CHONDRULES IN THE TAGISH LAKE METEORITE: LITHOLOGICAL VARIATIONS

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Introduction: The present study is continuation of previous efforts [1] to understand and describe the alteration history of the lithologies in the Tagish Lake meteorite. This meteorite is a brecciated carbonaceous Type 2 chondrite that consists of several lithological variations [e.g., 1, 2, 3]. Preliminary microprobe and XRD results of four samples (5b, 11i, 11h, 1v), which were selected on the basis of macroscopic characteristics [4], were presented in [1, 5], showing that they represent lithological variations. Chondrules from these four lithologies are the focus of the present abstract.

Results and Discussion: CM-like lithology 5b contains the most abundant number of chondrule-like objects set in a phyllosilicate-rich matrix. Circular to compacted chondrule-like objects, reaching up to 500 μm in diameter, are surrounded by fine-grained, heavily-altered accretionary rims. These chondrules exhibit porphyritic textures and are primarily composed of olivine (Fo_{99} to Fo_{95}) with rarer pyroxene, magnetite, and Cr-bearing spinel grains. Most of the chondrules exhibit evidence of alteration as indicated by serpentinization of forsterite. A large (~2000 μm diameter) chondrule was extracted intact from the friable matrix during processing of sample 5b. This chondrule is nearly perfectly spherical and shows slight alteration on its margins and in some mesostasis areas. It is a porphyritic type I (Fe-poor) chondrule dominated by enstatite ($En_{96}Fs_{3.6}Wo_{0.4}$) and olivine (Fo_{95-96}). Abundant Ca-augites ($En_{63}Fs_4Wo_{32}$) and rare Cr-bearing spinels ($(Mg_{0.77}Fe_{0.18}Mn_{0.04})(Al_{1.26}Cr_{0.7}Ti_{0.009})_2O_4$, largest ~15 μm) were identified. Mesostasis exhibits partial aqueous alteration which is reflected in its composition, i.e., low analytical totals and presence of Cl.

Chondrules are rarer in samples 11i and 11h than in 5b. Picking through 0.1 g of these samples produced only one or two intact chondrules, fewer than in 5b (five to six intact chondrules). Most of these objects appear to be fragmented with phyllosilicate matrix juxtaposed against fresh olivines. A single barred olivine chondrule (~200 μm diameter) was identified in 11h, while sample 11i contains a unique chondrule with oscillatory zoned olivines (Mg-rich cores (Fo_{79-99}) and Fe-rich rims (Fo_{61-74})).

Although two chips of the same 11v lithology were mounted for microprobe, each contains a different proportion of chondrule-like objects. One is almost devoid of these objects and is similar to 11i and 11h. The largest chondrules (~150 μm) in the other have porphyritic textures dominated by olivine, and contain fairly large 'hot spots' of Cr,Fe-rich and Si-poor areas (probably Fe-rich chromites).

References: [1] Blinova A. et al. 2009. *LPSC XL*, Abstract #2039. [2] Zolensky M.E. et al. 2002. *Meteoritics and Planetary Science*, 37:737-761. [3] Izawa M.R.M. et al. In Press. *Meteoritics and Planetary Science.* [4] Herd R.K. and Herd C.D.K. 2007. *LPSC XXXVIII,* Abstract #2347. [4] Blinova et al. 2010. *LPSC XLI*, Abstract #2140.