THE MELNIKOVO CHONDRITE (LL6). Krot A.N., Zaslavskay N.I., Petaev M.I., Kononkova N.N. Vernadsky Institute, Academy of Science USSR, Moscow

The Melnikovo meteorite weighing 545.6 grams was found in 1987.The sample covered by fusion crust of ~ 1 mm in thickness is a part of polyhedral individual with well-developed regmaglipts. On the light-grey coloured cut surfaces of the meteorite are visible rusty spots due to terrestrial weathering and rare chondrules. Only few barred, porphyritic and granular chondrules are observed in the sections studied. Two of these chondrules are enriched in chromite [1]. The meteorite doesn't show any brecciation on the cm scale. The matrix (93.9 wt.%) is composed mainly of Ol, Opx and Pl and rare grains of Cpx. The accessory minerals are troilite (3.9 wt.%), kamacite (0.4 wt.%), taenite, tetrataenite (0.7 wt.%), chromite (0.8 wt.%), ilmenite, Mn-ilmenite, apatite and whitlockite.

Ol, Opx, Pl and Chr (excluding Ol-Chr chondrule) are uniform in composition (Table 1). The chromites from the Ol-Chr chondrule are characterised by variable compositions [1]. Most grains of taenite are polycrystalline with clear zoning (31.85-42.43 wt.% Ni; 0.37-0.96 wt.% Co) and have tetrataenite rims (48.91-52.36 wt.% Ni). Two homogeneous grains of metal unetching by nital have relatively high contents of Co (0.99-1.19 wt.%) and average Ni (22.33-22.97 wt.%). Only few kamacite grains display Neumann bands, with other being polycrystalline. The composition of kamacite varies both between separate grains and within some polycrystalline grains (Table 2). There are two groups of troilite in Melnikovo: troilite occuring in tetrataenite is characterised by high contents of Ni (0.53 wt.%), the other one is nearly pure.

The compositions of Ol (Fa 27.8) and Opx (Fs 24.4) and the abundance of metal in Melnikovo suggest that the meteorite belongs to the LL-group of ordinary chondrites. The presence of relatively large grains of plagioclase (50 μ), poorly defined chondrules and the absence of primary glass indicate that Melnikovo belongs to petrologic type 6 of the Van Schmus and Wood's classification [2]. The meteorite is unusual for an LL-group chondrite in that it does not show large scale brecciation. The occurrence of unequilibrium metal and chromite grains suggests that the meteorite was not suffered the high-temperature metamorphism.

References:[1] Krot A.N et al. (1991), this volume [2] Van Schmus W.R., Wood J.A. (1967) Geochim. Cosmochim. Acta 31, 747-765

The Melnikovo meteorite: Krot A.N. et al.

Table 1

	Ol n=19	Opx n=14	Pl n=8	Cpx	Apt n=3	Whit n=4	Ilm n=4	Mn-Ilm	Chr n=25
	$\bar{X}$	$\bar{X}$	$\bar{X}$		$\bar{X}$	$\bar{X}$	$\bar{X}$		$\bar{X}$
SiO2	38.20	55.22	63.21	54.62	0.19	0.18	n.d.	n.d.	n.d.
TiO2	0.04	0.20	0.05	0.34	n.d.	n.d.	51.64	52.67	3.08
Al2O3	n.d.	0.22	21.96	0.31	n.d.	n.d.	0.05	0.07	5.90
Cr2O3	0.09	0.18	0.08	0.38	n.d.	n.d.	0.09	0.04	54.63
FeO	25.33	16.01	1.28	4.84	1.48	0.40	44.03	39.33	31.85
MnO	0.44	0.46	0.02	0.16	0.02	0.03	1.20	6.72	0.60
MgO	36.95	27.78	0.07	16.67	0.00	3.31	2.78	1.90	1.90
CaO	0.06	0.79	2.22	23.45	52.32	46.55	n.d.	n.d.	n.d
Na2O	n.d.	0.01	9.78	0.30	0.40	2.92	n.d.	n.d.	n.d.
K2O	n.d.	0.00	0.98	0.00	n.d.	n.d.	n.d.	n.d.	n.d.
P2O5	n.d.	n.d.	n.d.	n.d.	40.81	46.52	n.d.	n.d.	n.d.
Cl	n.d.	n.d.	n.d.	n.d.	6.21	0.01	n.d.	n.d.	n.d.
V2O3	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	0.72
ZnO	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	0.32
Total	101.1	100.9	99.7	101.1	101.1	100.6	99.8	100.7	100.2

Table 2

	1 n=11	2 n=4	3 n=20		4	5 n=2
	$\bar{X}$	$\bar{X}$	$\bar{X}$	σ		$\bar{X}$
Fe	61.67	62.21	93.14	1.38	90.87-93.82	74.83
Mn	0.01	0.04	n.d.	n.d.	0.01- 0.03	n.d.
Cr	0.02	0.04	0.02	0.03	0.00- 0.05	0.02
S	37.76	37.75	0.02	0.02	0.02- 0.03	0.02
P	0.01	0.01	0.01	0.01	0.00- 0.01	0.00
Ti	0.10	0.01	n.d.	n.d.	n.d.	n.d.
Ni	0.04	0.53	5.14	1.02	4.17- 7.16	22.98
Co	0.06	0.05	1.47	0.31	1.24- 1.30	1.11
Cu	0.03	0.04	0.03	0.04	0.00- 0.09	0.06
Total	99.70	100.68	99.83	99.84		99.79

1 - troilite , 2 - troilite enclosed in tetrataenite, 3 - kamacite, 4 - composition range of polycrystalline kamacite, 5 - metal unetching by nital