

Micro-analysis of skarn garnet interconnected with stepwise magma-fluxing from the Gagok deposit. South Korea

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The Gagok skarn deposit is a polymetallic (Fe, Zn, and Pb) deposit in Taebaek, South Korea. The geology around the deposit consists of Myobong, Pungchon and Hwajeol formation in Cambrian to Ordovician and granodiorite (about 80Ma) as a source of ore-forming fluid. In this deposit, a skarn mineral zonation from proximal type skarn to distal type skarn appears well. Especially, garnet is a ubiquitous mineral and have own micro-texture at each skarn type. We focus on relationship between evolution of ore-forming fluid and garnet micro-texture. Garnets in proximal skarn become closer to andradite composition from core to rim, and show the oscillatory zoning, shocked induced textures and resorption textures. Garnets in distal skarn are mostly grossular composition, showing retrograde texture such as a replacement texture, rarely zoning and fracture-sealing textures. Garnets in last stage are characterized by Mn-rich garnet (spessartine), and these appear in the form of epitaxial growth on the distal-skarn garnet. Based on micro-texture and element mobility of garnet in proximal skarn, oscillatory zoning indicates multiple fluid flux and dynamic changes of geological environment (diffusion-controlled growth and surface adsorption-controlled growth depending on PTX and oxygen fugacity), and shocked-induced textures mean garnets were in the high fluid pressure. A resorption texture means the fluid mixing with meteoric water and makes change pore water chemistry in skarn system. A behavior of Mn and Ti in garnets also demonstrate fluid mixing with this texture. Trace elements in garnet indicate each zoning and texture have own geological information, and these reflect the stepwise magma-fluxing. Moreover, geochemical features in proximal skarn garnet interconnected with it of distal skarn garnet. Through these information, we can establish the detailed fluid evolution history, and expect to be able to approach the precise ore forming-stage with garnet's micro-texture and micro-chemistry.