A Possible Magmatic Origin for Coronas in Grenville Metagabbros

B. J. SHAULIS[1]*, L. M. HEAMAN[1,2] AND R.A. STERN[1,2]

[1]Department of Earth and Atmospheric Science, Univeristy of Alberta (UA), Canada (*shaulis@ualberta.ca)
[2]Canadian Centre for Isotopic Microanalysis, UA

Coronitic metagabbros (CMGs) from the Grenville Province preserve both primary zircon and baddeleyite, and polycrystalline zircon psuedomorphs, which are inferred to have grown during corona formation [1,2]. For this reason CMGs are ideal candidates for determining both the timing of crystallization and the timing of corona formation. There is still debate whether corona formation occurs as a magmatic process or during ultra-high pressure metamorphism [3,4].

Previous U-Pb ages of magmatic zircon and baddeleyite suggest synchronous crystallization at ~1170-1150 Ma; and ~1050 Ma for polycrystalline zircon [1,2], the latter to have formed during ultra-high pressure metamorphism.

New CAMECA 1280 *in situ* zircon oxygen isotope data from a CMG from Ontario, Canada (similar to [1], same location as [2]) indicate that both the prismatic and polycrystalline zircon have identical and uniform mantle-like $\delta^{18}O_{VSMOW}$ values of 5.82 ± 0.04 ‰ (n=31) and 5.81 ± 0.03 ‰ (n=70), respectively (Mantle zircon $\delta^{18}O$ = 5.3 ± 0.6 ‰, [5]). The $\delta^{18}O_{VSMOW}$ values for zircons from this CMG occurrence are the lowest reported for CMG zircon from the Grenville Province (~6.4 ‰, [6, 7]). The uniform $\delta^{18}O_{VSMOW}$ values suggest that both prismatic and polycrystalline zircon formed during magmatic crystallization, such that the younger age of polycrystalline zircon is the result of Pb-loss during metamorphism, and that these coronas formed during magma cooling processes and are not a result of ultra-high pressure metamorphism.

[1] Davidson and van Breeman (1988) *CMP* [2] Heaman and LeCheminant (1993) *Chem. Geol.* [3] Shand (1945) *GSA Bull.* [4] Joesten (1986) *Min. Mag.* [5] Valley *et al* (2005) *CMP* [6] Valley *et al* (1994) *EPSL* [7] Reagan *et al* (2011) *Geosphere*