Fluid Inclusions in Gold-Rich Ores of the Dongping Gold Deposit, China

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Located 50km east to Zhangjiakou city, the Dongping gold deposit (152Ma) [1] is the largest one in North China Craton. The gold-bearing vein systems are mainly hosted in Hercynian Shuiquangou alkaline complex (390Ma) [2], and a few in metamorphic Archean Chongli group. The main gold mineralizing stages are stage II and III among four stages, that is, pyrite-quartz stage (II) and polymetallic sulphides (chalcopyrite, pyrite, galena) –smoky quartz stage (III). Visible gold grains can be seen in stage III, which occur in tiny pyrite-grey quartz veins filling in fractures of early white quartz veins. H_2O-CO_2 fluid inclusions are abundant in smoky grey quartz near gold grains (Fig.1).

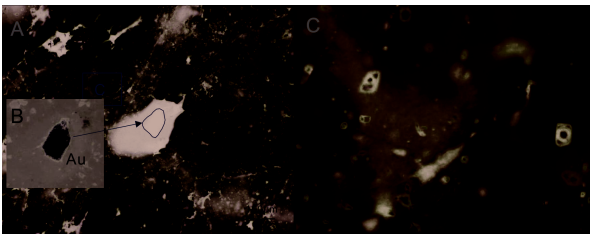

Figure 1 Fluid inclusions in gold-rich quartz veins A- A gold grain and fluid inclusions in stage II quartz; B- Exposed surface of a gold grain; C- H_2O-CO_2 inclusions in area C of the photo A

Micro thermometry shows that the bubbles in H_2O-CO_2 fluid inclusions are mainly vapor CO_2; a few H_2O-CO_2 inclusions have thin films of liquid CO_2 around bubbles, with -58.3~-57.6°Cof $Tm_{,CO2}$ and 27.8~30.9°C of $Th_{,CO2}$. The densities of CO_2 phases in H_2O-CO_2 inclusions are 0.58~0.67g/cm^3. The total homegenization temperatures (Th,tot) are 191°C-373°C, and mainly between 290 ~ 330°C. The melting temperatures of ice ($Tm_{,ice}$) are -5.6 ~ -0.8°C, and the melting temperatures of clathrate are 8.5 ~ 9.1°C, resulting in 1.2-8.7%NaCleqv of the salinities and 0.60-0.92 g/cm^3 of densities. According to the critical temperatures of H_2O-CO_2-NaCl system [3], critical pressures of the fluids are 70-160MPa. In conclusion, gold-rich ores were emplaced under at least 2.8km of a depth based on lithostatic pressures.

[1] Hart *et al* (2002) *Mineralium Deposita* **37**, 326-351. [2] MAO *et al* (2003) *Economic Geology* **98**, 517-534. [3] Frantz *et al* (1992) *Chem Geol* **69**, 235-244.