RARE OXYGEN-FREE INCLUSIONS IN KIMBERLITE-BORNE DIAMONDS FROM EASTERN CHINA.

Lei Zhao[1], Fengxiang Lu[2], M. A. Menzies[3], Hongfu Zhang[3], Yigang Xu[3], Jianpin Zheng[2], Qingzhu Meng[1]

1. China University of Geosciences (Beijing), 29 Xueyuan Road, 100083, Beijing, P. R. Chian

2. China University of Geosciences (Wuhan), Yujiashan, 430074, Wuhan, P. R. Chian

3. Department of Geology, Royal Holloway, University of London, Egham, Surry, TW20 OEX, U. K.

Native Silver and Ag—bearing Fe—Au alloy (Table—1) in natural diamonds are found fromthe pipe 50, and pipe Shengli #1 of Ordovician Kimberlite in Fuxian, liaoning Province-and in Mengyin, Shandong Province respectively. Among hundreds of inclusion—bearingdiamonds, three diamonds contain native Silver or Silver bearing Fe—Au alloy microinclusions:

In Sample Zf—1 and ZS—2 native silver intergrows or are enclosed in diamonds, Ag bearing Fe—Au inclusion is found in ZS—3. Infrared analysis show Zf—1 and ZS—2 are type Ia and ZS—3 is a intermedium between type Iaand type Ib. Both ZS—2 and ZS—3contain CH4. In diamonds of the two pipes some relatively rare inclusions havebeen reported, such as moissanite (SiC), high—K and high—Cl inclusion, high—Na and high—Cl inclusion, high—Cu and high—Cl inclusion and fluid inclusions containing H2O, CH4, CO2, CO etc.

In diamondiferous heavy mineral concentrate, there exist moissanite, native Fe, native Cu, native Ag, native Sn, fersilicite, ferdisilicite, unnamed oxygen—free mineral consisting of Si, Fe, Ti (the last two minerals also have been found in thin section and in polished section), Chromian kennedyite and tungsten carbide (WC).

Table 1, EPMA Composition of native silver and Ag—bearing Fe—Au alloy

Sample	Type	Number	Ag	Cu	Fe	Au	Zn
		1	98.58	1.17	0.26	0.00	n.d
		2	99.49	0.24	0.19	0.09	n.d
Zf—1	Ia	3	99.81	0.00	0.00	0.19	n.d
		4	100.00	0.00	0.00	0.00	n.d
		5	98.37	0.50	0.41	0.73	n.d
ZS—2	Ia	6	96.51	2.53	0.20	0.77	0.00
ZS—3	Ia—Ib	7	5.30	0.71	46.11	43.13	4.75
		8	2.64	0.34	46.26	50.76	0.00

The discovery of native silver and silver—bearing Fe—Au alloy in diamonds presentsa irrefutable evidence for a primary origin. Shandong and Liaoning Ordovician diamondiferousKimberlites come from about 220 Km (Zhao,1988) and 200 Km(Lu et. al,1991) respcetively. Native Ag,Fe—Au alloy,moissanite and native Fe in diamonds have profound implicationsfor the redox state of their source origin.

The lithospheric mantle at FMQ (Haggerty,1994) is far too oxidized for the stabilityof these minerals,the redox environment of the transition zone and the lower mantle areunknow,but a possibly conductive region (intensely reduced) is the "D" layer at the core—mantleboundary (Haggerty). Tungsten carbide (WC) has been recognized from heavy concentrateof pipe shengli #1 kimberlite, Shandong province,take this mineral into account, it can bepresumed that there are some minerals originated from extra reduced high T—P environment,becauseWC crystalizes at 2765℃ according to C—W binary phases diagram.

Native silver and silver—bearing Fe—Au alloy inclusions suggest an extra reduced fluid—rich environment.

Main Refference

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