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# Mineralogical studies of carbonate phases associated with the mineralized zones at Paramanahalli, Chitradurga Greenstone belt, Karnataka, India

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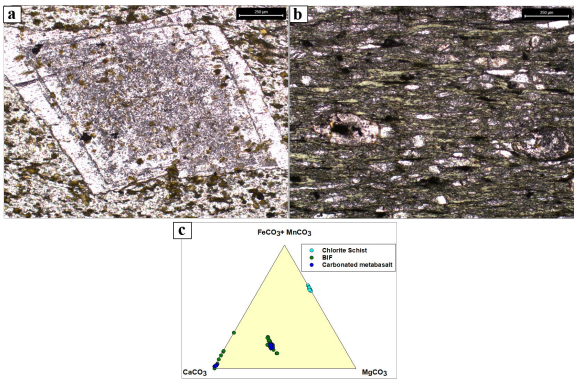


Petrographical studies with electron microprobe analysis (EMP) infer the mineral association from the mineralized zone at Paramanahalli, Karnataka (India), characterized as chlorite + albite + carbonate + quartz + pyrite ± gold. The carbonated metabasalt contain rhombic shaped ankerites, chlorite schist consist of pistomesite and few calcite.The abundance of ankerite, pistomesite, and calcite (few siderite grains) is decreasing order. The most abundant carbonate close to gold is ankerite (Fig.1a) [Ca (Fe, Mg, Mn)$(CO_3)_2$], and composition varies (in wt%) from $FeCO_3$=17-18, $MgCO_3$=31-32, $MnCO_3$=1-2, $CaCO_3$=50-51. The composition of pistomesite (Fig.1b) (Fe, Mg)$CO_3$ varies from $FeCO_3$=62-63, $MgCO_3$=33-35, $MnCO_3$=1-2, and $CaCO_3$=0. Carbonates are classified with the help of $CaCO_3$-$FeCO_3$ + $MnCO_3$- $MgCO_3$ ternary classification plot (Fig.1c). The abundance of carbonate minerals reflects the carbonic fluids responsible for forming the gold deposit, and the presence of different generations of carbonates indicates different mineralization/alteration events in the study area. The formation of carbonate mineral that forms in lode-gold deposits depends on the chemical composition of the host rock, which has a typical mineral assemblage of quartz, muscovite, biotite, albite, and chlorite. Over an extensive range of pressures and temperatures, a solid solution series is formed by Fe-carbonate (Siderite), Fe-Mg-Mn-carbonate (Ankerite), and Ca-carbonate (Calcite). However, the bulk rock chemistry, reaction with a hydrothermal fluid, and variation in P-T conditions can form different generations of carbonate along with metals. Hydrothermal fluids containing sulfur can react with the $Fe^{2+}$ from the host rocks, leading to pyrite/sulfide deposition, which consumes $H_2S$, reducing the fluid and thus destabilizing the $Au(HS)^{-2}$ complexes, causing precipitation of gold. The abundance of carbonates with sulfides makes these carbonate minerals as potential recorders of physical and chemical changes during the evolution of the hydrothermal fluid. An attempt has been made to use textural and geochemical data of carbonate phases closely associated with sulfides to infer the paragenesis of different carbonates and mineralization events in the study area.