Electronic Supplementary Information.

Zinc Hydroxide Chloride Monohydrate and Its Transformation to Crystalline Zinc Oxide

Amir Moezzi, Michael Cortie and Andrew McDonagh

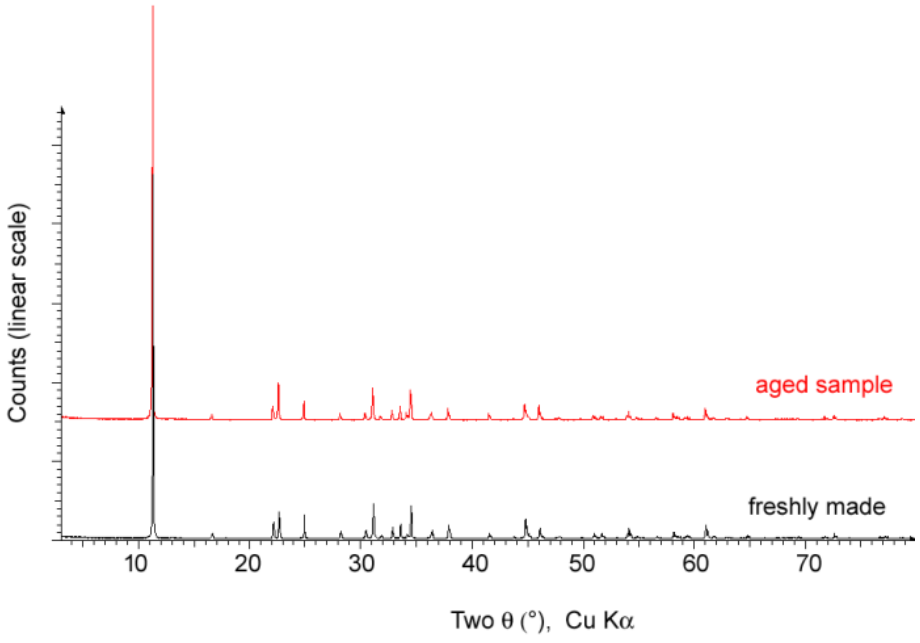


Figure S1. XRD on $Zn_5(OH)_8Cl_2 \cdot H_2O$ shows no change in pattern after aging for 18 months. Top graph: aged sample; Bottom graph: Freshly made and dried sample. Patterns are vertically offset for clarity.

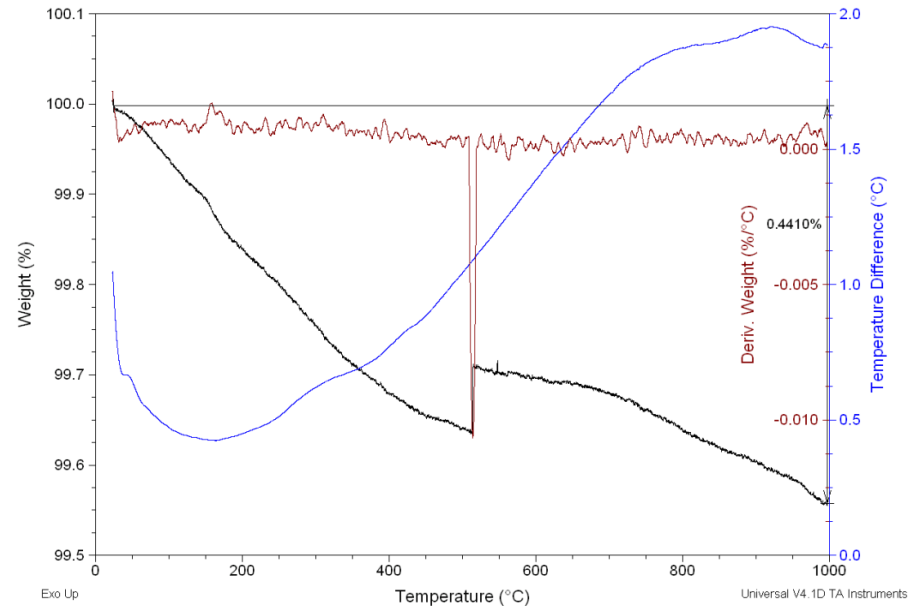


Figure S2. TGA-DTA on ZnO made by calcining $Zn_5(OH)_8Cl_2 \cdot H_2O$ at 600 °C. This ZnO sample had been stored for 13 months under ambient conditions and shows a small mass loss of around 0.4% when heated to 1000 °C. This indicates that some reaction with air had taken place during storage.

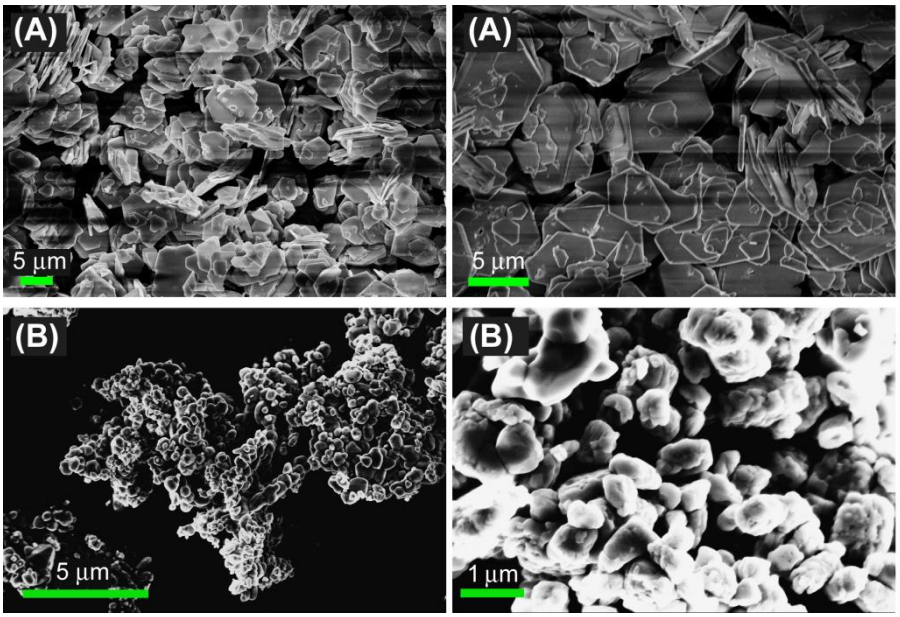


Figure S3. Additional SEM images of (A) $Zn_5(OH)_8Cl_2 \cdot H_2O$ and (B) ZnO made from the material shown in (A). Horizontal streaks are due to charging of the samples.

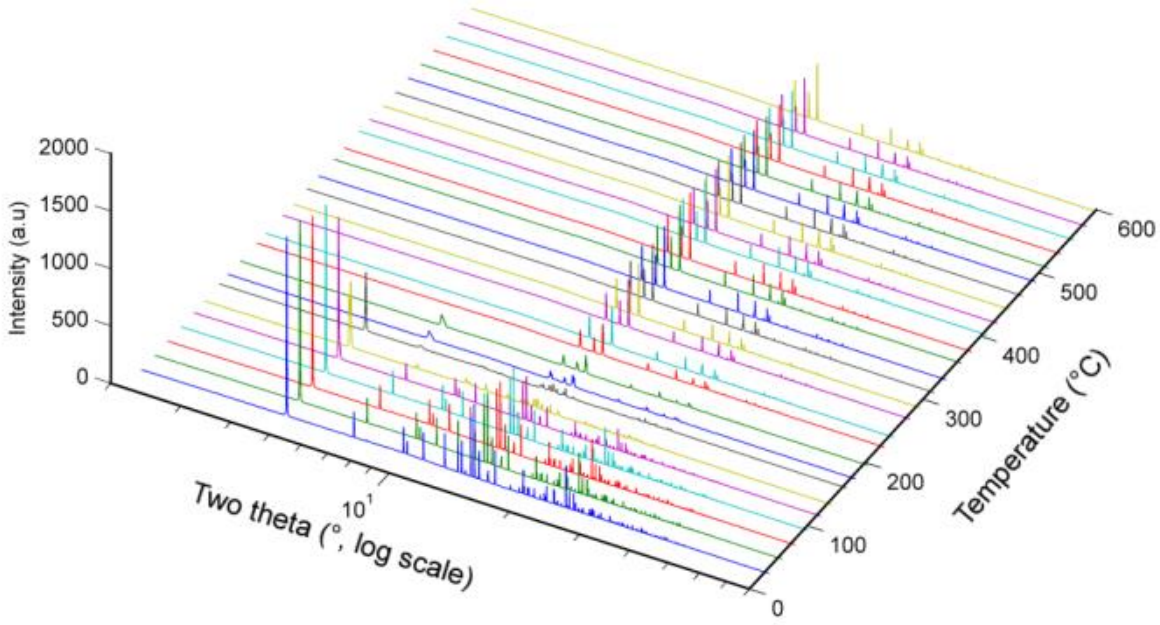


Figure S4. 3D-stacked XRD pattern on $Zn_5(OH)_8Cl_2 \cdot H_2O$ (Synchrotron radiation), Side view.

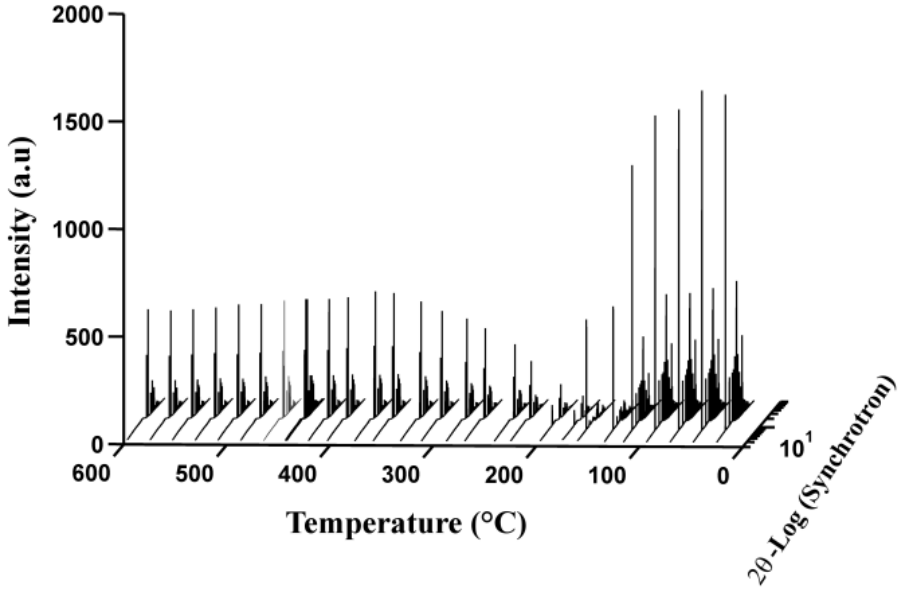


Figure S5. XRD patterns showing the development of diffraction peaks with temperature.

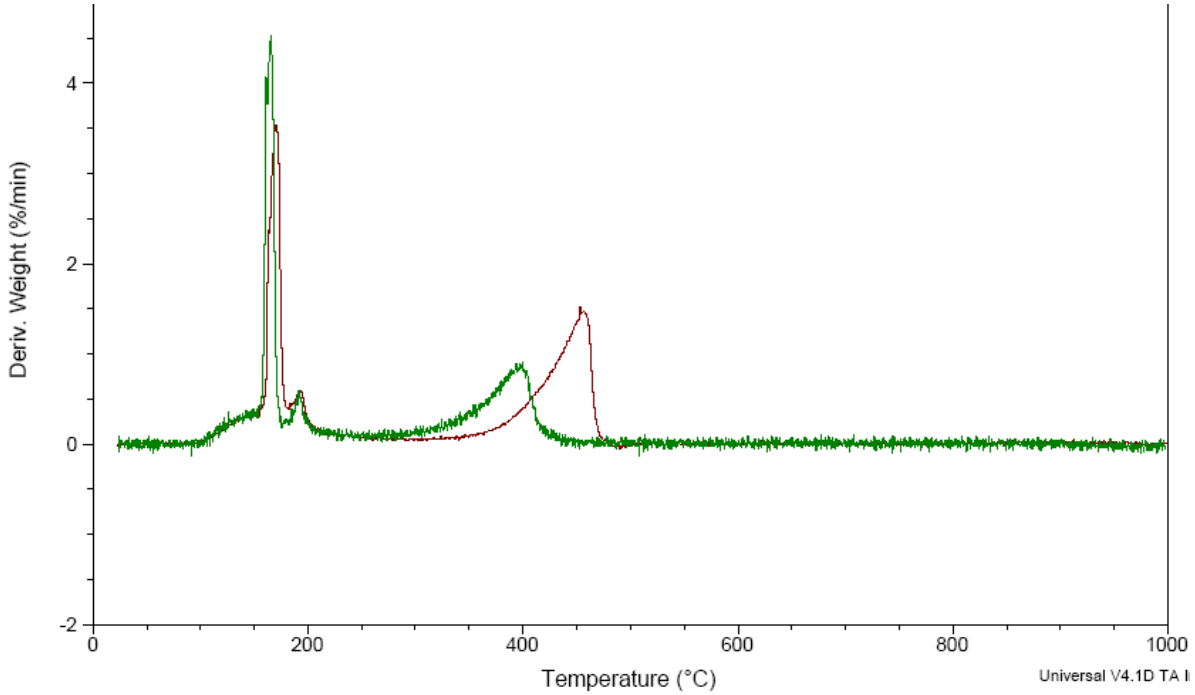


Figure S6. Thermogravimetric analysis on freshly made (green) $Zn_5(OH)_8Cl_2 \cdot H_2O$ and an sample aged for 13 months under room temperature storage conditions (brown graph) shows that decomposition of the latter is delayed to higher temperatures. The samples were both heated at 5 $K.min^{-1}$ in air.

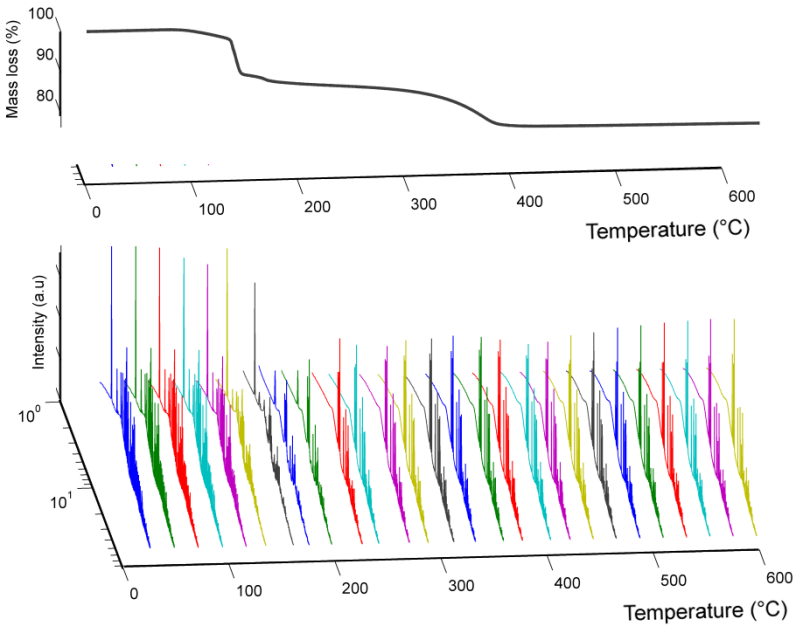


Figure S7. 3D-stacked graph of XRD patterns (synchrotron radiation) on freshly synthesized (Sample 'I') $Zn_5(OH)_8Cl_2 \cdot H_2O$ in conjunction with TGA results.

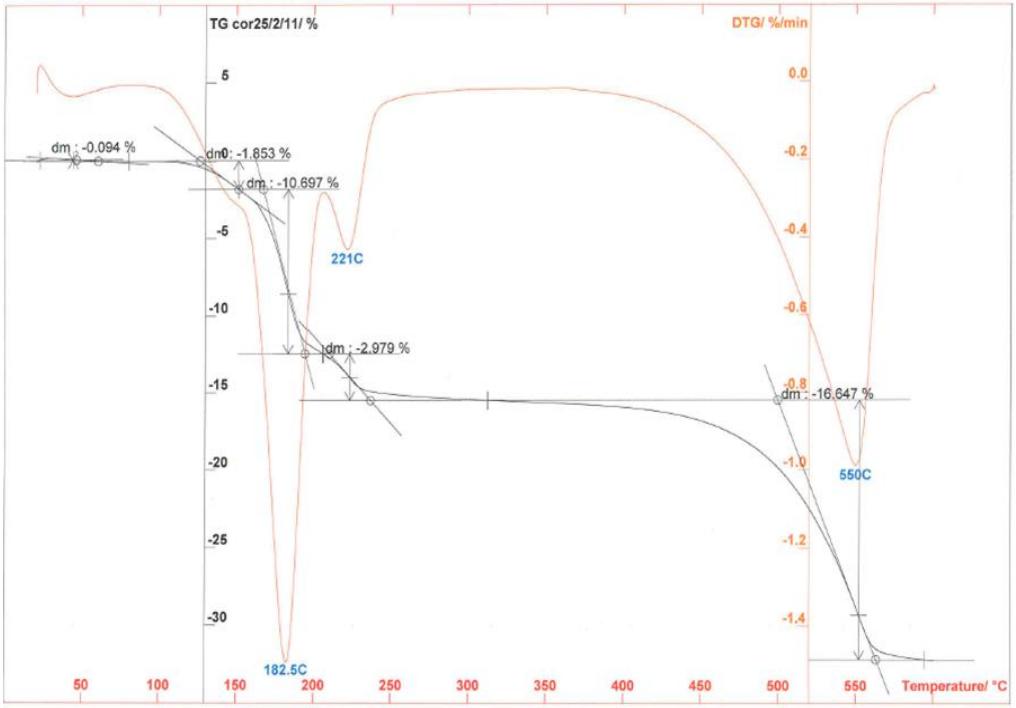


Figure S8. In-situ TGA during MS on $Zn_5(OH)_8Cl_2 \cdot H_2O$ under Ar with a heating rate of 4°C.min^{-1} and up to 600 °C.

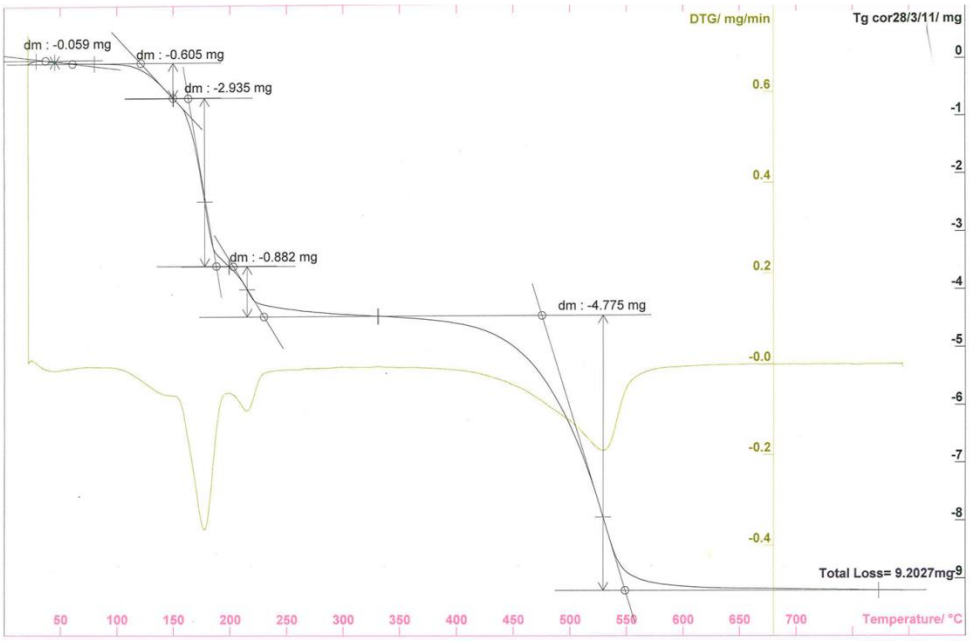


Figure S9. In-situ TGA during MS on $Zn_5(OH)_8Cl_2 \cdot H_2O$ under Ar with a heating rate of 3°C.min^{-1} and up to 800 °C (original mass=28.2 mg).

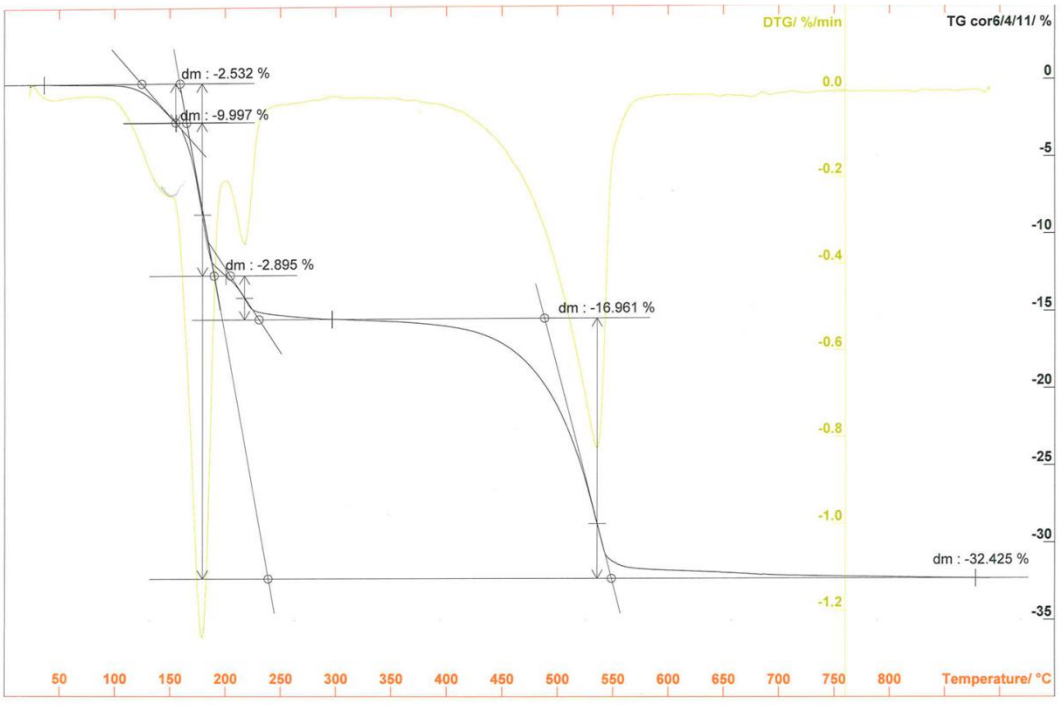
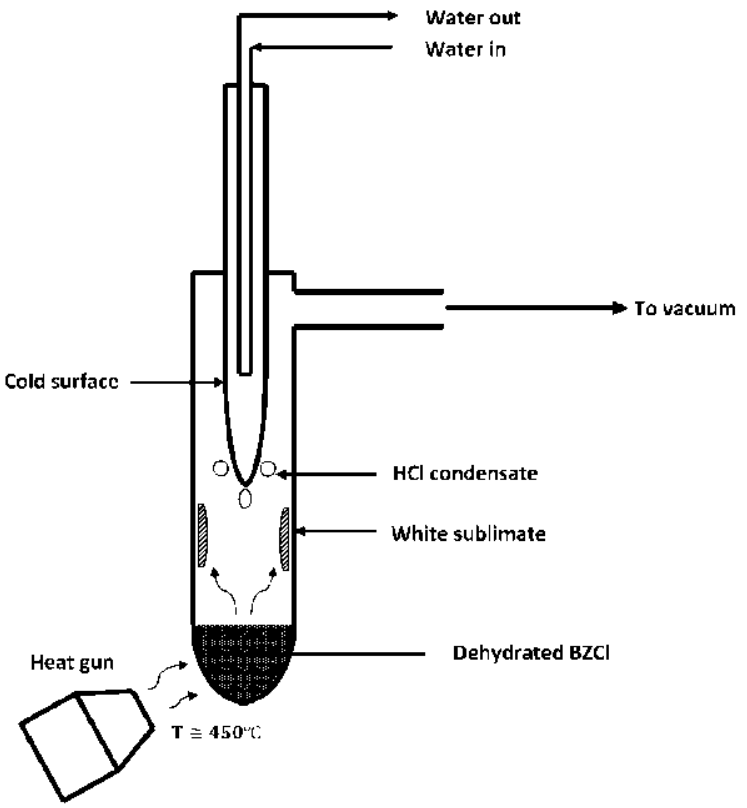


Figure S10. In-situ TGA during MS on $Zn_5(OH)_8Cl_2 \cdot H_2O$ under air with a heating rate of 3°C.min^{-1} and up to 900 °C.

(A)



(B)

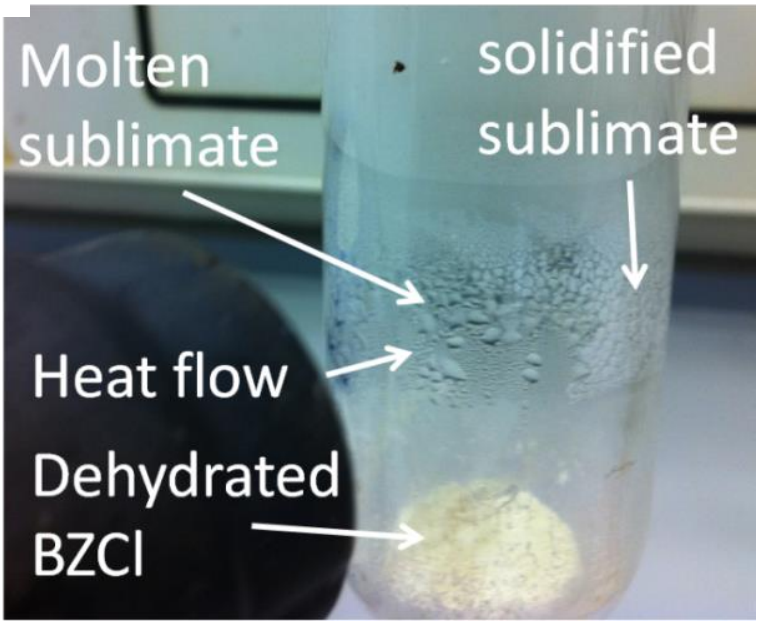


Figure S11. Sublimation set-up to trap the volatile zinc-containing material.

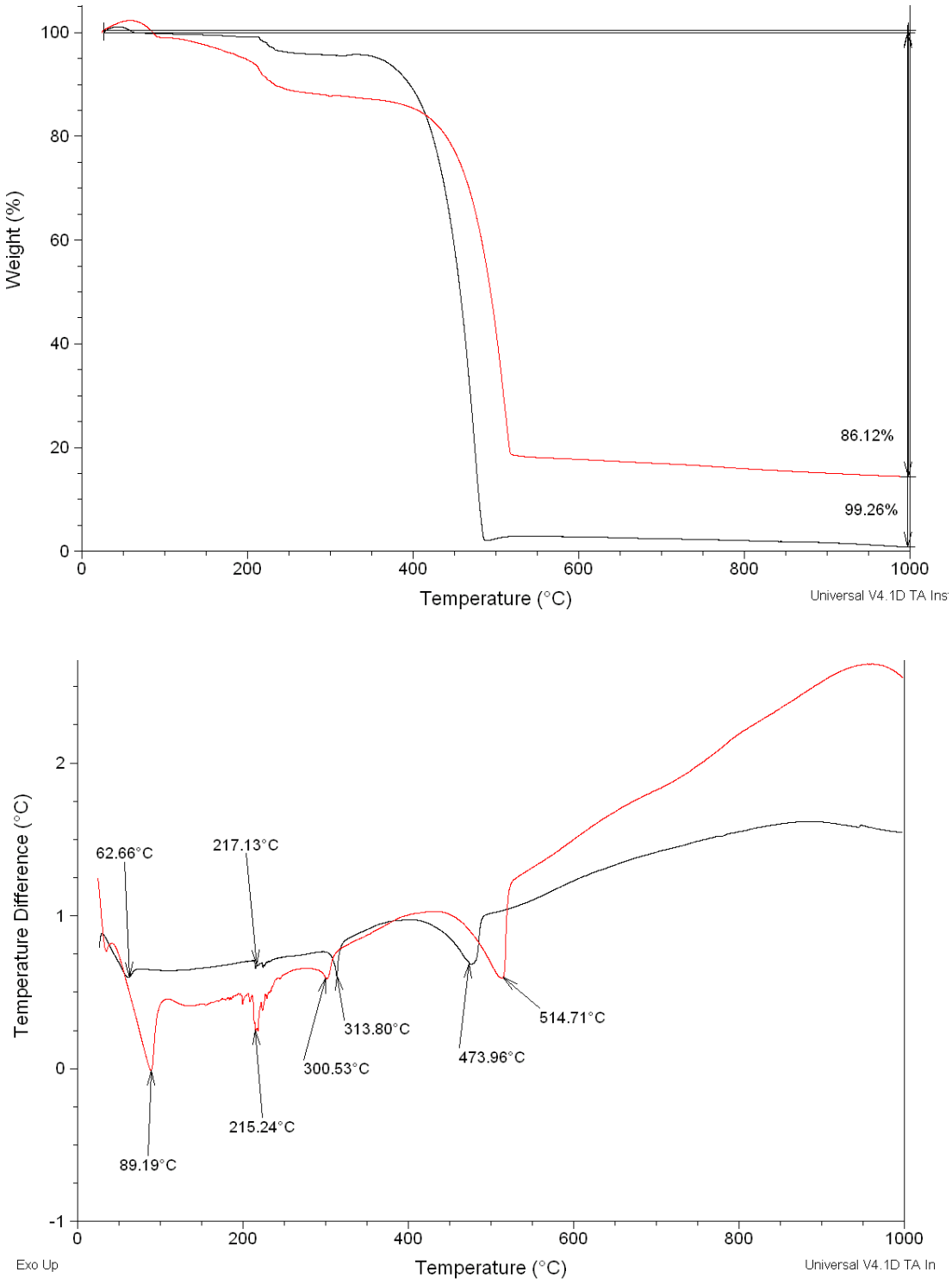


Figure S12. TGA-DTA on zinc chloride dihydrate (red graphs) and sublimate from decomposition of $Zn_5(OH)_8Cl_2 \cdot H_2O$ at 450°C (black graphs).