

Metallic lead nanospheres discovered in ancient Antarctic zircons

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Nanospheres of metallic lead, 5-30 nm in diameter, are present in previously-identified Pb-rich domains in zircons from high-grade gneisses of the Napier Complex, Enderby Land, East Antarctica [1]. They are associated with amorphous silica and titanium- and aluminium-rich phases, suggesting they represent melt inclusions. Unlike the weak nanoclusters and limited nano-scale mobility of Pb identified by an atom probe tomographic study [2], and related to α -recoil with volume diffusion enhanced by later metamorphism, the formation of metallic Pb attests to a much more extensive redistribution of unsupported radiogenic Pb. This is likely the result of polymetamorphism, with the Napier Complex having undergone two high-grade events: at ~ 2.8 Ga and ~ 2.5 Ga [1]. The formation of metallic nanospheres within annealed zircon effectively halts the loss of radiogenic Pb. However, inhomogeneity and possible matrix effects may compromise the precision and accuracy of U-Pb ages obtained from such domains by high spatial resolution microbeam techniques [3].

References

[1] Kusiak et al., 2013, *Geology* **41**, 291-294; [2] Valley et al., 2014, *Nature Geosc.* **7**, 219-23; [3] Kusiak et al., *PNAS*, in press.