Geogas Nano Material Elements Analysis For Detecting Concealed Structures in Dashui Gold Deposit in Gansu Province, China

XIUHONG PENG[1,2], HUI DENG[3*], BO XU[1],CHENGSHI QING[1],JIANGSU ZHANG[1,4]

[1]Geochemistry Dep., Chengdu University of Technology , China
[2] Key Laboratory of Nuclear Techniques in Geosciences, China
[3] State Key Laboratory of Geohazard Prevention and Geoenvironment Protection, Chengdu University of Technology (*correspondence:dh@cdut.edu.cn)
[4] Third Geology and Mineral Resources Exploration Academy of Gansu Province, Lanzhou, China

The nanoparticles in ore bodies can adsorb on gas and migrate in the updraft. It has strong penetrability which can rise vertically from the deep Earth to the surface, and creates a distribution anomaly (geogas anomaly) of nano material above the projection of ore bodies. Many scholars[1]-[2] have confirmed the prospecting effect of geogas method. From 1988 to 1999, Chunhan Tong et al. [3]-[4] had experimented on the geogas measure method in Laojie Gold Deposit in Yunnan Province and so on successively. They had successfully indicated the locations of ore bodies hundreds of meters deep underground, and observed the nanoparticles in geogas.

The dynamic geogas analysis adopted in this research is to use the pump to exact the geogas in the cover; then the nano materials will be captured by the liquid capture agent; and finally the various kinds of elements in geogas can be analyzed by ICP-MS to obtain the geogas information. Combining the geochemical exploration and the actual situation of the mine, five exploration lines and 40 elements of 139 samples were set in the survey area, including two experiment measuring lines on the known ore bodies.

Results and Conclusion

On the basis of the analysis of the trace elements and rare earth elements characteristics in ores and wall rocks, and the comparison of the geogas experimental profile, the geogas indicating elements were selected. The geogas indicating elements characteristics of the three exploration lines demonstrate that there are two concealed faults: one concealed structure and one ore-controlling structure in the survey area. The first concealed structure goes through No.7-13 measure point of Line a, No.15-19 measure point of Line b and No.7-14 measure point of Line c. The width of the structure (or the combination width of multiple microcracks) is 90-200m. The second ore-controlling structure goes through No.25 measure point of Line a, No.23-27 measure point of Line b and No.23-28 measure point of Line c. The width of the structure is about 80-100m. Because the results of radon survey is as the same as the geogas's, the prospecting exploration efforts should be greatly strengthened in the western periphery of Dashui Gold Deposit.

The authors acknowledge the support of the National Nature Science Foundation of China (No.41103025) and Cultivating Programme of Middle-aged Backbone Teachers of Chengdu University of Technology

[1] Kristanssonk et al. (1990) *Endeavour (New Series)* **14**, 28-33.[2] Wang et al. (2005) *GEOLOGY IN CHINA* **32**, 135-140.[3] Tong et al. (1997) *J MINERAL PETROL* **17**, 83-88.[4] Tong et al. (1999) *CHINESE JOURNAL OF GEOPHYSICS* **42**, 135-142.

The study on the solubility of the vanadium system focused on Panzhihua, China

Y. PENG[1,2], Y. ZENG*[1,2]

[1]College of Materials and Chemistry & Chemical Engineering, Chengdu University of Technology, Chengdu, Sichuan, 610059, P. R. China
[2]Mineral Resources Chemistry Key Laboratory of Sichuan Higher Education Institutions, 610059, P. R. China
(* correspondence: zengyster@gmail.com)

In recent years, the interest of the relationship between microelement and human health increased. Vanadium absence may have negative effects, and it also can be toxic if exposure occurs at high enough levels. It has strong transfer ability in environment. This ability related to the solubility of vanadium in soil solution.

Panzhihua, Sichuan is an important production base of vanadium and titanium magnetite. The vanadium storage is 64% of the total vanadium in China. The vanadium mining and smelting accelerated the vanadium diffusion in soil and water. It causes special environmental problems of vanadium in Panzhihua. Different surface soil in the region, the average mass fraction of vanadium is over 100 $\times 10^{-6}$,[1] far exceeding the background values of Chinese soil vanadium 86 $\times 10^{-6}$.[2] The amount of vanadium in the soil surrounding smelter is 16.5 times of contrast values. The amount of vanadium in the plant samples is 6.6 times of contrast values.[3]

The solubility of vanadium in soil solution is effected by coexisting ions in soil，such as potassium, sodium, phosphorus and so on. In order to investigate the relationship of solubility between vanadium and the other co-existing ion in soil, the phase equilibria of the quinary system $NaVO_3 + KVO_3 + NaH_2PO_4 + KH_2PO_4 + (NH_2)_2CO + H_2O$ and its five quaternary sub-systems were studied at 298 K with isothermal dissoluble method. According to the experimental results, the crystallization form of metavanadate is polyoxovanadate in the weakly acid system. The dissolution and migration of vanadium in aqueous solution has negative correlation with $H_2PO_4^-$ and $(NH_2)_2CO$. The exisiting of K^+ has little effect on the solubility of vanadium. This suggest that in similar soil environment, the solubility of vanadium was restrained by the increase of $H_2PO_4^-$ and $(NH_2)_2CO$, which can affect the transfer ability of vanadium.

The authors acknowledge the support of the National Natural Science Foundation of China(40673050, 41173071), and the Research Fund for the Doctoral Program of Higher Education from the Ministry of Education of China (20115122110001).

[1] Teng, Tuo, Ni. (2003) *Chinese Journal of Geochemistry*, **22**, 253-262. [2] Wei, Chen, Zheng. (1991) *Environmental Science*, **12**, 12-19. [3] Wang, Wei. (1995) *Element Chemistry of Soil Environment*, 231-241.