

A microstructural study of tungsten-(tin) skarns in Tabuaço, NE Portugal

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Tabuaço skarn in NE Portugal is one of the most prospective tungsten deposits in EU. In a light of the Europe's increasing demand for this metal, combined with an increasing dependence on foreign import, it is crucial to understand the geological context of such local resources in EU area.

In this study detailed micro-chemical and micro-structural analysis of the Tabuaço skarn deposits were carried out, using SEM-EDS/BSE, EPMA, QEMSCAN, XRF and fluid inclusion methods.

Two different skarn horizons were distinguished in the Tabuaço skarn, differing by texture, mineralogy, grain size, microstructural associations and the amount of the tungsten-bearing mineral, scheelite. The "Main skarn horizon", located proximal in respect to the intrusive granite, has an average scheelite content of ~1.70 vol% and mainly consists of vesuvianite, fluorite, feldspars, apatite, as well as minor amounts of grossular, zoisite, scheelite, cassiterite and malayaite. The "Lower skarn horizon" is separated from the "Main skarn" by about a 50 m thick sequence of schists. It has a scheelite content of ~0.98 vol% and is mainly composed of pyroxene, quartz, vesuvianite and feldspars with minor zoisite, scheelite, grossular and fluorite content. A strong association between scheelite, fluorite and apatite was observed in both skarn horizons.

We suggest that the observed differences between the two skarn horizons primarily arise from their position in relation to the granite intrusion. Furthermore we investigate the roles of temperature, fluid composition and host rock on the formation of the Tabuaço skarns. The specific micro-scale mechanisms that controls fluid-rock interaction in each of the two reaction systems are identified. These results can be applied to better understand metasomatic mass transfer in ore systems and their potential for hosting valuable mineral resources.

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