ON THE MINERALOGY OF THE H3-6 REGOLITH BRECCIA DJERMAIA

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Introduction: The Djermaia chondrite, which fell in 1961 in the Republic of Chad, is a light-dark structured meteorite and was recognized as a regolith breccia. Track density analysis [1], noble gas measurements [2] and cosmogenic nuclide studies [3] were performed to investigate pre-irradiation effects and exposure history. However, except for the olivine composition (Fa_{19}, determined by X-ray diffraction) given by [4] no mineralogical data of Djermaia were published so far. Here we present the preliminary results of mineralogical investigations obtained by optical microscopy, analytical SEM and electron microprobe analysis.

Petrography: By visual inspection of polished cuts (total area ~90 cm^2) three lithologies could be recognized. The main lithology A has a fine-grained chondritic texture consisting of dark brownish-grey type 3 material with numerous "sharp" chondrules. Lithology B is light brown to grey coloured and comprises several cm-sized angular to subrounded clasts. Most of these clasts have a coarse-grained chondritic texture corresponding to petrologic type 6. The apparently shock-blackened dark lithology C contains numerous shock veinlets, cellular metal-troilite mixtures and troilite-rich regions where all cracks in silicate grains are filled by sulfide. In places, lithology C also contains mm-sized impact-melt clasts and dikelets having quench textures consisting of acicular olivine crystals embedded in a partly devitrified glassy mesostasis.

Mineral compositions: Olivine and low-Ca pyroxene are clearly unequilibrated in lithology A having compositions in the ranges of $Fa_{4.9\text{-}25.3}$ and $Fs_{2.1\text{-}16}$, respectively. A few Ca-rich pyroxenes overgrown on low-Ca pyroxene have $Fs_{2.4\text{-}10.7}Wo_{32.4\text{-}40}$. In lithology B (Fe, Mg)-silicates are predominantly equilibrated with compositions typical for H-group chondrites. Mean compositions for olivine and low-Ca pyroxene are $Fa_{19.6}$ (range $Fa_{18.8\text{-}20.6}$) and $Fs_{17.5}Wo_{1.4}$ (range $Fs_{16.8\text{-}19.9}$; $Wo_{1.0\text{-}1.7}$), respectively. In lithology C most olivines ($Fa_{18.4\text{-}20.5}$) and low-Ca pyroxenes ($Fs_{16.1\text{-}19.0}$) from the shock-blackened regions also are equilibrated. Olivines from the impact-melt clasts exhibit a marked zoning with $Fa_{9.1}$ (core) up to $Fa_{17.7}$ (rim).

Mean (Ni; Co)-contents (in wt%$\pm1\sigma$) of low-Ni metal in lithology A (6.9 ± 0.6; 0.46 ± 0.05), lithology B (7.0 ± 0.1; 0.46 ± 0.02) and lithology C (6.8 ± 0.2; 0.54 ± 0.04) are within the range reported for kamacite compositions of H chondrites, [e. g., 5]. However, low-Ni metal in cellular metal-troilite mixtures is of martensitic composition (8.0 ± 0.3; 0.48 ± 0.04). Troilite in cellular metal-troilite mixtures contains 0.13 ± 0.04 wt% Ni, whereas all other measured troilite grains have Ni-contents <0.02 wt%.

References: [1] Lorin J.C. and Pellas P. 1979. *Icarus* 40:502-509. [2] Schultz L. and Signer P. 1977. *Meteoritics* 12:359-360. [3] Englert P. 1986. *Meteoritics* 21:358. [4] Mason B. 1963. *Geochimica et Cosmochimica Acta* 27:1011-1023. [5] Rubin A.E. 1990. *Geochimica et Cosmochimica Acta* 54:1217-1232.