

# Sulfur and Lead Isotopic Geochemistry of Nanlao Cu–W Deposit in Southeastern Yunnan Province, China

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**Abstract:** Nanlao Cu–W deposit, one of newly discovered skarn deposits, is located in the north-western of Laojunshan district, and its Cu and W reserves reach the middle scale. To clarify its ore genesis, an investigation with geological feature and sulfur and lead isotope on this deposit is carried out. Sulfur isotopic compositions of sulfides have a relatively uniform  $\delta^{34}\text{S}_{\text{CDT}}$  value ranging from 4.05‰ to 11.02‰, suggesting a mixture of magmatic and strata sulfur origin. Radioactive lead in different ore minerals is significantly different, which shows a multi-source character. The isotopic composition of lead ranges in  $^{206}\text{Pb}/^{204}\text{Pb}$ ,  $^{207}\text{Pb}/^{204}\text{Pb}$ , and  $^{208}\text{Pb}/^{204}\text{Pb}$  are 18.412–18.761, 15.600–15.789, and 38.504–39.094 for scheelite, 18.301–18.345, 15.652–15.696, and 38.488–38.564 for chalcopyrite, 17.871–18.972, 15.415–16.037, and 38.008–39.769 for pyrite, and 17.917–18.093, 15.524–15.650, and 38.004–38.283 for arsenopyrite, respectively. In comparison, they are obviously different from that of the Cambrian, but consistent with that of the Caledonian or Late Yanshanian magmatic rocks, combined with geochronology research result, hinting to the Pb and ore-forming metals are probably derived from the Caledonian magmatism. It is a mesothermal to hyperthermal deposit related to the Caledonian magmatism, contact belt between Nanlao gneiss and the Cambrian is the favourable setting for ore formation.

**Keywords:** Caledonian; Cu–W deposit; S–Pb isotope; Nanlao