

***Crystallographic preferred orientation of thermally overprinted strain
in the Challenger Gold Deposit, Gawler Craton, South Australia.***



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Abstract

The granulite hosted gold mineralisation at Challenger records an extended period of deformation post initial alteration, as indicated through electron backscatter diffraction (EBSD) techniques, coincident with prograde metamorphism operating from $\sim 300^{\circ}\text{C}$ to near peak metamorphic conditions. Basal $\langle a \rangle$, rhomb $\langle a \rangle$ and prism $\langle a \rangle$ slip dislocation creep mechanisms featured during this period, competing against strain partitioning resultant through the presence of melt and phyllosilicates at high temperatures, influencing a broadened spread of data. A systematic variation in strain is identified with peritectic garnet-rich mottled gneiss zones identified between ore bodies comprising shear zones overprinted by post deformation peak metamorphism; as well as a potential model for progressive strain textures preserved within ore zones observable through face mapping. With structural analysis supporting from macro, micro and meso scales through face mapping, optical microscopy and electron backscatter techniques respectively; an evolution model is proposed for the Challenger deposit as a slate belt gold deposit/ orogenic gold deposit of hypozonal class, which has been subject to continued burial, temperatures and deformation. Additionally, a case is provided for crack seal mechanisms as host to the mineralisation, as opposed to the parallel bedding hypotheses.

Keywords: CPO, electron backscatter diffraction, quartz, shear, gold, slate belt, orogenic