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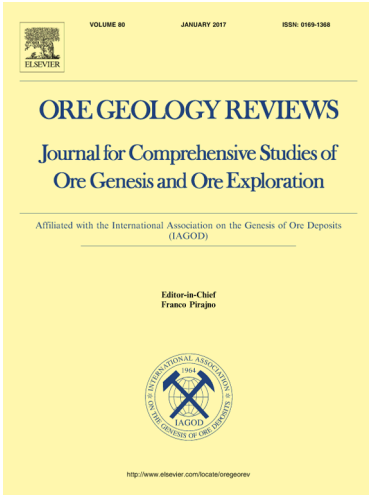

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A Study by Electron Microscopy of Gold and Associated Minerals from Round Mountain, Nevada

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Abstract

Details regarding the mineralization patterns of gold in epithermal systems are poorly understood. A refined understanding of gold microtextures, the interface between gold and associated minerals, and the role that nanoparticles play in gold mineralization could provide insight into the details of gold growth and may contain indicators of gold ore concentration mechanisms. Furthermore, a refined understanding of the interface also may explain variation in cyanide leaching extraction efficiency and may enable enhancement of recovery methods. Macrocrystalline gold samples from Round Mountain, Nevada were analyzed using field emission scanning electron microscopy and transmission electron microscopy. This study suggests that gold nanoparticles are common in Round Mountain gold and associated mineral phases, and may play an important role in the formation of macrocrystalline gold in this deposit. Microtopographic evidence indicates that the two dimensional nucleation and growth mechanism is dominant and nanotextural evidence suggests that nanoparticulate gold was the first stage of growth in the formation of these macrocrystalline samples that grew rapidly at high degrees of supersaturation. Results suggest that the interface between gold and quartz and other related minerals is far more complex than previously thought, and that textures present at the interface and in the bulk gold can help explain mineralization history and can also have implications for gold recovery efficiency for macrocrystalline bearing ore.