THE ASSEMBLAGE OF AL-RICH PIGEONITE WITH CRISTOBALITE IN THE METAL PARTICLE FROM THE EFREMOVKA CV CHONDRITE. A.V.Fisenko, G.V.Baryshnikova, A.V.Guzhova, A.K.Lavrukhina. V.I.Vernadsky Institute of Geochemistry and Analytical Chemistry, USSR Academy of Sciences, Moscow.

A rounded silicate inclusion (fig.) of unusual composition and structure has been identified within a large (ϕ=0.5mm) metal particle isolated from the Efremovka chondrite matrix. The petrographic and microprobe investigations of the particle and silicate inclusion in a polished section allow the following conclusions to be drawn: 1. The particle containing the silicate inclusion is polymineralic in composition and is composed of kamacite, taenite and troilite. The kamacite is polycrystalline. The Ni and Co contents in the kamacite grains have been estimated at 4.5-7.0 wt.% and 0.5-0.8 wt.%, respectively. The taenite is high in Ni (50 wt.%) and occurs mostly in the core of the particle in assemblage with the silicate inclusion. The Ni content of the troilite is under 0.2 wt.%. 2. The silicate inclusion is composed of two mineral phases, pyroxene and free silica. The pyroxene makes up most of the inclusion, occurs as discrete closely packed grains and has the chemical composition of pigeonite. Except for FeO, the pigeonite displays an extremely uniform composition throughout the inclusion. The FeO content varies gradually from 3.2 wt.% in the core of the inclusion to 11.1 wt.% on the contact of the inclusion with the metal. This zoning is thought to be due to Fe diffusing from the metal. Pigeonite (see table) is rather rich in Al_2O_3 (to 6.8 wt.%); in this respect, it has no analogues among the analyzed samples of meteorite, lunar and terrestrial pigeonites. Free silica occurs as tiny (not larger than 5μm) spherolites in pigeonite which are distributed non-uniformly throughout the inclusion, their number increasing towards the contact with the metal. The shape of the segregations suggests that silica may be cris-

tobalite. 3. Occasional idiomorphic crystals of less than 5μm in size were recorded on the surface of the silicate inclusion, and by their chemical composition they belong to magnomagnetite (table).

The data obtained suggest that the observed assemblage of the metal-sulphide particle with the silicate inclusion composed of Al-rich pigeonite and free silica was formed by multistage process involving the magmatic stage, breaking and agglomeration of the residual silicate melt product with the metal-sulphide phase. The processes completed with the melting and slow cooling of the agglomerate. Alternatively, the assemblage could have formed as a result of agglomeration and subsequent melting of the low- and high-temperature condensates of the silicate with the metal-sulphide phase.

Table

Oxide	Pigeonite		Cristobalite		Magno-magnetite
	Mean (8*)	Range	Mean (4)	Range	(1)
SiO_2	55.15	53.32-56.22	95.00	92.63-97.68	0.05
TiO_2	0.27	0.23-0.31	0.07	0.05-0.09	0.01
Al_2O_3	6.55	6.14-6.83	1.12	0.70-1.28	0.65
Cr_2O_3	1.76	1.56-1.98	0.26	0.21-0.27	6.25
Na_2O	0.13	0.09-0.18	0.03	0.00-0.05	0.08
V_2O_3	0.03	0.00-0.08	n.d.	-	0.86
FeO	7.97	3.21-11.14	0.81	0.40-1.00	87.19**
MnO	0.23	0.16-0.28	0.03	0.00-0.07	0.04
MgO	22.52	20.80-24.54	2.31	0.90-3.02	2.63
CaO	5.23	5.06-5.46	0.56	0.20-0.74	n.d.
Total	99.84		100.19		97.76
Fs	14.4	6.5-19.2			
En	73.4	69.4-80.5			
Wo	12.2	11.3-13.1			

n.d. - not detected

* Number of analyses. ** This value was measured as Fe_2O_3.

Figure. The silicate inclusion. P-pigeonite, C-cristobalite, M-metal