Tectonothermal evolution and muliphase ore-forming processes at Turmalina gold deposit, Quadrilátero Ferrífero, Brazil

W. FABRICIO-SILVA[1*], C.A. ROSIÈRE[2], M.E.S.D. GIUSTINA[1] AND B. BÜHN[1]

[1]Universidade de Brasília, Brasília, 70910-900, Brazil (*correspondence: wendellfabricio@gmail.com)

[2]Universidade Federal de Minas Gerais, Belo Horizonte, 31270-901, Brazil

Turmalina is an important orogenic gold deposit hosted in an Archean greenstone belt, intruded by a granite stock, and located in the Quadrilátero Ferrífero, Brazil. The deformation events (D_1 to D_3) associated with the Au-bearing sulfide stages are reconstructed with the support of garnet porphyroblasts (Grt_1 to Grt_3).

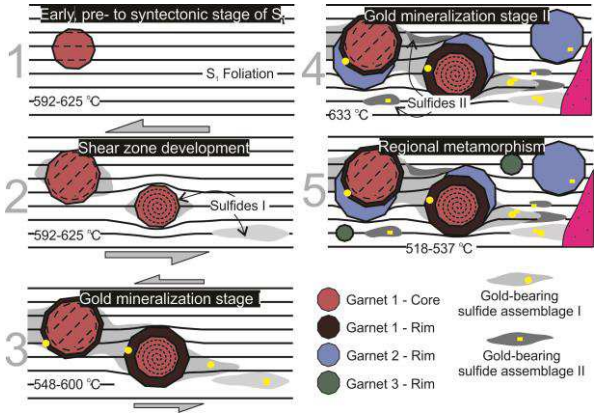

Figure 1: Timing relationships of the garnet porphyroblasts related to deformation events, gold mineralization stages and sulfide assemblages.

The Grt_1 have grown pre- to syn-D_1 and Grt_2 formed during the late to post-deformation stage of the D_2 event. The initial temperature was established as 548-600°C, reaching 633°C during late-D_2, likely as a result of granite intrusion. The Grt3 resulted from re-equilibration under retrograde conditions. Two gold-bearing sulfide stages were identified using microstructural studies, mineral chemistry, geothermometry, and sulfur isotope analysis: po-apy±lö±ccp±gold stage I (the main stage) formed during D_2 event and; po-py-apy±ccp±gold stage II precipitated below the metamorphic peak and continued towards lower than 450°C. We interpret that granite intrusion imposed magmatic fluids and increased metamorphism to promote gold mineralization.