POSTSHOCK ANNEALING OF THE BASZKÓWKA METEORITE.

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Introduction: Baszkówka meteorite is an equilibrated L5 chondrite of shock stage S1 [1]. It is unusual in its high porosity, ranging 20 vol.% [2, 3]. Low shock index, high porosity and no arrangement of metal particles [4] are believed to be evidence for lack of shock deformation in Baszkówka. However, meteorite displays presence of macro- rather than microporosity [5] and silicate rims on the chondrules, isolated grains but also chondrule fragments [6]. It suggests strong collisional event in the history of the meteorite what is in strong disagreement with the shock classification. Optical and scanning electron microscopy observations as well as microprobe measurements were conducted to get insight into deformational history of the meteorite.

Sample description: Baszkówka sample is composed of chondrules, chondrule fragments and isolated, euhedral silicate grains embedded into clastic, kamacite rich, poorly compacted matrix. Majority of the objects contain irregular silicate rims and interstitial crystals grow into pore space. The rim-forming minerals are chemically well equilibrated with the grains they surround. The isolated grains, minerals inside of chondrules as well as their fragments and rims display sharp extinction of light and no fractures are optically recognizable. On the other hand, the rock contains native copper flanks and partly crystalline, irregular, chromite-plagioclase assemblages.

Traces of healed cracks: In BSE images, olivine and pyroxene of the Baszkówka show linearly/planarly arranged inclusions. They are ~2 µm wide vein segments and ~5 µm large blebs composed of metal and troilite or chromite. Olivine crystals display usually two sets of the veinlets. Some of the crystals are also cut by chromite – plagioclase filled veins and wedge shaped, ~10 – 30 µm wide veins with diopside microcrystals in feldspatic glass. They penetrate the crystals along the metal-sulfide veinlets but also join parallel sets of veins cutting through the crystal. The wedges disappear at the boundary of the crystals and their rims.

Discussion: Observed veins are here interpreted as shock-induced but healed planar fractures. Their occurrence along with chromite-plagioclase assemblages, native copper flanks and macroporosity suggest that Baszkówka could be shocked to S3-S4 stage. Fact that olivine shows sharp optical extinction and no planar fractures are visible implies that after the extensive shock event causing formation of planar fractures and injections of melted metal-sulfide as well as silicate material, the rock was annealed at subsolidus temperature [7]. Annealing healed the cracks in silicates, sealed the trails of opaque blebs inside and caused equilibration of the broken rock with newly formed rims on the fragmented objects as well as allowed to partly crystallize plagioclase in assemblages.

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