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Interactive comment on "Ice nucleating ability of particulate emissions from solid biomass-fired cookstoves: an experimental study" *by* Kimmo Korhonen et al.

Anonymous Referee #2

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Ice nucleation activity of soot particles from several biomass fuels was investigated. The physical and chemical properties of these soot particles were also studied. These measurements are very useful to understand the implications of soot emissions from solid fuels that are very commonly used worldwide. Such INP data is scarce, and I recommend 'publication' after addressing the following comments.

1. To better understand the implications of these measurements, it would be best convert the data shown in Figures 4 to 6 to active site density (ns) or active fraction kind of metric and compare against other INP data (soot, dust, etc.) from literature. This will help to put the data in the context of other INPs.

2. Figures and Tables. In Figure 1, do the ejector dilution (ED) also helps to cool the samples? (this is described on line 95). It is not clear how ice crystals can grow to size up to 11 um (Figure 2) as droplets only grew to 4.5 um only (page 256). Would you please explain this observation? If these droplets freeze, the size of the ice crystal should be equal to the droplet size, correct? From ∼20.5 to 20.6 hrs (Figure 2), where ice crystals are observed, there are some particles of size 2 ± 1 um observed. How is this possible? All the droplets should be frozen at this temperature. If these are not droplets, then why such small ice crystals are observed? Please elaborate caption of figure 3. SPIN data is not shown here. How is the contribution from multiple charge particles is corrected for the data shown in figure 3? SPIN was operated at RHw = 115% and without depol. detector. How was droplet breakthrough artifact addressed? It is not clear if the ice activation threshold is 1e-3, then how data is shown up to 1e-4 (see figures 4 to 6). If the data (from 1e-3 to 1e-4) is not trustworthy because of the threshold limit, I would revise the figures to show data from 1e-3 to 1 only. Please explain what X-axis labels in Figure 7 are. What is K500? How these labels are related to figures 4 to 6. I think there is a typo ('ja') on line 762. The ice detection limit (figure 4 to 6) shows 1e-3, but in Table 1 detection limit is in the range of 1e-06. Please clarify this discrepancy and definition of the detection limit. From a readability perspective, it would be better to spell out the abbreviations (e.g., ND, FD etc.) that appeared in Tables 1 to 3 in the Table caption-text itself.

3. It is mentioned that the evaporation section is not efficient (line 262). Would you please explain this feature of the SPIN. Why it is not efficient, how it affects the data presented here, and how it is operated differently from other SPIN and CFDC style chambers. A paragraph from Line 273 to 276. Please elaborate on this argument. Does the correction factor was applied? If yes, how this factor was determined. There is some discussion in section 3.3; however, it is not very clear. The factor estimates described on line 458 to 461 are not proved using INP measurements. These are speculations. Please justify.

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