Source of ore fluids of the Yangshan gold deposit, Western Qinling belt, China: evidence from microthermo-metry, noble gas isotopes and *in-situ* sulfur isotopes of Au-bearing pyrite

JINLONG LIANG[1], WEIDONG SUN[2], SHIJUN NI[1]

1No.1 Dongsanlu, Erxianqiao, Chengdu, Sichuan, China; Richardljl04@aliyun.com

2No.11 Kehuajie, Wushan, Tianhe District, Guangzhou, China; Weidongsun@gig.ac.cn

The issue of ore-forming fluids sources and genesis model of sediment-hosted disseminated gold deposits including Carlin-type and some orogenic gold deposits has been debated for several decades. Although Yangshan gold deposit was taken as the largest Carlin-type gold deposit in China ten years ago, there are still experts who propose that Yangshan belongs to orogenic type gold deposit [1].

The microthermometric measurements show the homogenization temperature from 221°C to 303.5 °C and low salinities of 2.0~7.2 wt.% NaCl equiv of the H_2O-CO_2 system. $^{3}He/^{4}He$ ratios of fluid inclusions ranging from 0.0330 to 0.0809 Ra, shows no mantle sources. The measured $^{40}Ar/^{36}Ar$ values of fluid inclusion in pyrite and quartz range from 434.1 to 863, higher than the ratio of $^{40}Ar/^{36}Ar$ of air-saturated water (295.5). The $^{40}Ar^{*}/^{4}He$ values (0.0227-0.0539) for the pyrite samples are far below the crustal and mantle values (0.2 and 0.5 respectively).The in-situ sulfur isotopes of Au-bearing pyrite results using Nano-SIMS is as the following: framboidal pyrites show low $\delta^{34}S$ values of -23.8~-20.9‰; the pyrites from mineralized plagiogranite dikes have a narrow $\delta^{34}S$ range of -4.4~1.3‰; and the inner part of zoned pyrites form the main ore rocks of black carbonaceous phyllites have the similar $\delta^{34}S$ feature to the framboidal pyrites, whereas the rims enriched in gold have $\delta^{34}S$ values around 0‰, similar to the pyrites in mineralized plagiogranite dikes.

Based on the characteristics mentioned above, we concluded that: first, ore-forming fluids own typical feature of orogenic gold deposit; second, recycled meteoric water heated by magmatic heat source may be a component of ore fluids instead of mantle matter involvement; third, in-situ sulfur isotope analyses indicate that the exact ore-related sulfur sources are magmatic sulfur.

[1]Liang J.L., Sun W. D., et al. 2014, Journal of Asian Earth Sciences. 40-52.