Second Review of "The role of viscosity on drop impact forces" by Sanjay et al.

The authors have made some improvements to the manuscript based on the feedback provided, however some concerns were not fully addressed, as described below. I will use the same number scheme as in the prior report for consistency. I am content with the response for points that are not re-addressed below.

- 1. While I appreciate the inclusion of two additional force datasets, no new droplet shape profiles were included. For a paper that has a significant experimental component, I am surprised with the lack of direct visualization of the droplet dynamics. At minimum, I would recommend adding droplet shape profile comparisons for the two new data sets. Furthermore, these visualizations (including the one already included) should include a scale bar. Additionally, I would suggest including some experimental videos as supplementary materials.

- 2. I appreciate the clarification regarding the error bars. However, a proper characterization (and description of the procedure by which they are determined) of the estimated parametric errors is still incomplete. Rather than including additional discussion, the authors reference the supplementary materials of a prior work (Zhang et al. (2022)). In reviewing this work, I cannot identify error assessments on key parameters (such as impact velocity). An error is now included on the droplet size, but there is no discussion of how drop size is determined nor how this error determined. Additionally, the related point regarding horizontal error bars was not addressed. Given that there is no length limit, I would suggest the authors include all details in the present manuscript rather than referring to incomplete discussions in prior work. (Also a minor point: the new horizontal line associated with the force sensor resolution should be described in the caption.)

- 3.

  - In the experimental methods, the authors now describe that the Bond number is fixed at 1. Given the change in fluid properties between different solutions (with fixed droplet size), this cannot be the case. This needs to be made more precise. Furthermore, in the authors prior work (Zhang et al. (2022)) it is mentioned that the Bo is fixed at 0.5 in simulation for similar experimental parameters. Why the change?
  - By now providing the drop size used, the Oh and Bo now can be used to define the parameters. However, it is not clear that the non-dimensional values are correct. For instance, Figures 2 and 3 both mention experimental conditions where $Oh = 0.0025$ whereas apparently different droplet sizes were used (2.05

mm in Figure 2, and 2.54 mm in Figure 3). Was a different fluid used between these figures such that the Oh could be held fixed? To clarify all of these issues, and for the ease of the readers, I strongly suggest the authors add the dimensional parameters for all experiments to the captions (as they have now done for Figure 2), an appendix, or make experimental data available in a supplementary data set.

  - Given the significant amount of data overlap in the various figures (e.g. Figure 3(b)), I am more convinced now that the parameters and raw data need to be provided in a supplementary dataset for reproducibility and to facilitate further comparisons.
  - The authors mention that their mixtures maintain "a fairly constant surface tension and density, around 61 mN/m and 1000 kg/m^3, respectively." Since the values are now clearly specified in the table now, what is the meaning of these particular characteristic values which do in fact vary by around 20%?

- 5. The new title is more appropriate, but it should be mentioned in the title that there are specific restrictions/assumptions on the substrate (i.e. non-wetting), as the results are likely to depend on the surface wettability.

- 7. If the experimental is repeatable, for a given drop height, the oscillation phase at which the droplet arrives at the surface should not vary, and thus is unlikely to be captured by the error bars as claimed. Some additional quantification of the non-sphericity of the droplets should be included.

- 11. While moving to a different fluid is one viable option, using smaller radii could also allow for smaller Oh.

- 13. While the authors have done a good job clarifying their theoretical arguments, I am not sure that citation to unpublished (and currently inaccessible) work by the same group is appropriate or really necessary.

Regardless of the remaining critical feedback, I still believe this work is valuable and will be of interest to the community working on impacting droplets. However, I still have reservations on the current version given the persistent lack of details on the experiments.