

Invisible gold in arsenian pyrite from the high-grade Daliuhang gold deposit, Jiaodong, China: insights from LA-ICPMS mappings

KAI FENG^{1,2,3*}, HONG-RUI FAN^{1,2}, FANG-FANG HU^{1,2}

¹ Key Laboratory of Mineral Resources, Institute of Geology and Geophysics, Chinese Academy of Sciences, Beijing 100029, China (*correspondence: fengkai@mail.iggcas.ac.cn)

² College of Earth and Planetary Science, University of Chinese Academy of Sciences, Beijing 100049, China

³ Department of Geoscience, Aarhus University, DK-8000, Aarhus C, Denmark

The Jiaodong Peninsula is the largest and most productive gold province in China, and pyrite is the most abundant sulfide mineral and the dominant repository of gold. The Daliuhang deposit is one representative of auriferous quartz-vein type gold deposits, hosted in Mesozoic granitoids. To increase our understanding of gold distribution and multiple mineralized processes, trace elements spots and mapping analyses on gold-hosted pyrite were conducted by LA-ICPMS.

Four generations of pyrite (Py1, Py2, Py3, Py4) from auriferous quartz veins are categorized, corresponding to four mineralized stages. Another type of pyrite is also recognized from sericite-quartz altered rock (Py0) for comparison. Among them, Py3 from Stage III quartz polymetallic sulfide veins shows elevated concentrations of As (mean 16704.27 ppm) and Au (mean 22.60 ppm) and is generally identified as a brighter overgrowth rim of precursor pyrite (Py0 or Py2). In this case, Py0 and Py2 commonly display partially fluid-assisted dissolved and remobilization textures, such as abundant fine grained galena inclusions and micro-sized pores. LA-ICPMS mappings of complex pyrite reveal that the porous and inclusion rich core areas (Py0 or Py2) contain large amounts of Ag, Pb, Cu, Zn, Sb, and minor Bi, Ga. It is likely due to those unavoidable and abundant micro-inclusions. However, the clean rims (Py3) show a distinct oscillatory zoning with respect to As, Au, Co and Ni. It's inferred that the Au-riched Py3 is directly precipitated from As-Au-bearing solutions, which are generally undersaturated with gold, resulting from rapid and cycled fluid pressure fluctuations during fault movement.

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