The current status of zircon oxygen micro-isotopic analysis using *SHRIMP II*

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Zircon, one of the most robust repositories of the U-Pb isotopic system, has also proved to be excellent at preserving oxygen isotopic compositions that reflect the environment in which the mineral crystallised [1]. With the development of techniques for the precise analysis of zircon oxygen isotopes by ion microprobe [2] it has become possible to trace the evolution of magma oxygen compositions as recorded in the isotopic zonation of individual zircon grains [1].

The *SHRIMP* ion microprobes were designed primarily for isotope ratio measurements. Except for the pioneering analyses of sulphur isotopes on *SHRIMP I* [3], however, little work has been done on light stable isotopes.

Following the installation of a Cs ion source, electron gun and multi-collector on the ANU *SHRIMP II*, work is now well advanced on implementing the analysis of a range of stable isotopes, including oxygen isotopes. Current focus is on improving the external precision beyond the 0.3‰ already achieved.

High internal precision is obtained relatively easily: a 3nA Cs^+ beam focused to a spot 20µm diameter produces ~100pA of $^{16}O^-$ secondary ions from zircon. $^{18}O/^{16}O$ can be measured with a precision of ~0.2‰ in a few minutes. Surface charge is easily neutralised using an oblique incidence, broadly focused electron beam from a Kimble Physics ELG-5 electron gun. The challenge has been to achieve a high level of inter-spot reproducibility over a full 24-hour session. Most progress in this regard has resulted from redesign of sample mounts and mount holders and identification of a cause of variable mass fractionation related to differences in secondary ion trajectories.

The current status of micro-isotopic analysis of oxygen in zircon using the RSES *SHRIMP II* will be documented through analyses of zircon standards. Examples from a variety of Paleozoic granites from SE Australia and early Archean TTG suites from SW Greenland will illustrate the contrasting ranges of magma isotopic compositions and sources in the two regions.

References

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