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# The ore-forming magmatic-hydrothermal system of the Piaotang W-Sn deposit (Jiangxi, China) as seen from Li-mica geochemistry

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## Abstract

Many studies have proved the usefulness of Li-mica and chlorite geochemistry as indicators of the chemical and thermal evolution of magmatic systems. This study highlights the suitability of Li-micas as tracers of hydrothermal mineralizing events in world-class W-Sn deposits associated with Jurassic (190–150 Ma) granites in China through the complex magmatic–hydrothermal evolution of the Piaotang deposit (South Jiangxi). A paragenetic sequence has been established for the Piaotang deposit comprising (1) a first "silicate-oxide" stage that hosts abundant W-Sn mineralization (wolframite and cassiterite), (2) a "calcic" stage with scheelite and wolframite, (3) a "base metal sulfides" stage with cassiterite and wolframite, and (4) a late "sulfide" stage, involving for the first time a polyphase emplacement of the mineralization. Li-micas from the underlying granite, greisen, and the different stages represented in the veins, were studied. The chemistry of the micas (characterized by intermediate compositions between phlogopite-zinnwaldite-muscovite poles) demonstrates the presence of end-members representing three different fluids that were involved in the emplacement of the Piaotang deposit. These end-members can be linked to previous fluid inclusion studies conducted on this deposit. The three fluids are identified to be magmatic, meteoric (as previously reported in the literature), and also metamorphic, and are shown to have mixed throughout the different stages. Moreover, it appears that the magmatic fluids could not have been derived from the Piaotang biotite granite but instead must have originated from a more evolved rare metal granite that is presently unidentified. These fluids were responsible for the greisenization.

Finally, chlorite geochemistry reveals the occurrence of a heating process (from 200 °C in stage II to 300 °C in stage III) during the post-mineralizing stages, which was responsible for the precipitation of new generations of ore-bearing minerals (cassiterite and wolframite) concomitant with a continuous gain of metals during the emplacement of the Piaotang deposit.

**Keywords:** Piaotang, W-Sn deposit, yanshanian, lithium-mica, chlorite, magmatic-hydrothermal; From Magmas to Ore Deposits