

# The distribution of chondrule sizes and the chemical composition of matrix phyllosilicates in Tagish Lake

\*Kento Kiryu<sup>1</sup>, Wataru Fujiya<sup>1</sup>, Ko Hashizume<sup>1</sup>

1. Ibaraki Univ.

## • Introduction

Tagish Lake is a carbonaceous chondrite with various characteristics indicative of aqueous alteration as CI, CM, and CR chondrites. However, the bulk oxygen isotopic composition and reflectance spectrum of Tagish Lake are different from any of existing chondrite groups. Thus, Tagish Lake is a unique chondrite which doesn't belong to known chondrite groups.

The main purpose of this study is to characterize Tagish Lake by comparing with other chondrites. This study focuses on the size, the volume percentage, and the number density of chondrules, which have not yet been reported, and the chemical composition of matrix phyllosilicates. We used a scanning electron microscope (SEM) and energy dispersive x-ray spectroscopy (EDS) for mineralogical observations and chemical analyses.

## • Results and Discussion

The diameter, the volume percentage, and the number density of chondrules in Tagish Lake are  $0.20 \pm 0.12$  mm, 4.21 vol.%, 0.88 /mm<sup>2</sup>, respectively. These values are relatively small among carbonaceous chondrites. Aqueous alteration may be a possible reason for the small volume percentage and number density of the Tagish Lake chondrules. However, the diameter of the Tagish Lake chondrules shows normal distribution in a logarithmic scale, and the diameter of about 90% of the Tagish Lake chondrules are within a factor of 2 of the mean value. These characteristics are common for other chondrites. These observations suggest that the small volume percentage and number density of the Tagish Lake chondrules are not due to aqueous alteration and that the parent body of Tagish Lake formed in an environment where fewer chondrules existed.

The chemical composition of matrix phyllosilicates in Tagish Lake is intermediate between saponite  $[(Ca/2, Na)_{0.3}(Mg, Fe)_3(Si, Al)_4O_{10}(OH)_2 \cdot 4H_2O]$  and serpentine  $[(Mg, Fe)_3(Si, Al)_2O_5(OH)_4]$  solid solutions. The phyllosilicate composition of Tagish Lake is similar to that of CI chondrites, consistent with the conclusion by Zolensky et al. (2002). Furthermore, we found that Fe# (defined as  $Fe/(Fe+Mg)$  (mol/mol)) of the matrix phyllosilicates, which is an index of the extent of aqueous alteration, obtained in this study (Fe# = 0.28) is also similar to that measured by Zolensky et al. (2002) (Fe# ~ 0.3). Thus, the chemical composition of matrix phyllosilicates in Tagish Lake and the extent of aqueous alteration may be independent on lithologies.

Keywords: Tagish Lake , Carbonaceous chondrite, Chondrule, Phyllosilicate, Aqueous alteration