

Mineral and fluid inclusions in the Hadean detrital zircon

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The first 600 million years is critical period of the habitable planet Earth, but Hadean (4.56-4.0Ga) rocks are absent on the modern Earth. The Jack Hills metasedimentary rocks have long been investigated because of the presence of Hadean detrital zircons back to ca. 4.4 Ga (e.g. Valley et al, 2014). Previous works for Hadean detrital zircons have given important geological aspects on the Hadean surface environment (e.g. Hopkins et al., 2010). Here we discovered fluid inclusions in 4.34 Ga zircon core with random distribution as primary fluid inclusion habit. They are several micro-meters in size and showing Brown motion due to coexisting gas and liquid phases, and Raman spectra showed weak signals of CH₄ + H₂O. The inherited core contains quartz and K-feldspar as mineral inclusions, suggesting felsic magma origin. Therefore, the presence of H₂O in 4.34 Ga zircon indicates hydrous source magma and suggest that a capture of magmatic water during zircon growth. Fluid inclusions preserved in Hadean zircons may give critical information about primordial felsic crust (continent), presence of ocean and origin of water.

References: Hopkins, M., Harrison, T.M. and Manning, C.E. (2008) Low heat flow inferred from >4 Gyr zircons suggests Hadean plate boundary interactions. *Nature* 456, 493-496. Valley, J.W., Cavosie, A.J., Ushikubo, T., Reinhard, D.A., Lawrence, D.F., Larson, D.J., Clifton, P.H., Kelley, T.F., Wilde, S.A., Moser, D.E. and Spicuzza, M.J. (2014) Hadean age for a post-magma-ocean zircon confirmed by atom-probe tomography. *Nature geoscience* 23, 1-5.

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