EARLY HISTORY OF THE ALLENDE CV AND KAINSAZ CO CARBONACEOUS CHONDRITES. Lavrukhina A.K., Kashkarov L.L., Korotkova N.N., Kalinina G.V., Kashkarova V.G. V.I.Vernadsky Institute of Geochemistry and Analytical Chemistry, USSR Academy of Sciences, Moscow, USSR.

The Allende CV carbonaceous chondrite is a slightly metamorphised heterogeneous polimict breccia with age of $\sim 4,5.10^9$ years, individual compound phases of which have retained a various records of early solar system processes. We have found in olivine fraction of the chondrite sample N3529 NMNH two track groups due to precompaction low-energy ($1 \lesssim E \lesssim 100$ MeV/nucleon) irradiation (1). The group I tracks have higher track densities (2.10^6-$6.10^7 cm^{-2}$) than group II tracks (8-$9.10^5 cm^{-2}$). Occurence of much steeper energy spectrum of VH-nuclei with power law index ($\gamma \sim 6$) in some olivine grains has led to suggestion about the exposure to ancient active sun particles or during an expanding supernova stage. The shortening of track lenghts up to 1 μm (Fig.1a) due to thermal influence was found and the temperature of short-time heating during chondrite samples brecciation were determined $\lesssim 670$ K. The high density of fossil fission tracks, $(1$-$2).10^7 cm^{-2}$, was found near opaque Cr-containing inclusions in some olivine grains of the same sample (2). This high density was explained by us due to spontaneous fission of extinct isotope ^{244}Pu and probably ^{248}Cm (2,3).

The Kainsaz CO carbonaceous chondrite is a smallest metamorphic degree meteorite among the CO-type carbonaceous chondrites. The track investigation of individual olivine grains, separated from the matrix and different chondrules of the chondrite sample N15256 was carried out. Among ~ 200 olivine grains under investigation in 85% of all cases the VH-nuclei track density less than $\sim 10^4 cm^{-2}$. About 10% of all grains fall within track density interval of $(10^6$-$10^7) cm^{-2}$. The results indicate that initial material of this meteorite at early stage before his accretion was exposed to correspondently low degree of irradiation. The track density gradient was observed for two olivine grains. The gradient characteristics indicate that irradiation of this objects was short (shorter $\sim 10^4$ years) and occured without any shielding. In contrast to olivine grains of Allende for which VH-track lengths is shortened, the tracks of Kainsaz reach as much as possible length ~ 12 μm (Fig.1b). This indicates for lack of heating of the compacted material up to a temperature of $\sim 200^oC$ during of several hours.

The thermoluminescence (TL) investigations of common specimens of these meteorites show also the significant differences. The total TL intensity for Allende nearly two orders of magnitude smaller than for Kainsaz. The TL glow curve from Kainsaz exhibits an very intense low-temperature emission at 170^oC, what is absent for the glow curve for Allende (Fig.2).

Early history Allende, Kainsaz

Lavrukhina, A.K. et al.

Obtained results in total with granulometric characteristics for these chondrites (4,5) and with data on concentration of the planetary noble gases (6,7) allowed to conclude, that: (1) accretion of the Kainsaz chondrite was occured at collisions of chondrules and metal-sulfide aggregates before common gase dissipation of protoplanetic nebula; irradiation with solar flare cosmic rays and solar wind of the planetesimale surfaces was occured only at last accretion stages; (2) during and after accumulation process this meteorite have not been heated up to temperature higher ~ 200°C during of several hours and because of this meteorite have not been metamorphised; (3) thermal and radiation history of the Allende CV chondrite is more complex. We have composed an evolution scheme of its olivine fraction including: (i) olivine of forsterite composition formation ~ $4,5.10^9$ years ago; (ii) its irradiation with low-energy ($1 \lesssim E \lesssim 100$ MeV/nucleon) cosmic rays (group I tracks) took place simultaneously with beginning of small planetesimale (1-100 cm) accretion; (iii) shock lithification due to planetesimale collisions of different intensity (1-20 ГПа, $T_{brecc.} \lesssim 670$ K) and grouth of larger bodies with simultaneous irradiation of their surfaces with cosmic rays (group II tracks, $T_{brecc.} \lesssim 620$ K).

REFERENCES: 1.Korotkova N.N.,Lavrukhina A.K.,Kashkarov L.L.,Dmitriev N.B. (1979) Geokhimia, N3,p.420-425. 2.Korotkova N.N.,Lavrukhina A.K. (1980) Geokhimia, N10, p.1427-1437. 3.Lavrukhina A.K.,Korotkova N.N.,Fisenko A.V. (1982) Abstr.5th Conf.Geochronology.Cosmochronology and Isotopic Geology, Jyne,p.210-211, NIKKO,Japan. 4.Fisenko A.V.,Semjonova L.F.,Volodina E.A.,Lavrukhina A.K.(1982) Lunar.Planet.Sci.XIII,p.221. 5.Clarke R.S.,Jarosewich E., Mason B. et al.,(1970) Smithson.Contrib.Earth Sci., 5, p.1-53. 6.Mazor E.,Heymann D.,Anders E.,(1970) Geochim.et Cosmochim.acta,v.34,7,p.781-824. 7.Lavrukhina A.K. et al. this volume. p.00.

Fig.1.Distribution of the VH-nuclei maximal track lengths for olivine crystals of Allende (a) and Kainsaz (b)

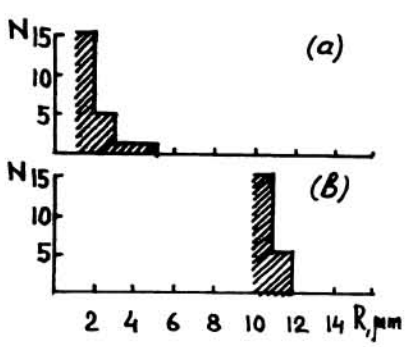

Fig.2.The natural TL glow curves (full lines)of Allende(I) and Kainsaz(II).The dashed lines are the artifical TL glow curves(irradiation of samples with γ-rays ^{60}Co).