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[Fe,Ni,Cu](O,S) spheroides from Catoca kimberlits eclogite xenolites

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Spheroids are discovered by studying eclogite xenoliths from Catoca kimberlite using the SEM-EDS system on microprobe JEOL JSM-6510LA [1]. The spheroids are the formations of rounded and oval cut, sized 0,2- 0,5 mm, mainly of the FeO-NiO(S) composition with admixtures of Si, Mg, V, Cu, Al and Ca (Tab. 1). They appear on the borders of garnet and clinopyroxene grains and as inclusions in them (Fig.1,a). Also registered the fused idiomorphic grains or grains with "fringy" borders (Fig.1,b,d) and the grains being xenomorphic and gravely disorganized as a result of fusion (Fig.1,e).

Table 1: Representative chemical composition of [Fe,Ni,Cu](O,S) minerals, wt % (by SEM-EDS)

pt	Sample kat-5, Low-MgO eclogite (Fig.1,в)													
SiO_2	030	0,53	0,37	96,40	0,00	0,16	0,00	1,12	1,35	0,00	0,00	100,00	031	2,57	0,50
Al_2O_3															
FeO															
MnO															
MgO															
CaO															
NiO															
SO_3															
V_2O_5															
CuO															
Σ															

	93,92
	0,00
	1,51
	0,00
	1,50
	0,00
	0,00
	0,00
	100,00
032	
	29,0
	3,69
	35,66
	0,11
	11,9
	0,97
	14,2
	0,00
	1,06
	3,23
	100,00

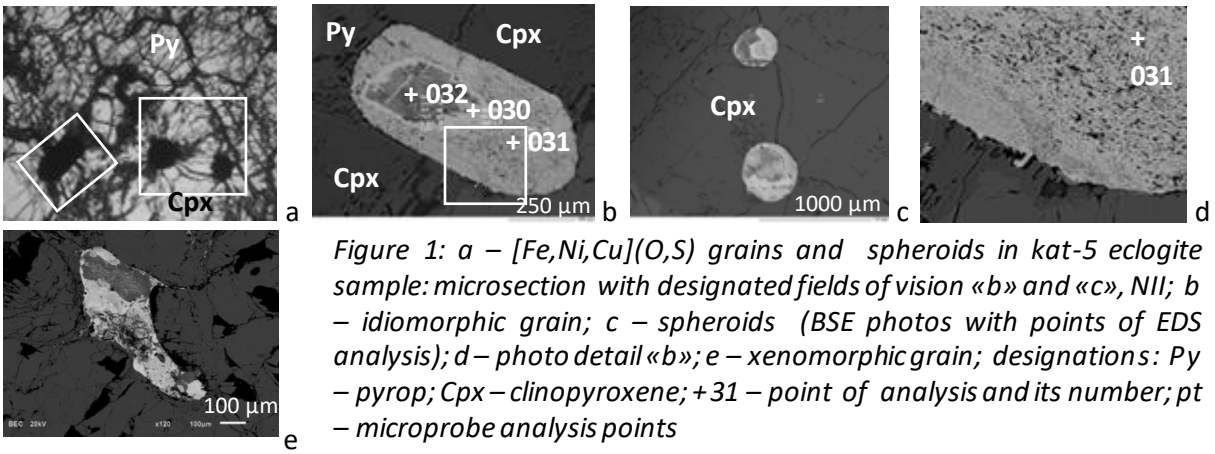

Figure 1: a – [Fe,Ni,Cu](O,S) grains and spheroids in kat-5 eclogite sample: microsection with designated fields of vision «b» and «c», NII; b – idiomorphic grain; c – spheroids (BSE photos with points of EDS analysis); d – photo detail «b»; e – xenomorphic grain; designations: Py – pyrop; Cpx – clinopyroxene; +31 – point of analysis and its number; pt – microprobe analysis points

They form two groups subject to chemical composition. The first of them contains mainly FeO (93,0-99,0 %), with admixture of MgO (up to 1,5%) and NiO (up to 1,0%). The second group is formed by the minerals of composition of FeO (36,0-86,0%), NiO (up to 16,5%), CuO (up to 3,5%), SO_3 (up to 1,5%), V_2O_5 (up to 1,0%), TiO_2 (up to 1,0%) and CaO (up to 1,0%). The inner zoning is registered in grains and spheroids: in the outer zone (micropore phase, point 031) the content of NiO lowers, the FeO rises, in the central zone (dark grey phase, point 032) the increased content of NiO and MgO (Fig.1,b) is registered. The pale grey phase of the intermediate part (point 030) is analogue to the other parts by content, but the oxide SO_3 is registered within it.

Genesis of spheroids and fused grains of eclogite xenoliths from kimberlites probably refers to intense heating and decompressive fusion of [Fe,Ni,Cu](O,S) minerals. They may be referred to as the products of deep differentiation of mantle material under Archean Cassai craton as a result of partial fusion of

[Fe,Ti]O and [Cu,Ni]S minerals. The zoning of composition of the grains are probably the result of the «zone fusion» effect, in process of which the outer «envelope» of the grains was nourished by the low-melt phases, and the central part – by the high-melt phases, which ascertains the hypotheses of Milashev V. about the differentiation of mantle material according to «zone fusion» mechanism [2].

References:

[1] Zinchenko V (2014) In: Russian Mineralogical Society Annual Session 2014, Mineralogy in a whole space of the word: LEMA Publicher, 189-190

[2] Milachev V (1994) *The space end processes of natural diamonds generation*: Nedra Publicher, 1-142