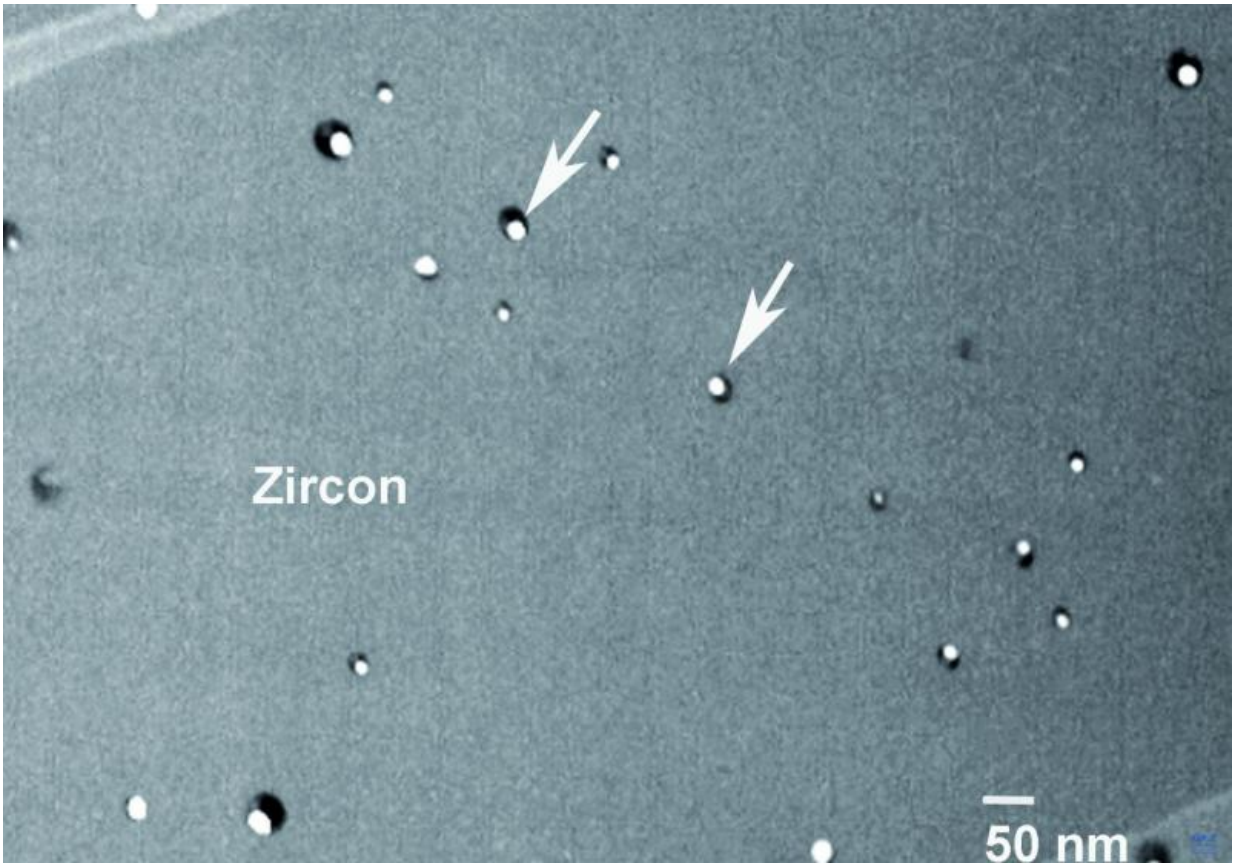
Lead hokes the age

April 6 2015



Zircon from East Antarctica with nanospheres of metallic lead under GFZ's transmissionelectron-microscope TEM. The rock sample is more than 3,4 billion years old. Credit: GFZ

Rocks do not lose their memory across Earth history, but their true ages might be distorted: Even under ultra-high temperature metamorphic

conditions exceeding 1200°C, zircon retains the lead content accumulated during radioactive decay of uranium and thorium.

Giga-year-old zircon crystals still contain lead in form of nanometre-sized spheres of pure lead. However, the inhomogeneous spatial distribution of the lead spheres might falsify ages determined from high-resolution Pb isotope measurement via ion probe.

Zircon is an ideal mineral for the age determination of very old rocks because it is believed to be a closed system through Earth history. Zircon geochronology is thus a standard method of geological age determination.

Recently, an international group of Earth scientists studied zircon from 3- to 4-billion-year-old, high-temperature metamorphic rocks from Antarctica with transmission electron microscopy TEM at the GFZ German Research Centre for Geosciences. TEM investigations revealed that the lead from radioactive decay was not homogeneously distributed in zircon but was accumulated within inhomogeneously distributed Pb nanospheres in zircon only 5 to 30 nm in diameter. The inhomogeneous distribution of lead in zircon might adulterate the ages measured via high-spatial resolution ion probe technique.

More information: Monika A. Kusiak et al.: "Metallic lead nanospheres discovered in ancient zircons", *Proceedings of the National Academy of Sciences*, *PNAS Early Edition*, DOI: doi/10.1073/pnas.1415264112

Provided by Helmholtz Association of German Research Centres

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