

THE RADIATION HISTORY OF KAIDUN METEORITE ON DATA OF TRACK AND TL STUDIES OF Ca-px CRYSTALS. L.L.Kashkarov, N.N.Korotkova, V.G.Kashkarova, A.Ya.Skripnik. Vernadsky Inst. Geochemistry and Analytical Chemistry, USSR Acad. Sci. Moscow

With the purpose of the further investigation of radiation-thermal conditions during the accretion and brecciation processes of Kaidun heterogeneous meteorite /1/ we have measured the TL parameters and VH-nuclei cosmic ray tracks in the same individual Ca-px crystals handpicked from the two inclusions in carbonaceous matrix. The TL-parameters of the separate mineral crystals don't depend on the rather weak heating unlike the glasses in which the sensitivity to the TL storage is determined in the main by their devitrification degree, that is by the thermal history /2/.

We have made the following conclusions from the obtained data presented in the Table.1. The absolute value of TL intensity I_{art} for Ca-px ranges from 100 to 2720 rel.un.(samples 17.4.1 and 10.1.2 respectively); it is lower than that for the feldspar approximately by the 2-3 orders of magnitude. The track density values due to VH-nuclei of cosmic rays are low and approximately the same in the indicated samples ($\rho \leq 3 \cdot 10^4$ tr/cm²). 2. The I_{art} value is distinguished more than by a factor of 6 for the two individual Ca-px crystals (17.4.1 and 17.4.2) having the identical low ρ values and belonging to the same inclusion. 3. The I_{art} value for the sample 17.2.1 is more than fourfold lower than that for matrix material separated from the same inclusion. 4. The peak temperature value changes slightly and ranges from 205 to 220°C for all samples of Ca-px. 5. The full width at half maximum height, FWHM-parameter variations are greater (60-95°C). Rather clear relationship between ρ value and FWHM parameter is observed (see Fig.1).

Conclusions. A relation between the TL intensity and ρ value for the studied crystals has not been found. We propose that the effect of the comparatively low volume density of structure microdisturbances within the range of (10^7 - 10^9) track/cm³ is insignificant on the TL background the intensity of which is determined by the other factors. However the increase of the TL parameter FWHM by a factor of ~ 1.5 (see Fig.1) in the crystals with the higher ρ value indicate in all probability the appearance of the additional low-energy electron traps the quantity of which increases in proportion with the volume track density independently of the summary TL intensity.

References: 1. Kashkarov L.L. et al. LPS XX, 1989, 508-509. 2. Guimon R.K. et al. GCA, 1985, 49, 1515-1524.

Table. TL and track parameters of Ca-px inclusions from Kaidun meteorite

N	Sample	Mass, mg	TL _{art} ^{x)} , rev.un.	T _{peak} , °C	FWHM, °C	Track density, cm ⁻²
1	K 10.1.2	0.05	2720	205	75	(3±2)·10 ⁴
2	K 10.1.3	0.1	464	225	95	(1.1±0.1)·10 ⁶
3	K 10.1.4	0.05	1340	210	60	(6±4)·10 ⁴
4	K 10.1.5	0.2	209	210	65	<10 ⁴
5	K 10.1.6	0.15	272	220	80	(1±0.3)·10 ⁵
6	K 10.1.7	0.1	400	215	85	(6±3)·10 ⁴
7	K 10.1.8	0.05	764	210	85	(3±0.6)·10 ⁵
8	K 10.1.9	0.15	293	215	75	(4±2)·10 ⁴
9	K 17.2.1	0.2	159	210	60	<1·10 ⁴
10	K 17.4.1	0.3	100	205	60	<1·10 ⁴
11	K 17.4.2	0.05	630	205	60	<1·10 ⁴

x) The total dose of ¹³⁷Cs γ -irradiation is 2.2 Mrad.

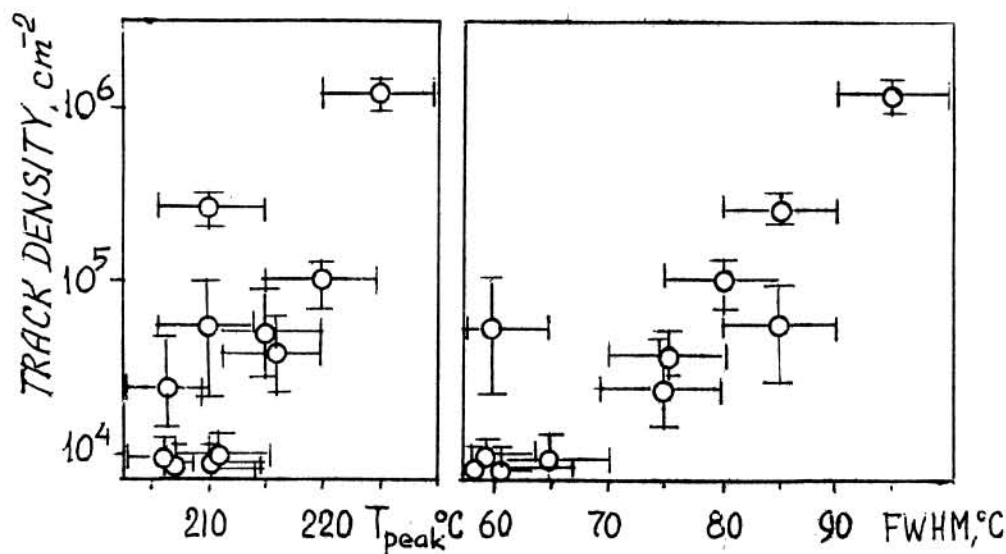


Fig.1. Track density against TL peak temperature (T_{peak}) and peak width (FWHM) for 11 Ca-px crystals from Kaidun meteorite.