SiO_2-RICH COMPONENTS IN ORDINARY CHONDRITE SHINEJINST (H4)

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SiO_2-rich components (SRC) are quite rare objects present in most types of nonequilibrium chondrites [1-8; etc.]. These objects are interest because the mechanism of formation of objects enriched in SiO_2 in the protosolar nebula is not fully understood. SRCs are found in the form of chondrules and their fragments, most often consisting of pyroxene and a polymorphic modification of SiO_2 (tridymite, cristobalite, less often quartz).

Fragments of the Shinejinst meteorite, with a total mass of 693.42 g, were founded in the Gobi Desert 10 km Northwest of Somon Shinejinst, Bayankhongor Aimag, in Mongolia. [9-10]. The meteorite is classified by us as H4. The meteorite was studied at the Geoanalitik IGG UB RAS (Ekaterinburg, Russia) using a scanning electron microscope JSM 6390LV with an EDX attachment EDS X-max 80 and EBSD systems NordlysNano Oxford Instrumentsc. The Raman spectra were captured using a LabRam HR800 Evolution spectrometer with an Olympus BX-FM optical microscope, an Ar laser with a wavelength of 514 nm.

Four SRC were found in the matrix of the Shinejinst meteorite. SiO_2-phase is associated with low-Ca pyroxene in these objects (fig.1). The SRC-01 inclusion (fig.1a) has an irregular clastic shape and a size of 100×120 μm, composed of low-Ca pyroxene ($Fs_{30\pm0.1}En_{69\pm0.1}Wo_{1\pm0.1}$) with SiO_2-phase inclusions. Silica is represented by rounded and elongated inclusions in low-Ca pyroxene ranging 5-25 μm in size. Using Raman spectroscopy, it was found that pyroxene is represented by clinoenstatite (the characteristic of clinoenstatite is absence of a mode 75 cm^{-1}), silica is cristobalite (the positions of the vibrational modes: 226 cm^{-1}, 414 cm^{-1}). According to study by electron backscatter diffraction (EBSD) the SRC-01 inclusion composed of a single crystal clinoenstatite. Cristobalite rounded inclusions consist of several crystals.

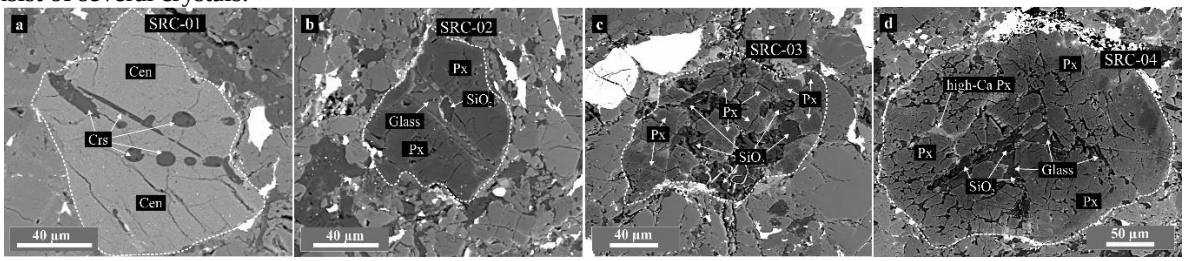

Figure 1. SEM image of SiO_2-rich components in ordinary chondrite Shinejinst (H4).

Inclusion SRC-02 (fig.1b) has a size of 100×120 μm, consists of two large grains of low-Ca pyroxene ($En_{97\pm0.1}Fs_{3\pm0.1}$), separated by mesostasis (K-rich glass with an increased K_2O content of 3.8 wt%). Silica (SiO_2 > 98.1 wt%) is in the form of an inclusion size of 10×15 μm at the contact of pyroxene and K-rich glass. The SRC-03 inclusion is represented by a chondrule fragment (fig.1c), has a porphyritic structure and consists of low-Ca pyroxene ($Fs_{8\pm0.4}En_{91\pm0.3}Wo_{1\pm0.1}$) and silica ($SiO_2$ 98.4-99.4 wt%). Porphyritic pyroxene (PP) chondrule SRC-04 (Fig.1d), consists of low-Ca pyroxene, with edges of high-Ca pyroxene, mesostasis is composed of K-rich glass (K_2O 3.0±2.2 wt%) and silica (SiO_2>98 wt%). The chondrule is slightly elongated with uneven borders, and has a size of about 300 μm. In the low-Ca pyroxene grains, the iron content is zoned from the center to the edge (FeO from 5.6 to 10.4 wt%).

The FeO content of low-Ca pyroxene varies from 2.1 wt% to 21.5 wt% in SRCs in the Shinejinst meteorite. Similar variations of iron content are observed in SRC in the Devgaon H3.8 meteorite [4]. The K-rich glass contain K_2O 2-4 wt% was not observed previously in the SRC in some chondrites.

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