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U-Pb ID-TIMS dating applied to U-rich inclusions in garnet

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Abstract

Garnet has long been recognized as an important mineral in metamorphic petrology thanks to its widespread distribution and successful use in the reconstruction of *P-T-t* paths. However, the potential of garnet to solve geological problems may have been underestimated. In this paper, we make use of the role of garnet as a safe container of U-rich inclusions that, despite being metamict, are screened from Pb loss-causing processes and can be dated by isotope dilution–thermal ionization mass spectrometry. Garnet itself is not a true U-Pb geochronometer, as it normally contains no uranium, but it represents a vessel that protects U-rich inclusions from later disturbances. Garnet is virtually free of common Pb, it is clean and transparent, and provides a good control for the selection of suitable grains. In this study, inclusions such as uranitite in garnet were successfully used to obtain a precise U-Pb age of 318.36 ± 0.32 Ma of a pegmatite vein (Évora, Portugal), which otherwise would have been undatable due to the absence and/or strong alteration of common geochronometers such as zircon.

Keywords: Pegmatite, garnet, U-Pb ID-TIMS, U-rich inclusions