In Situ Observation of Carbonaceous Globules In The Tagish Lake Chondrite.


We report in the Tagish Lake carbonaceous chondrite the first in-situ observation of hollow organic globules in any extraterrestrial material. The data from analytical TEM and micro-FTIR spectroscopy indicate that the globules consist of aliphatic and oxygenated functions. The hollow spherical morphologies are strikingly similar to the material produced by the laboratory simulation of UV photolysis of interstellar ice analogs and subsequent aqueous processing, suggesting that the organic globules in Tagish Lake may be extremely primitive organic material that formed before or during the formation of the solar system. The FTIR organic signatures also show strong similarities to the membrane-like products formed from hydrothermal reaction of an OH-bearing amino acid in the presence of hydrous minerals. The survival of the structures in Tagish Lake indicates that primitive meteorites must have delivered those structures to the early Earth as a possible precursor to life.

Figure 1: An organic globule embedded in fine grained phyllosilicate, saponite. The dark grains dispersed in the matrix are sulfides.

Figure 2: FTIR spectra of (a) an area enriched in carbonaceous globules.

References:


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