**ASX RELEASE**

15 January 2019

## QUANTIFIABLE RESULTS IN MULLITE FIBRE PRODUCTION

Chase Mining Corporation Limited ("CML" or "Company") is pleased to announce that the most recent report from the University of New South Wales ("UNSW") contains quantifiable results and a major processing breakthrough in the production of mullite fibre from Torrington sourced topaz concentrate:

- Separable mullite fibre is being produced (Ultimate aim of the research programme)
- Topaz being fed into the furnace no longer requires grinding or pelletising (Cost saving)
- Lower furnace operating temperatures are now possible (Cost saving)

### Executive Summary

Previous reports have suggested that mullite whisker formation is possible at only specific calcination conditions: (1) at elevated temperatures (≥1600°C), (2) following milling of topaz, and (3) pressing topaz into pellets. These conditions were considered to facilitate vapour-solid interactions during the conversion from topaz to mullite. It also was concluded that retention of the vapour ($SiF_4$) at elevated temperatures assists the formation of mullite whiskers. Milling was assumed to enhance gas formation and uniaxial pressing was assumed to enhance the vapour retention.

The present work reports studies of calcination of as-received (minus 1mm) topaz without milling or pressing while enclosed as an alternative approach. The later (successful) experimental arrangement reported on and being used is shown in **Figure 1**. This has the advantage of facilitating vapour ($SiF_4$) retention within the topaz sample being calcined.

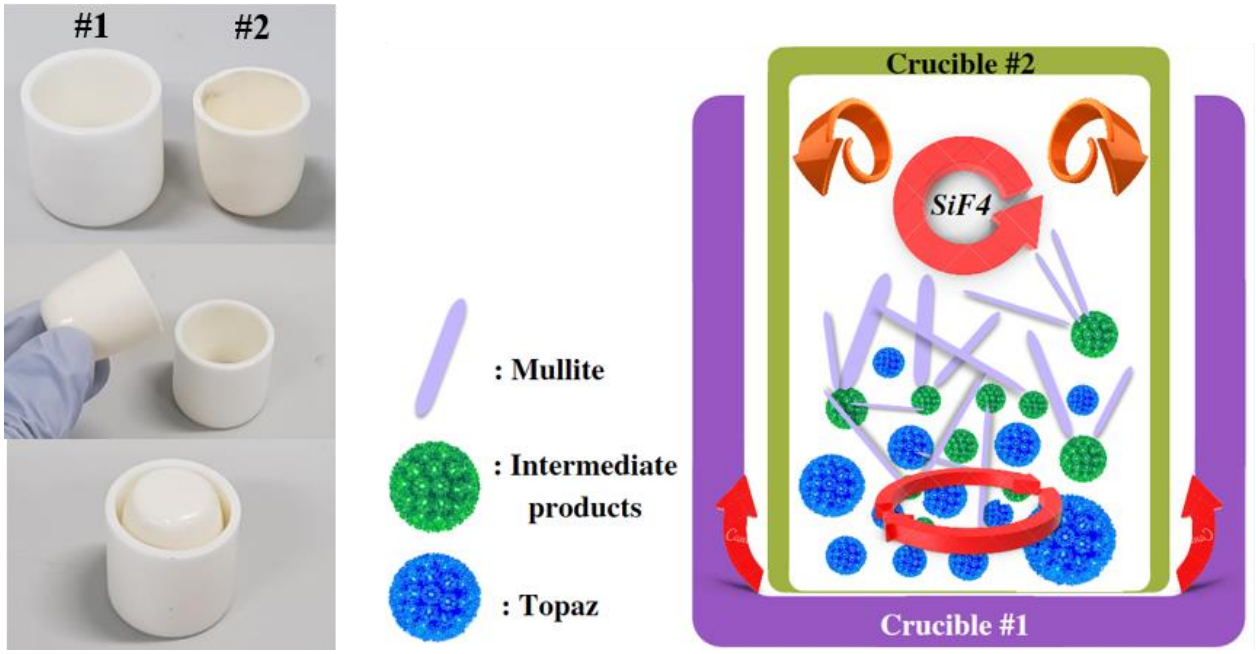


**Figure 1.** Pictorial representation of the alumina crucible configuration used

The present results suggest that pure, separable, mullite whiskers can be produced from as-received minus 1mm topaz concentrate from Torrington packed as a loose, but enclosed bed at temperatures lower than 1600°C in ≤2 hours.

**Experimental Procedure – Mullite Whisker Fabrication**

Compared to previous experimentation, the present work reports data for the conversion of as-received topaz (not milled) in a loosely packed bed using an enclosed crucible arrangement. The calcination was done at 1400°-1600°C for 1-3 hours using relatively rapid feed rates (70-120 sec over a 54 cm transit distance). The samples were examined by field emission scanning electron microscopy (FESEM) and X-ray diffraction (XRD).

The FESEM images in **Figures 2 and 3** are examples of the whiskers / fibre products.

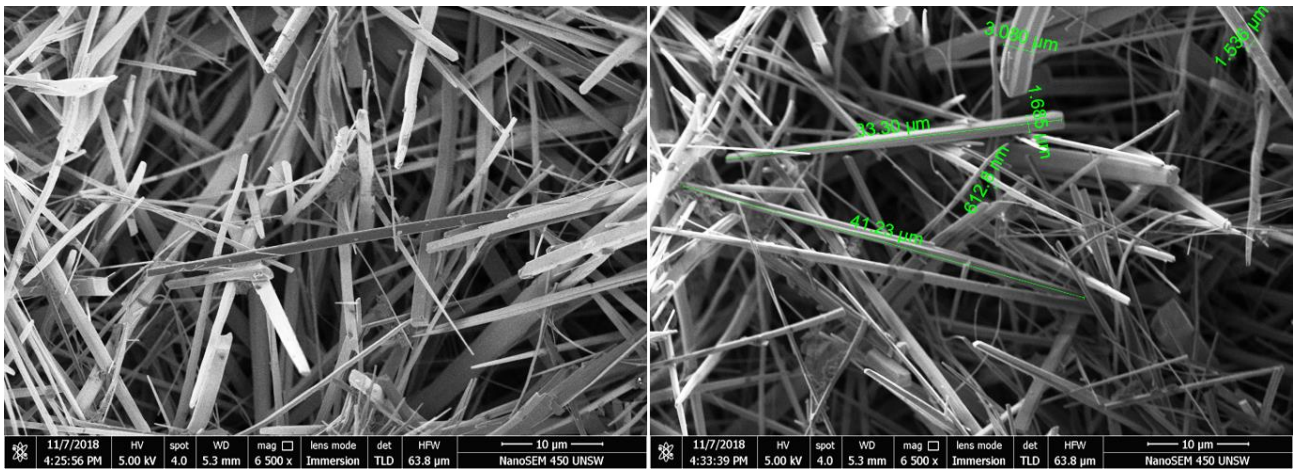


**Figure 2**. FE-SEM analysis of product sample P1600-1 (surface, at the gas-solid interface). Some dimensions are noted on the right-hand image.

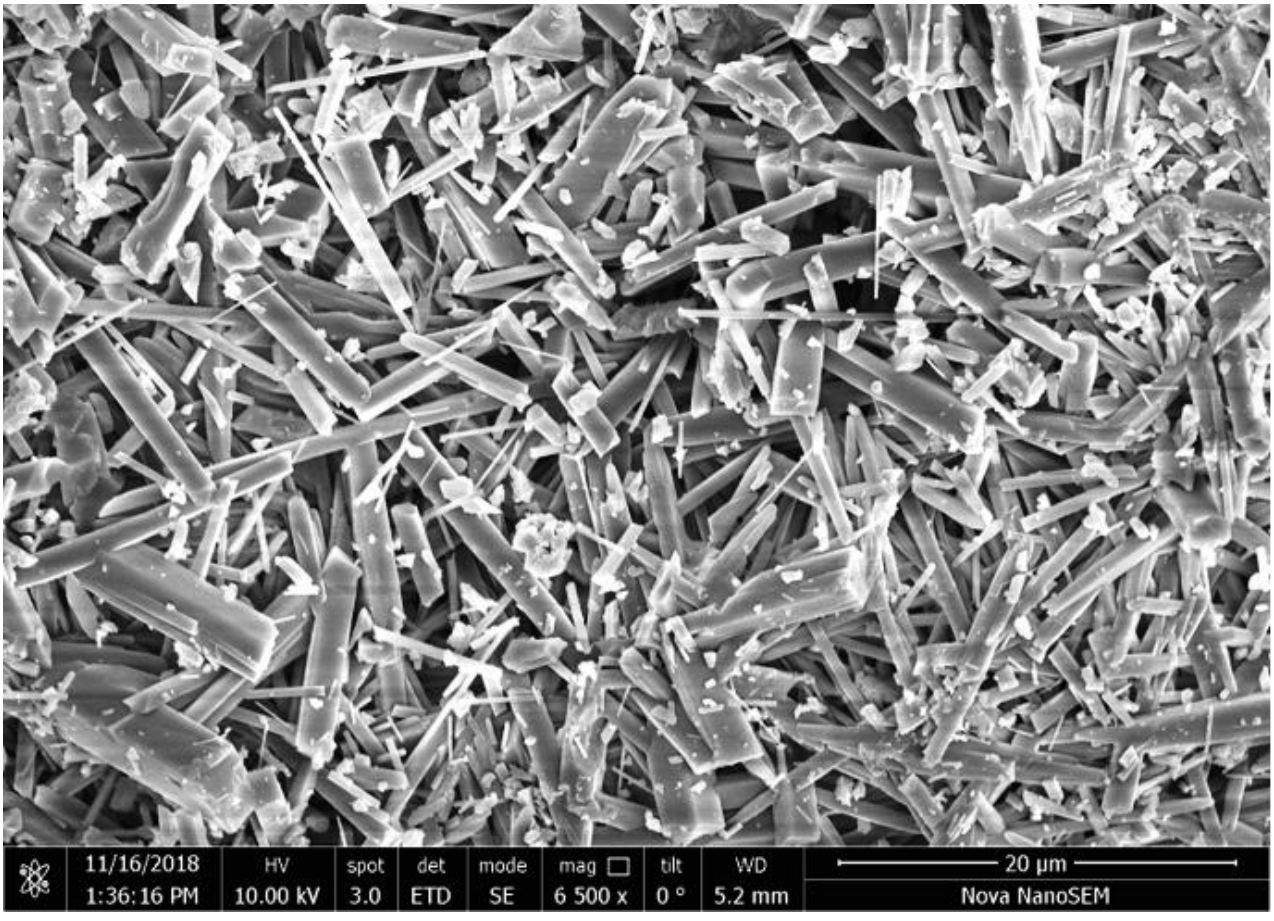


**Figure 3**. Morphology of product sample S1600-2 (fibre powder).

The XRD patterns of samples (products obtained using the closed crucible configuration) show only one crystalline phase of mullite; each diffraction peak has been assigned a crystallographic plane in the mullite crystal as shown in **Figure 4**. *It is important to note that no secondary phases such as alumina and silica were observed.*

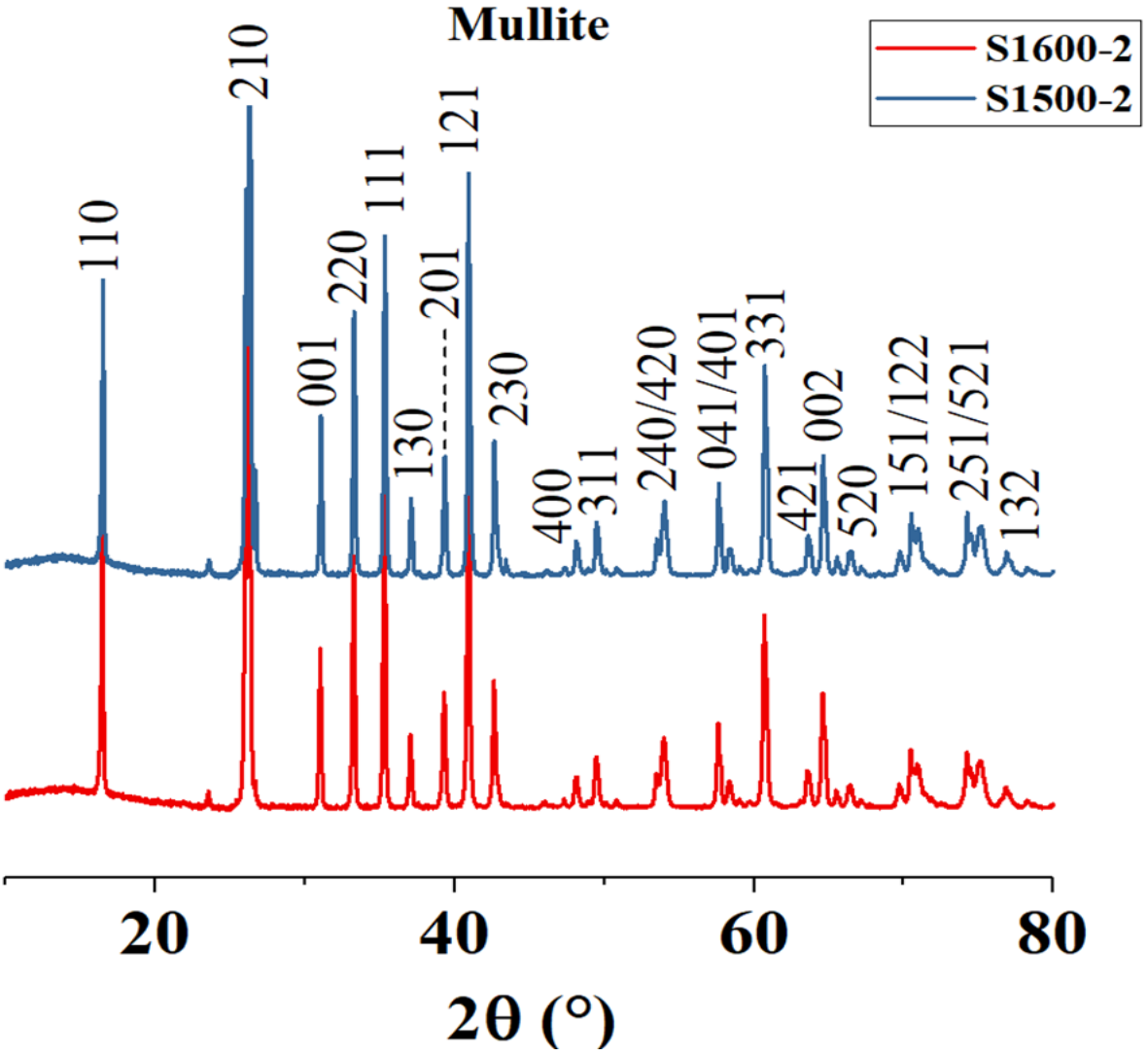


**Figure 4**. X-ray diffraction patterns of the S1500-2 and the S1600-2 mullite fibre products.

**Outcomes**

- Uniaxial pressing was found to enhance the formation of mullite whisker intergrowths, thus reducing the potential to separate them.
- The use of a loose bed of unmilled topaz and enclosure within nested crucibles appeared to have enhanced retention of the vapour phase and resulted in the growth of well-formed and separable whiskers.
- Longer heating times resulted in longer and thicker whiskers but these were at the expense of increased interfibre bonding strength, which made separation by grinding with mortar and pestle more difficult. However, there remains no direct observation of intergrowths, which would be impossible to separate.
- The locations of the whiskers within the bed affected the extent of calcination and whisker size, where the upper two-thirds of the volume exhibited greater extent of reaction and longer and thinner whiskers while the bottom one-third exhibited the converse.
- The results confirm the importance of the retention of the vapour phase in order to allow the availability of sufficient material for continuous mullite whisker growth.

**Future Work**

- Investigation of topaz conversion at lower temperatures in closed crucibles
- Investigation of conditions conducive to growth of fibres
- Development of means of separation and classification of mullite whiskers

**Metal infiltration of mullite fibre preforms**

In collaboration with the UNSW it has been agreed that Topfibre (Pty) Ltd (which is a wholly owned subsidiary of the Company) will fund the initial trials and secure the IP before seeking external assistance funding.

For, and on behalf of, the Board of Directors of Chase Mining Corporation Limited:

Dr Leon Pretorius

Executive Chairman

Chase Mining Corporation Limited

15 January 2019

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