REFRACTORY INCLUSIONS IN TAGISH LAKE: A STRONG LINK TO THE CMs. [1,2]L. Grossman and [1]S. B. Simon, [1]Dept. Geophysical Sci., 5734 S. Ellis Ave., Univ. of Chicago, Chicago, IL 60637, USA. [2]Enrico Fermi Inst., Univ. of Chicago, Chicago, IL 60637, USA.

Introduction: Tagish Lake is a unique carbonaceous chondrite with CI-like phyllosilicates [1] and high-temperature components like those of CMs [2]. We are conducting a petrologic study of the anhydrous component of Tagish Lake to clarify its possible relationship to the CMs. Although freeze-thaw disaggregation has been used successfully to recover refractory inclusions from Murchison, applying this technique to ~1 g of Tagish Lake yielded only one spinel spherule and two other Al-rich objects [2]. From an additional allocation of 9.6 g, we disaggregated 7.3 g of fusion crust-free material. In addition, we mounted and polished seven chips of the meteorite to search for inclusions *in situ* by X-ray mapping. The latter results are described herein. We found two hibonite-bearing inclusions, not previously reported from Tagish Lake, and ~25 other spinel-rich objects *in situ*, including small (~10 µm) single crystals and loose to compact clusters of grains. We also found that many inclusions, chondrules, and single crystals are enclosed in thick, fine-grained, phyllosilicate-rich mantles. These mantles are discussed in a companion abstract [3]. Such mantles are common in CMs [4] but not in CIs. These results strengthen the connection between Tagish Lake and the CMs.

Observations: Both hibonite-bearing inclusions have thick mantles and consist of thin (~ 2 µm across), discrete laths occurring between equant spinel grains (~ 5 µm). The smaller inclusion, ~ 40 x 30 µm, is compact and may be a spherule fragment. It has hibonite with ~6 wt % TiO_2, ~1 wt % FeO, and < 0.1 wt % V_2O_3, and V-poor spinel. The larger one, 100 x 90 µm, has a highly irregular, porous, nodular texture. It has relatively Ti-poor hibonite (1.5-3 wt % TiO_2) with 0.6 wt % FeO and 0.3 wt % V_2O_3, and V_2O_3-rich (0.5 wt %) spinel. Inclusions with FeO-bearing hibonite have also been reported from Mighei [5]. Most spinel clusters also have mantles, are irregularly shaped and consist of loosely packed, small (~5 µm), anhedral grains ± trace amounts of fine perovskite. The spinel grains typically contain 0.5-1.0 wt % FeO and 0.1-0.5 wt % V_2O_3. One spinel-rich aggregate contains TiO_2-rich (0.7-1.1 wt %) spinel like that found in a spherule from Tagish Lake [2] but unlike any spinel reported from CMs.

Discussion: The presence of hibonite-spinel inclusions in Tagish Lake clearly shows that it is petrologically related to the CMs. The present results further suggest that an important component of the refractory inclusion population in Tagish Lake, like that of Mighei [5], consists of small, altered Mg-Al spinel-rich inclusions and loose clusters of spinel grains. Because they are small, hibonite-free and fragile, most of these would not be recovered through the freeze-thaw process. In our preliminary study [2], a small sample size and/or a small high-temperature, anhydrous component relative to previously described CMs led to a very limited recovery of CAIs. Our study of a significantly larger sample of Tagish Lake should lead to a better representation of the CAI population of Tagish Lake. We will continue to search the density separates thoroughly for additional inclusions in order to determine their nature and abundance. Both thin section mapping and freeze-thaw disaggregation are needed for complete characterization of the anhydrous fraction of Tagish Lake.

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