AN ORIGIN OF THE PYROXENE-RIMMED SILICA OBJECTS IN THE HOWARDITES AND POLYMICT EUCRITES.

C. A. Lorenz[1], [1]Vernadsky Institute of Geochemistry and Analytical Chemistry, Kosygin St. 19, Moscow, 119991, Russia, c-lorenz@yandex.ru

Introduction: Silica is a common component of the eucrites and usually does not show any reaction relationships in the matrix of the howardites. Only one tridymite fragment rimmed by pyroxene from the Yurtuk howardite was reported and interpreted as a product of thereaction of silica with matrix [1]. Recent detail survey of the HED breccias showed that pyroxene-rimmed silica objects (RSOs) are typical accessory components of the Yurtuk and Dhofar 1302 howardites and the Dhofar 285 polymict eucrite. Here we discuss the possible mechanisms of the RSOs formation due to reaction of silica with an olivine-saturated melts.

Results: The RSOs occur in the HED breccias mostly as isolated objects. 15 RSOs were found in the studied meteorites. The RSOs composed of a massive silica cores and pyroxene rims, in some objects containing olivine and plagioclase. The RSOs rims have sharp contacts with the host breccia. Usually, a morphology of the rim follows to a shape of the core. A core-rim margin is compicated. Typically, pyroxene rims have a massive texture. In several objects the rim is comprised by high- and low-Ca pyroxenes.

Three RSOs found in the Dho 1302 have pyroxene rims and similar textures of the core-rim interface. The largest object is RSO#14; it composes of 350x200 µm silica core and pyroxene rim ($En_{65}Wo_3$) of 40 µm width. The core-rim interface is decorated by aggregate of finest, 5 µm length, euhedral crystals of pyroxene radially oriented relative to the silica core. On the broken side of the object the silica core sharply contacts with the pyroxene fragments of the host breccia. The RSO#104 contains a linear chain of four silica grains 20-100 µm in size surrounded by a common pyroxene ($En_{74}Wo_1$) rim of 40 µm width. The object resembles a fragment of a vein in which the silica is partially replaced by pyroxene. The RSO#42 is similar to RSO#14 but has more magnesian rim ($En_{74}Wo_1$).

The RSOs in Dho 275 have rims of pyroxene of variable composition: $En_{47}Wo_4$ or $En_{39}Wo_{22}$, but RSO#37 has olivine, Fo_{24-27} in the rim as well. Two RSOs (#68 and #75) have thin pyroxene-olivine rims, and the veins of similar composition are propagated into the silica core from these rims. The olivine in the veins mostly contacts with pyroxene. RSO#75 contains feldspar on the contact with silica in the core, and the veinlets sharply terminate on the silica-feldspar contacts. Such texture should indicate that a vein-forming material was preferentially reacted with silica during injection into the fractures in the silica-feldspar-bearing host rock.

The RSOs in Yurtuk howardite contain pyroxene of composition $En_{54}Wo_3$ or $En_{35}Wo_{48}$ except of RSO#17 which contains more ferroan pyroxene ($En_{30}Wo_{16}$). The RSO found in Yurtuk before have a rim pyroxene $En_{60}Wo_2$ [1]. The RSO#15 and RSO#29 are inclusions within the fine-grained pyroxene-feldspar melt rocks. RSO#15 has a core of 200x50 µm in size and a rim of 15 µm width. The rim of RSO#15 has a sharp contact with a host melt rock and it is an aggregate of pyroxene $En_{56}Wo_3$ and $En_{35}Wo_{49}$ in composition while the host rock contains only low-Ca pyroxene ($En_{56}Wo_3$). Thin veinlets of the rim material protrude into the silica core. Three eucritic rock fragments containing a silica that has complicated relationships with pyroxene similar to those in the RSOs were found in the Yurtuk.

Discussion: The RSOs mineral chemistry suggests that they should be formed from the HED source. The RSOs are texturally uniform and, therefore, should be generated in a common process. Three studied meteorites differ from each other by MG# of RSOs pyroxenes and the rim mineral assemblages probably indicating that in each case the RSOs had come from some one specific source. While the host breccias minerals are in equilibrium with silica, the pyroxene rim is not a result of *in situ* subsolidus reaction of silica and breccia components during the thermal metamorphism and was formed before the admixing of RSOs into the breccias. Low degree of thermal equilibration of the rock fragments observed in Dho 1302 also is in contradiction with the metamorphic mechanism of RSOs formation. The texture of pyroxene-silica interfaces in Dho 1302, veining in the silica cores of the RSOs in Dho 275, presence of feldspar and olivine in the rims and occurrence of RSO in the melt rocks assume that the pyroxene rims most possibly is a result of a reaction of silica fragments with some kind of melt. Some eucrites have olivine-saturated compositions [2] as well as olivine diogenites. The olivine-saturated melts are not in equilibrium with silica, and should react with the trapped silica fragments to produce a pyroxene rim. The reaction could take place as a result of contamination of impact melts by the regolith containing silica fragments. A possible reaction textures of silica found in the eucritic rock fragments of the Yurtuk could be a result of dissolution of silica-bearing xenoliths captured by a magma. Based on that some of RSOs could have magmatic origin.

References: [1] Labotka T. C. and Papike J. J. (1980) Proceedings of *LSC XI*, 1103-1130. [2] Stolper E. (1977) *Geochimica et Cosmochimica Acta* 41:587-611.