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江西雅山花岗岩岩浆演化及其Ta-Nb富集机制

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摘要:

雅山岩体是华南地区著名的富含钽铌矿的稀有金属花岗岩。从早阶段到晚阶段花岗岩中的云母的Li、F和Rb₂O含量逐渐升高,其类型变化为“黑鳞云母→Li-云母→锂云母”。锆石的Zr元素被Hf、U、Th、Y和P等元素的置换比例随着岩浆演化程度升高而增大。云母和锆石矿物成分变化特征与全岩体系的Zr/Hf、Nb/Ta比值不断下降而F、Li和P₂O₅含量逐渐升高的趋势一致,将可以用于指示岩浆演化程度。在岩浆演化过程中不断富集的P、F、Li元素增加了熔体中非桥氧数(NBO),促使钽-铌元素在岩浆中的溶解度加大而逐渐富集,在最新阶段的黄玉锂云母花岗岩具有最高的Ta、Nb元素含量。因此,雅山花岗岩具有较高的F、Li、P₂O₅含量是其岩浆演化及其Ta-Nb富集的重要机制。西华山花岗岩中的云母与雅山花岗岩中的锂云母相比,具有明显较低的F、Li、Rb₂O含量,表明西华山花岗岩的岩浆演化程度相对低于雅山花岗岩。西华山花岗岩中的钨富集与流体作用密切相关,体系氧逸度的降低促使了钨成矿。因此,岩浆演化程度的不同可能是造成华南稀有金属花岗岩发生不同成矿作用(如Ta-Nb矿和W矿)的重要原因。

英文摘要:

The Yashan granites are typical rare-metal granites in South China and famous for enriched tantalum-niobium deposit. From early to late units of the Yashan granites, the micas varied in the types of "protolithionite→Li-mica→lepidolite" corresponding to increasing Li, F and Rb₂O concentrations. The proportion of Zr substituted by other elements (e.g., Hf, U, Th, Y and P) in the zircons was also elevated during magmatic evolution. The variations of micas and zircons are consistent with the whole rock geochemical trends of decreasing Zr/Hf and Nb/Ta ratios but increasing F, Li and P₂O₅ contents in the Yashan granites, indicating that both the micas and zircons could be as indicators of the extent of magmatic evolution. Ta and Nb were gradually concentrated in the rocks during magmatic evolution because the non-bridging oxygens (NBOs) generated by F, Li and P would promote the dissolution of niobium and tantalum in the melt, so the latest unit of topaz-lepidolite granites has the highest Ta and Nb. Therefore, high concentrations of F, Li and P₂O₅ are important for Ta-Nb enrichment and magmatic evolution in the Yashan granites. The micas in the Xihuashan granites contain lower F, Li and Rb₂O than the lepidolite in the Yashan granites, indicating that the extent of evolution in the Xihuashan granites is less than that in the Yashan granites. The enrichment of tungsten in the Xihuashan granites was closely related to fluid activity. The decline of oxygen fugacity in the melts also triggered the deposit of tungsten in the Xihuashan granites. Therefore, the extent of magmatic evolution would be important mechanism of diverse mineralizations (e.g., Ta-Nb deposit and tungsten deposit) in the rare-metal granites in South China.

关键词: [稀有金属花岗岩](#) [钽-铌矿](#) [钨矿](#) [云母](#) [锆石](#) [岩浆演化](#) [华南](#)

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