Perrouty S, Linnen RL, Samson IM, 2017, LREE-rich epidotes and fluorocarbonates in the Canadian Malartic district, Quebec, Canada: toward new indicator minerals for intrusion-related gold deposits?, Abstract, CIM-GAC-MAC, Vancouver, BC

Light Rare Earth Element (LREE; La-Ce-Pr-Nd)-rich epidotes (allanite) and fluorocarbonates (parisite, synchysite) have been reported from several gold deposits worldwide. These minerals are commonly considered as "accessory", and their relationships with gold mineralization have yet to be determined. This preliminary work investigates the spatial distribution, chemistry, and paragenesis of these LREE-rich minerals in the metasomatic footprint of the world-class Canadian Malartic gold deposit. This low-grade, stockwork-disseminated, intrusion-related system is located south of the Cadillac – Larder Lake Deformation Zone, Pontiac/Abitibi Subprovinces. Host rocks include quartz-monzodiorites, meta-sedimentary rocks, and mafic dykes. Gold mineralization is structurally controlled along faulted contacts between intrusive and meta-sedimentary rocks and along high-strain S_2-parallel corridors. Significant mass gains in Au-Ag-Te-Bi-Sn-Mo-W-S-C-F and alkalis have been documented. The deposit displays a well-defined metasomatic footprint, up to 6 km wide, which has been extensively investigated over the last five years by the NSERC-CMIC Exploration Footprints project. LREE-rich minerals are present as disseminated crystals in all mineralized lithologies, as inclusions in or at the edges of pyrite, and within quartz+carbonate±pyrite±gold veins where locally they are spatially associated with gold grains. In the mafic dykes, which were more reactive than other rock types to the Canadian Malartic hydrothermal fluids, their presence is linked with LREE mass gains. Allanite represents a distal marker for alteration, and its chemistry (e.g., REE/Ca ratio, Al^{VI} content) varies systematically toward gold mineralization. Allanite was replaced by chlorite-fluorocarbonate (parisite, synchysite) assemblages in proximal alteration zone (CO_2 alteration). The distribution of LREE-rich minerals outlines the spatial progression of the metasomatism in all rock types in the Canadian Malartic district. LREE-rich minerals may therefore represent new indicators for similar types of intrusion-related gold deposits.

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