

Morphologies of apatite inclusions within mantle zircon in NE Cambodia

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The mantle zircon from NE Cambodia, contain abundant apatite inclusions. It provides a window into fluid composition in the upper mantle. Apatite inclusions show interesting morphologies. Our petrographic observations show that the original apatite rich fluids were trapped during zircon crystal growth in the mantle. They burst to form apatite crystals and tubular channels of manifold morphologies (**Figure 1**), during the decompression and cooling processes, when zircon quickly transported to the earth surface. Here we report Laser Raman spectroscopy and morphology studies of apatite inclusions within mantle zircon from a gem village in NE Cambodia. The report of new morphology observations on apatite inclusions within zircon may allow us to put better constraints on the compositions of mantle fluid.

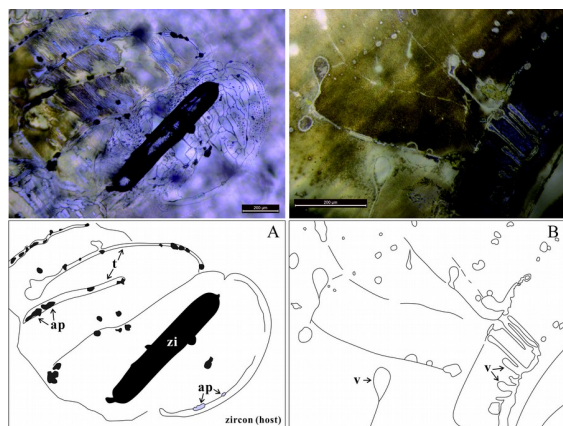


Figure 1: Transmitted light photographs of apatite inclusions in zircon.

(A) The inset shows the oval shaped inclusion clusters (1300 μm across), made up of zircon (labeled “zi”), apatites (labeled “ap”), and tubular channels (labeled “t”).

(B) Volatiles from the original inclusion may have coalesced to form the vesicles (mainly 10-100 μm wide, labeled “v”), during rapid decompression of the original inclusion. These morphologies are similar to the moment of magma eruption.