## "Fuchsite" and Chlorite in Carbonated Komatiites at the Kerr-Addison Deposit, Ontario, Canada: Genesis of Listvenites in Orogenic Gold Settings

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The association between Cr-bearing green micas (i.e., muscovite var. fuchsite and mariposite) and altered ultramafic rocks (listvenites) in orogenic gold settings is known, yet the genetic relationship between the two remain unclear. Altered komatiites from the 483 t Au Kerr-Addison deposit (Virginiatown, Ontario, Canada) were investigated to: (1) determine how muscovite var. fuchsite forms in ultramafic-hosted orogenic gold deposits (via petrography, SEM-EDS, and thermodynamic modelling); (2) apply mineral chemistry of muscovite and chlorite to elucidate hydrothermal processes and refine exploration techniques (using SWIR reflectance spectroscopy); and (3) relate trace-element mineral chemistry to lithogeochemistry for exploration in ultramafic-hosted terranes (using LA-ICP-MS and lithogeochemistry). Results show:
(1) The alteration assemblages of komatiitic protoliths (i.e., hydrated komatiite, regional carbonation, talc-chlorite, carbonate-chlorite, and carbonate-muscovite facies) and reaction textures (tremolite → dolomite, talc → magnesite + quartz, and chlorite → muscovite) are compatible with thermodynamic modelling, suggesting progressive carbonation in the presence of K+.
(2) The Al content in chlorite increases proximally via Tschermak substitution [[6](Mg,Fe2+) + [4]Si4+ ↔ [6]Al3+ + [4]Al3+], consistent with progressive carbonation of chlorite-bearing facies rocks. This zonation correlates with an increasing ~ 2250 nm peak position for chlorite in SWIR reflectance spectra.
(3) The Li content in chlorite increases proximally, from 55 to 400 ppm, interpreted to represent fluid contributions based on lithogeochemical additions in the carbonate-chlorite facies. Within the carbonate-muscovite facies, the muscovite does not show significant zonation in major to trace elements.
In conclusion, carbonation is a key process in the formation of listvenites in orogenic gold deposits. The extent of carbonation may be mapped on a deposit scale by interpreting the Al content in chlorite via SWIR reflectance spectroscopy. Given the lack of spatial variability recorded in muscovite chemistry at Kerr-Addison, muscovite chemistry may be useful for global-scale comparisons of ultramafic-hosted gold deposits over time and space.