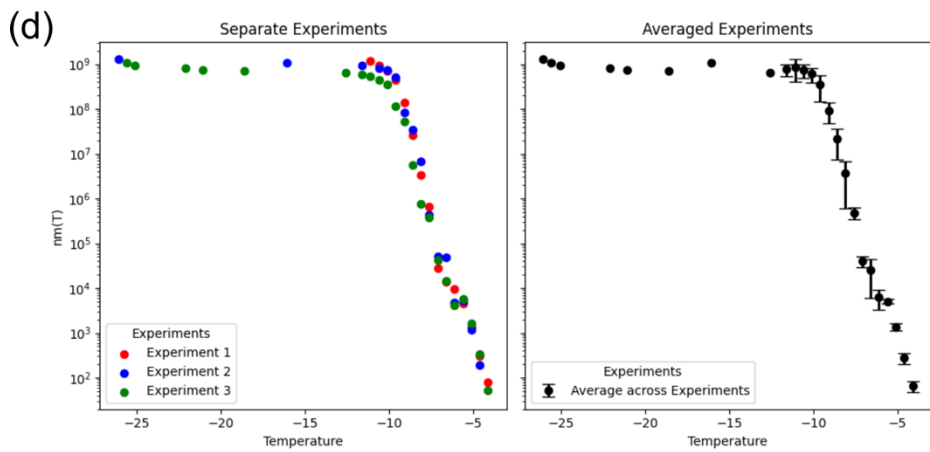
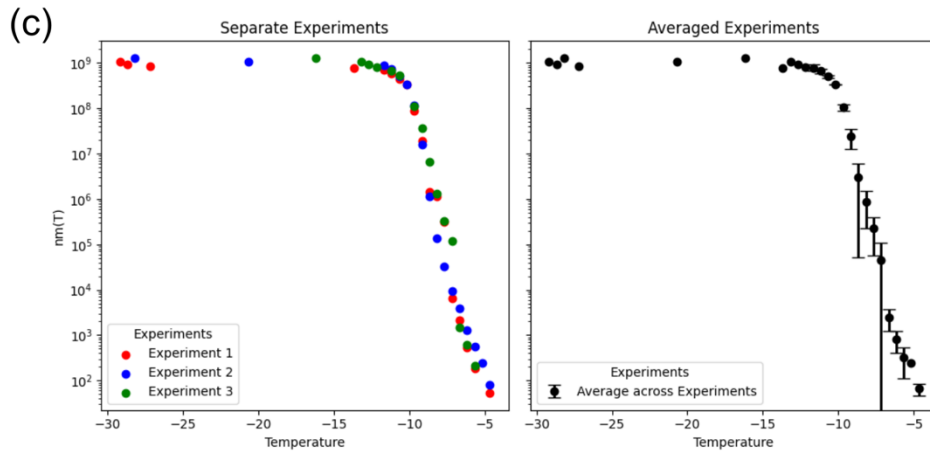
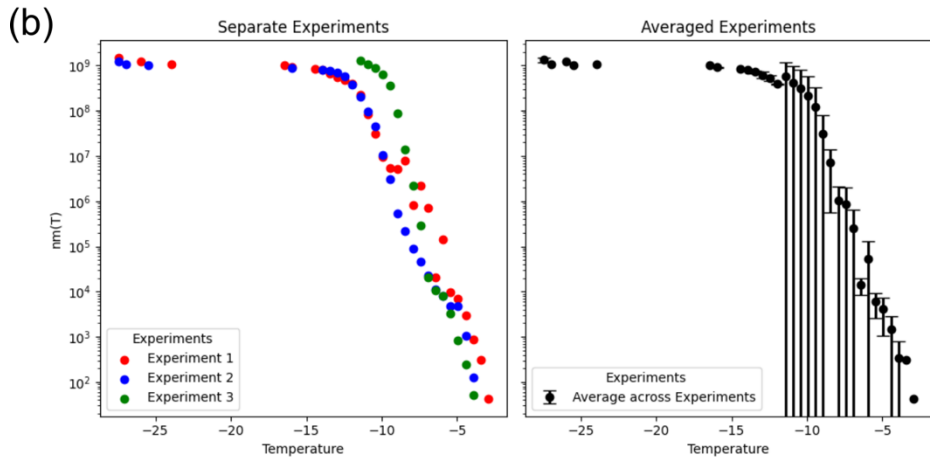
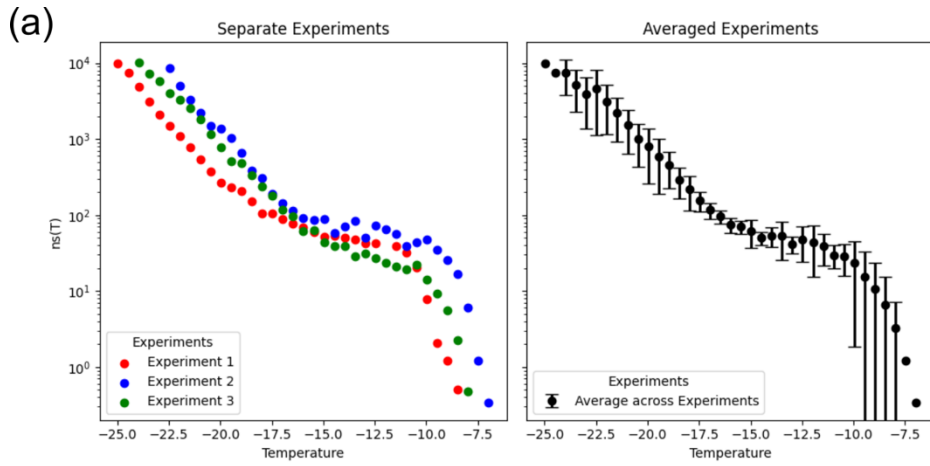


Referee 1

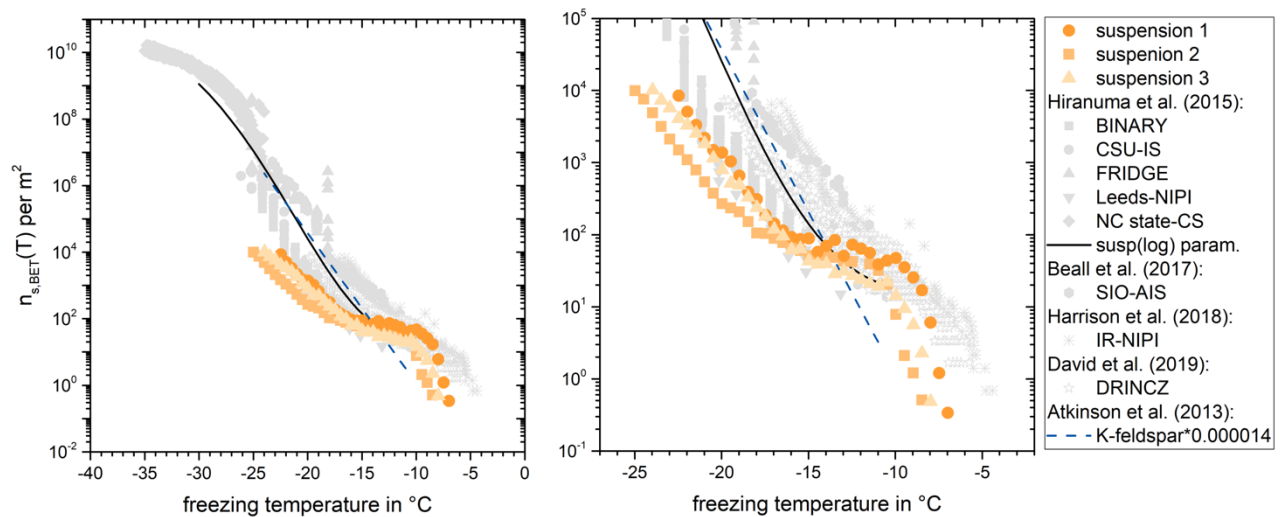
1. The authors attributed the lower INA activity of the frozen Snomax compared to the fresh sample to the variability between the suspensions. Given that they have conducted the additional experiments, I would suggest they add the uncertainty of the calculated nm based on the repeating experiments. Also, it's good to include the uncertainties reported by Wex et al. [2015]. This would help confirm that the lower values are indeed due to the variability between the suspensions.

Thank you very much for this suggestion. We were advised by referee 2 to remove the standard deviations from the graphs, thus we decided to show the data for the three individual experiments instead. We have now again added the graph that shows the average and standard deviations of the experiments to the Supplementary S5. In Figure S5(b) the standard deviation for 3 freshly prepared suspensions is shown. The activity of the frozen suspension falls within this range when considering the large error bars. We appreciate the suggestion to include the uncertainties by Wex et al., however the data is not publicly available. Further, the data from the intercomparison study shows the deviation between various instruments and additionally the variation within the substrate. Thus, the uncertainty would consequently be combined for these two effects and therefore not comparable with what we show in this study.



2. While I agree that the active site surface density ( $n_s$ ) reported by previous studies varied within three orders of magnitude, upon considering the uncertainty of  $n_s$  measured in their studies and the variation of  $n_s$  reported by previous studies, the measured  $n_s$  still falls within the lower limit of the  $n_s$  range reported by previous studies, particularly at colder temperatures. I will not say they are comparable, at least based on the showed figure 6. In addition, David et al. [2019] have also reported the  $n_s$  of illite NX at temperatures from  $-10\text{ }^\circ\text{C}$  to  $-5\text{ }^\circ\text{C}$ . At lower temperatures, Chen et al. [2018] have also reported  $n_s$  illite NX at lower temperature ranges. More studies can be included for comparison.

We have reformulated the sections in the manuscript that state comparability to the previous data. Further, we have added the  $n_s$  data of Illite from David et al. (2019) in Figure 6 and added a second graph magnifying the relevant range. Unfortunately, the data from Chen et al. (2018) is not published but visually falls within the range of the data already shown as grey background.



Referee 2:

The authors have solved all the issues I had with the earlier version of the manuscript. One new, but very minor issue arose from changes made to Figure 2. The line between "top copper base" and the cooling block currently points to the "vapor chamber", whereas it should point to the copper part above it.

Thank you very much, we have updated Figure 2 accordingly.

