ON SOME MICRO-TEXTURAL FEATURES OF LIBYAN DESERT GLASS WITH DARK SCHLIEREN. F. Brandstätter[1] and J. Ponahlo[2]. [1]Naturhistorisches Museum, Burgring 7, A-1010, Vienna, Austria. [2]Slatingasse 6A, A-1130, Vienna, Austria.

Introduction: Libyan desert glass (LDG) is known to the scientific community since the early 1930s [1]. Various theories have been proposed for the origin of this enigmatic natural silica glass. However, based on mineralogical observations (e.g., [2-4]) and the finding of a meteoritic component in LDG (e.g., [5-6]) most investigators attribute its origin to an impact event. Comparative studies of impact glasses [7] have revealed that cathodoluminescence (CL) images of LDG show spectacular flow textures that are not visible in any other microscopic method. Here we report on some micro-textural CL features observed in LDG with dark schlieren.

Results and discussion: BSE images taken at several locations within the schlieren-rich areas indicate the presence of microscopic flow structures but are rather poor in textural details. CL images recorded at the same locations exhibit very detailed textures with marked brightness variations within a distance of a few µm. In places, the CL patterns exhibit features typical for turbulent flow. Although the fine structure of the CL features is below the spatial resolution of the electron microprobe, a rough correlation between CL brightness and chemical composition of LDG could be established. Areas with high CL intensity typically have Al_2O_3 < 1 wt%, FeO < 0.2 wt% and TiO_2 0.1-0.2 wt%. Interestingly, very low CL intensities were observed not only for LDG areas with elevated iron contents (0.7-0.9 FeO) but for those consisting of almost pure silica, too. The overall range in major element chemistry (wt%) in the LDG areas investigated is SiO_2 89.0-99.9, TiO_2 <0.02-0.63, Al_2O3 0.02-9.1, FeO <0.02-1.1, MgO <0.02-1.2, CaO <0.2, Na_2O <0.05, K_2O <0.02-0.11. The observed distinct enrichment of Al, Fe, and Mg and the local decrease in SiO_2 to <90 wt% in dark schlieren of LDG are in agreement with the data given by [8].

In some of the LDG sections zircon grains exhibiting different degrees of thermal decomposition have been located. Several of these altered grains are surrounded by luminescent halos, a feature that is not visible in BSE images. Possible explanations for the presence of these halos are (i) radiation damage of the LDG host associated with creation of luminescence centers around zircon inclusions, and (ii) thermal release of CL activators from zircons and incorporation into the adjacent melt during the high temperature event that led to LDG formation. Some of the thermally altered zircons have a luminescent tail that apparently traces the relative movement of these grains before solidification of LDG.

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