UNUSUAL XENOLITHS IN CHELYABINSK LL5 METEORITE. S. V. Berzin[1], S. Yu. Stepanov[1], G. A. Yakovlev[2] , R. F. Muftakhetdinova[2] and V. I. Grokhovsky[2], [1]The Zavaritsky Institute of Geology and Geochemistry, Russian Federation, Ekaterinburg, 620016, Vonsovskiy street, 15, sbersin@yandex.ru, [2]Institute of Physics and Technology, Ural Federal University, Russian Federation, Ekaterinburg, 620002, Mira street, 21, grokh47@mail.ru.

Introduction: Based on mineral compositions, oxygen isotopic composition and texture, the Chelyabinsk meteorite is a typical impact breccia LL5 ordinary chondrite with shock stage S4 and weathering grade W0 [1-4]. This meteorite consist of three main lithologies [5, 6]. Also, a few xenoliths have been found during examination of Chelyabinsk meteorite samples recently. All of them are situated in light lithology

Methods: Thin section of first sample and microsection of second sample have been prepared. Both of them were studied using optical microscope Carl Zeiss Axiovert 40 MAT, scanning electron microscopes Carl Zeiss Sigma VP and JSM-6390LV from JEOL with EDX spectrometers X-max 80 from Oxford Instruments.

Results and discussions: Usually chondrules in Chelyabinsk meteorite are recrystallized, they are deformed or broken and in size up to 1.0 mm, but in our case xenoliths achieve 10 mm in size. Xenolith (6x10 mm) in first sample contain only barred olivine chondrules with worm-like texture. Metal and sulfides grains are rare. External part of barred olivine chondrules consist of olivine monocrystals forming hollow skeletal box crystals. Chondrules internal parts contain acidic plagioclase glass with microcrystals of olivine, clinopyroxene and, very rare, orthopyroxene. Recrystallized matrix is absent in this xenolith. Structure of space between chondrules and chondrules structure are very similar. Their chemical composition according to microprobe data is also very similar. The difference in chemical composition of matrix and chondrules in non-xenolith part of meteorite is more evident. Xenolith have continuous orthopyroxene rim 100-200 μm width (fig.1). It's worth to note that compound chondrule have been found in matrix of the Chelyabinsk meteorite. The origin of this chondrule probably resemble scheme, discussed in [7].

Composition and structure of xenolith in other fragment is different. Chondrules have not been found in this round inclusion 10 mm in diameter. Xenolith contains net of veins. These veins are formed by mineral which chemical composition reminds plagioclase. Spaces between veins are filled with olivine. Tiny chromite inclusions were noticed, sulfides have not been found.

Variations in composition and texture of examined objects due to different chondrule precursors are discussed.

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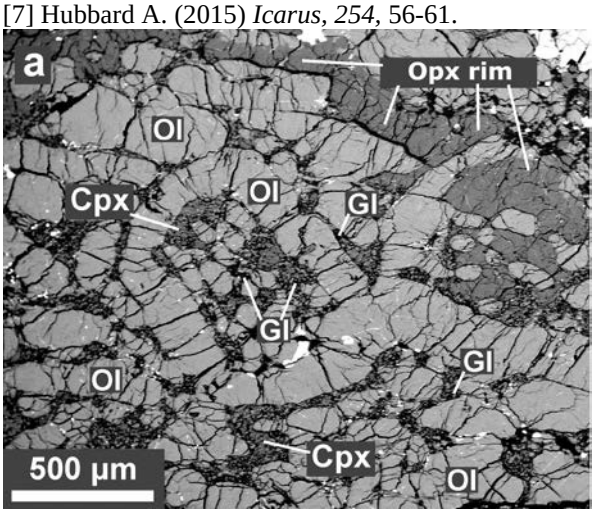

Figure 1. Structure of xenolith in first sample of Chelyabinsk meteorite. Orthopyroxene rim around xenolith and agglomerated barred olivine chondrules. Ol – Olivine, Cpx – Clinopyroxene, Opx – Orthopyroxene, Gl – acidic plagioclase glass.