Goldschmidt 2025 Abstract
https://doi.org/10.7185/gold2025.27379

A study on a natural sphalerite sample as a potential reference material for the measurement of sulfur and zinc isotopes using fs-LA-MC-ICP-MS

LIE-WEN XIE[1], HUI-MIN YU[2], GUO-QIANG TANG[1], CHAO HUANG[1], YUE-HENG YANG[1], LEI XU[1], SHI-TOU WU[1] AND HAO WANG[1]

[1]Institute of Geology and Geophysics, Chinese Academy of Sciences

[2]School of Earth and Space Sciences, University of Science and Technology of China, Hefei, Anhui 230026, China

Sphalerite, a common mineral found in sulfide deposits, serves as the primary source of zinc and often contains critical metals such as germanium, gallium, and indium. *In situ* microanalytical determination of high-spatial-resolution Zn-S isotopic signatures coupled with trace element distributions can offer unprecedented capacity to decode the physicochemical nature of ore-forming fluids and elucidate mineralization mechanisms.[1] However, the current lack of matrix-matched reference materials with characterized Zn and S isotopic compositions presents a significant challenge.

In this study, we investigated a natural sphalerite sample (IGGSph-1) to assess its potential as a matrix-matched reference material for in situ microanalysis of zinc and sulfur isotopes. Electron probe microanalysis (EPMA) and random spot isotopic analyses conducted using laser ablation multicollector inductively coupled plasma mass spectrometry (LA-MC-ICP-MS) confirmed the homogeneity of major elements, as well as Zn and S isotopes, within the sphalerite grains. No growth zoning was detected, indicating that the IGGSph-1 sample has the potential to serve as a reference material.

The measured $\delta^{34}S_{VCDT}$ value using an elemental analyzer-isotope ratio mass spectrometry (EA-IRMS) was 16.35 ± 0.26 ‰ (2S, N = 6). And the measured $\delta^{66}Zn_{JMC\text{-}Lyon}$ value using a SN-MC-ICP-MS were 0.17 ± 0.04 ‰ (2S, N = 18).

References

[1] Shiyu Liu, Lin Ye, Ruidong Yang, Zhenzhong Xiang, Chen Wei, Yusi Hu, Zhilong Huang & Sichen Liu (2023), Ore Geology Reviews 159, 105529.