

Ni- AND V-RICH METALLIC PARTICLE IN CAI OF THE EFREMOVKA CV CHONDRITE. A.V.Fisenko, K.I.Ignatenko, and A.K.Lavrukhina. V.I.Vernadsky Institute of Geochemistry and Analytical Chemistry, USSR Academy of Sciences, Moscow, USSR.

The large (~300  $\mu$ m) metallic particle (EM2) was discovered in CAI of the Efremovka chondrite. CAI (designated as EF2) is the large fragment (~3.5x3.5 mm) of inclusion which it had diameter  $\geq 15$  mm according to curvature of the preserved CAI rim. We classified the CAI as Type B1, based on its structure and the chemical composition of its major mineral phases /a wide melilite mantle, large variation of the content of Ak (from ~10% to ~65%), and a maximum measured value for the  $\text{TiO}_2$  content in the fassaite of ~18 wt% /. In EF2 there are also small ( $\leq 50$   $\mu$ m) metallic particles and metallic veins near their. The particle EM2 consist of high-nickel taenite only and it enriched with V (table). The content of V decrease sharply toward the surface of EM2. The particle EM2 there is interruption an outer rim of whitlockite, apatite and fassaite grains. and also FeNi-phase in the form of emulsion fine balls, rim near phosphate grains, and particle xenomorphic. Only in metal near phosphate grains the kamacite was discovered and it enriched with Co (table). Analogous to content Co the kamacite was found in CAIs of the Efremovka chondrite also /1/. The fassaite grains in rim of EM2 there are high content of  $\text{V}_2\text{O}_3$  (up to ~7 wt%) and low contents of  $\text{TiO}_2$  and  $\text{Al}_2\text{O}_3$  as compared with those in EF2.

Discussion. We supposed the Ni enrichment of the particle EM2 is not caused with low-temperature processes of oxidation and/or sulphurisation because there are not the magnetite and sulphides and take into consideration that metallic veins in EF2 are taenite (Ni/Fe ~1.3). The process of high-nickel alloy condensation in high-oxidation environment /2/ can not be used also because of there is not the magnetite and containing of V in metal. Probably the main process of the Ni enrichment of particle EM2 was diffusion of Fe, Ni, and Co from melt or solid metal to the melt CAI matter. According to data, for instance, for system basalt- Fe, Ni, Co-alloy, the partition coefficient ( $D_{\text{met/sil}}$ ) for Fe more than by 2 and 1.5 order is smaller those for Ni and Co respectively /3/. If the system CAI- Fe, Ni, Co-alloy will be have analogous correlations between the D values for Fe, Ni, and Co then metallic alloy will be enriched with Ni because there is mainly diffusion of Fe from alloy to CAI melt. The ratio Ni/Co in metal will be also increased because  $D_{\text{Co}} < D_{\text{Ni}}$ . In the time of cooling and crystallization of the CAI matter the iron have gone into spinel grains and/or out from CAI.

The phosphorous was dissolved in metal at first but it went out the during of cooling at oxidation condition

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and phosphate Ca was formed by reaction between P and CAI matter. Vanadium diffused mainly from surface zone of the particle EM2 and V-rich fassaite was formed. Kamacite in metal near the phosphate grains in rim EM2 is result of low-temperature phase transformation of the FeNi-phase which it was enriched with Fe and Co in the time of these elements diffusion from particle EM2.

The particle EM2 may be precursor of the some "Fremdlinges" according to the supposition of Blum et al. /4/ as it was not subjected to processes of the oxidation and sulphurisation.

References. 1. Nazarov M.A., Ulyanov A.A., and Kolesov G.M.(1987). Abstracts of XX Meteoritic Conf. USSR, Tallin. p.142. 2. Bischoff A., Palme H.(1987). G.C.A., v.51, p.2733. 3. Schmitt W., Palme H.(1989). G.C.A., v.53, p.173. 4. Blum J.D. et al.(1989). G.C.A., v.53, p.543.

Table  
Chemical compositions of the particle EM2 and a metal, whitlockite, and apatite in rim of particle EM2 (in wt%)

Particle EM2			Rim of particle EM2				
	A(13)	B(3)	Fe (5)	Fe (1)		Wh(6)	Ap(2)
Fe	43.83	43.54	83.46	70.84	CaO	47.03	55.65
Ni	53.87	52.78	6.48	17.29	P <sub>2</sub> O <sub>5</sub>	45.94	42.24
Co	1.80	1.77	6.00	4.07	FeO	2.33	0.96
V	0.79	0.14	0.10	0.15	Na <sub>2</sub> O	3.43	0.24
P	-	-	0.05	0.17	SiO <sub>2</sub>	0.18	0.15
S	0.02	0.03	0.08	0.13	Cr <sub>2</sub> O <sub>3</sub>	0.75	0.02
Cr	0.09	0.03	0.03	0.03	V <sub>2</sub> O <sub>3</sub>	0.52	0.07
Ca	0.01	0.08	1.32	1.57			
	100.41	98.37	97.52	94.25		100.18	99.33

A and B are centre part and surface zone of EM2, respectively; Wh=whitlockite; Ap=apatite; - = not detected; in the parenthesis are shown the number of analyses.