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Different Sn-W Vein Textures: The San Finx Deposit, NW Spain

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Tin and tungsten have been included by several countries in the list of critical and strategic minerals for the energy transition. These minerals primarily occur as granitic-related deposits including porphyries, greisens, skarns, pegmatites, stratabound deposits, and perigranitic vein systems.

The San Finx Sn-W vein-type deposit is located in northwest Spain, within the Sn-W metallogenic district of the Iberian Massif. This province includes notable mines such as Panasqueira (Portugal) and La Parrilla and Barruecopardo (Spain).

The mineralized, dominantly exogranitic, quartz veins at San Finx extend 3,500 m in length and are approximately 50 m wide on average, striking N30-50°E, N10°W with a steep dip. The cassiterite and wolframite (hubnerite) mineralization is coarse grained and high grade. U-Pb dating on apatite and ⁴⁰Ar-³⁹Ar dating on muscovite have yielded ages of 281.7 ± 1.03 Ma and 287.75 ± 1.03 Ma, respectively.

Wolframite-deplete, cassiterite-rich, brecciated sections of up to 80 m length occur included within the dominant quartz veins hosting the main cassiterite-wolframite mineralization. These segments include (1) an ultragreisen-type assemblage dominated by muscovite and likely developed under conditions of retrograde quartz solubility; and (2) a feldspars assemblage, primarily composed of potassic feldspars and depleted in quartz. The transition between the feldspar sectors with the dominant quartz assemblage within the veins is always sharp. Moreover, minor feldspar veinlets are also commonly present in the brecciated surrounding wall rock. This supports that the feldspar sectors originate from boiling of an original magmatic-hydrothermal fluid, where phase separation accelerates cooling and alkalinization of the resulting high-density aqueous phase, promoting the precipitation of feldspar instead of quartz.