Dear reviewer,

Many thanks for your support and improvement of our manuscript. In the following we are addressing your comments and how we have included your suggestions into the revised version.

Review 2
Comments and Suggestions for Authors

The paper reports the results of combined effect of hyperalkaline conditions and very high SA/V ratio on the dissolution of International Simple Glass and the formation of secondary phases. Authors concluded that the SA/V ratio is a key parameter for the dissolution rate and for the formation of the altered glass surface and secondary phases. They found a very low residual dissolution rate which was several orders of magnitude lower than the initial rate. Authors have also found that the microstructure of the altered glass surface consisted of a very thin, porous layer and that instead of a typical gel-like colloidal morphology, the porous layer was made of a foam-like structure with voids which contained no solid phases. The paper provides important data to be shared with the scientific community. It is well-written and is of commendable quality being recommended to publication [..]

Thank you very much for this kind evaluation.

First, the Table 1 is not "Composition of the YCWCa synthesized…" as claimed, it is the content of elements in the young cement water containing Ca.

This is corrected accordingly.

Line 123: 'Content of elements in the young cement water containing Ca measured by ICP-OES'.

Second, Line 135 informs readers that "The powder was then cleaned ultrasonically in water to remove the ultrafine fraction.". Could authors comment on changes that could occur in the glass during its cleaning in water? Can they be fully neglected? Are there any estimations of near-surface changes due to the contact of glass with the water?

*It is known that real nuclear waste glass samples on contact with water show in the very initial period of contact with water a short-term fast leaching of species from glasses termed instantaneous surface dissolution – see the equation (24) of reference "Corrosion of alkali-borosilicate waste glass K-26 in non-saturated conditions", J. Nucl. Mat. **340**, 12-24 (2005). This term is particularly important for the opposite case when SA/V ratio is very low, and this is most probably the case of glass samples washing. How this short-term fast leaching of species from glasses is accounted if glass washing is done using water?*

In order to distinguish between the original glass and secondary phases formed during the dissolution, the fines need to be removed. The washing and ultrasonic treatment steps are short term treatments only applied for a few minutes.

Dissolution experiments were conducted at very high SA/V ratio to investigate the long-term glass dissolution. The short term fast leaching of species from the glass when washing is done using water will have thus no influence on the long term results. Moreover, the glass powder observed before leaching does not show glass dissolution features like etch pitch or porosity. This is also the case for the altered glass powder altered for 59 days, in contrast to the later observations after several hundred days.

Line 135: 'The powder was then cleaned ultrasonically in water for a few minutes to remove the ultrafine fraction. This treatment does not induce glass dissolution features like etch pits or porosity.'