Geophysical Research Abstracts, Vol. 7, 00682, 2005
SRef-ID: 1607-7962/gra/EGU05-A-00682

Spectroscopy of the fulgurite glasses

A.Y. Lysiuk (1), G.N. Lysiuk (2)

(1) Institute of geology (andra227@yandex.ru), (2) Institute of geology (cryst@geo.komisc.ru

Fulgurites is a glassware tubular bodes, which formed after the melting of rocks by the hit of a lightning. They are relatively rare and not enough studied geological objects. In our investigations we use several methods such as: X-Ray analysis, Mossbauer spectroscopy, infra-red spectroscopy, electronic microscopy. We studied fulgurite from the area of Nigoziro in Karelia, Russia, which formed on a carbon-containing aleurolits. The main component of fulgurite is alumosilicate glass, which chemical composition is rather correspondent to the composition of carbon-bearing aleurolits. With the help of X-Ray analysis we find that fulgurite glasses have quartzo-felsphatic composition. Also we expose the heterogeneity of glasses which consists in combined presence of amorphous glassy matrix and crystalline formations with differ composition: orthoclase, hematite, chlorite, pyrite. The state of iron in fulgurite was studied with the help of Mossbauer spectroscopy. In spectrum distinguished fore double-peaks of iron. One double-peak of trivalent iron in tetrahedral position, which contains 4.1% of all iron, and three double-peaks of divalent iron in octahedral positions. The last differs by extent distortion of octahedrons. The content of iron at that positions accordingly 33.9; 30.4; 31.6% from all amount of iron. The ratio of $Fe2+/Fe3+$ in sample makes up 23.4%. The infra-red spectrums of fulgurites consists from the typical for the silicate glasses absorption stripes, which connected with the oscillation of silicium-oxygen carcass of glassy fulgurite substance. Also we find several narrow stripes of crystalline quartz which is an evidence of crystalline quartz presence in felsphatic fusion. By the micro-probe analysis we determined that the main mass of glassy fulgurite substance is a thicken Si-Al-Fe fusion. In the main mass of fusion the areas of almost pure glasses are distinguished. The simultaneous appearance of fragments as glassy such as residual quartz in fusion tells that the temperature of fusion in that zone was near the temperature of quartz melting, this is about 1700 C. Also we often meet inclusions of hematite Fe2O3. Its grains have the straight borders. The appearance of this inclusions allow as to estimate the temperature of the fusion which did not reach

the temperature of hematite melting. Besides, in the glass, we find the inclusions of hematite with the tracks of partial fusion. Appearance of a great amount skeleton formations with the composition such as FeO (wustite) is an evidence of a great fusion cooling speed. Such structures forms because of dissociation on the cooling stage.