.

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