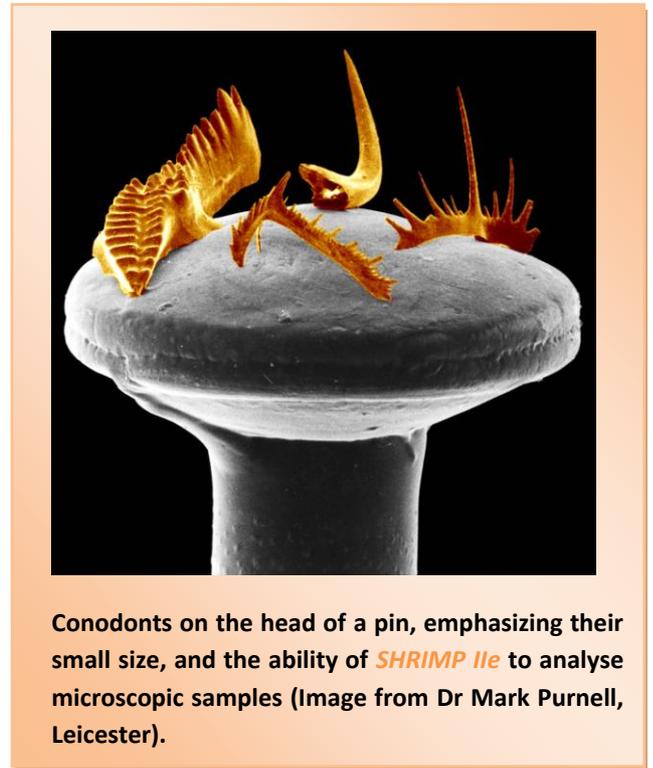


Pioneering the Technique, Perfecting the Technology

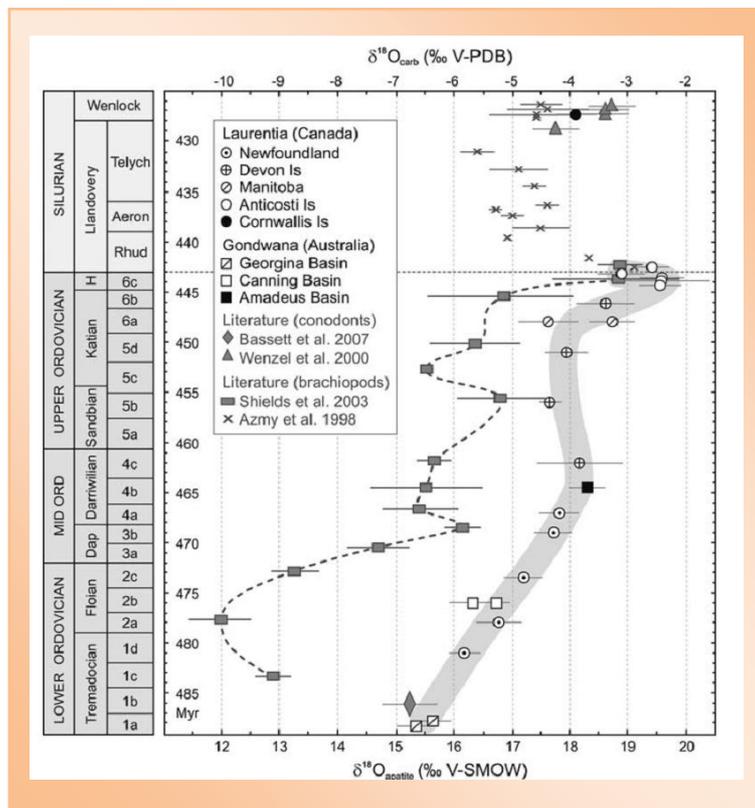
High Precision Stable Isotope Analyses

SHRIMP IIe has long been recognized as the instrument of choice for U-Pb geochronology. With its advanced multi-collector, the *SHRIMP IIe/MC* is ideal for high precision Stable Isotope applications. The ASI multi-collector, combined with advanced electrometers, and optional charge neutralisation, provides increased versatility and enhanced performance while preserving the trademark ease of use and reliability of *SHRIMP* instruments.

Stable isotopes have diverse applications in biology, archaeology, climatology and paleoclimatology and in geological and environmental studies. Isotopic analysis of sulfur, oxygen and carbon, for example, can help solve puzzles such as *the evolution of life, the origin of magmas, palaeoclimate, sources of sediment cements, temperatures of mineral formation, and origins of ore components*. Stable isotopes are also used in the study of extra-terrestrial materials, including the origin and classification of meteorites.



Conodonts on the head of a pin, emphasizing their small size, and the ability of *SHRIMP IIe* to analyse microscopic samples (Image from Dr Mark Purnell, Leicester).



In Stable Isotope configuration, the *SHRIMP IIe* is fitted with either the standard Duoplasmatron for electropositive elements (e.g. lithium, boron) or a bright, robust Caesium Source and Charge Neutralisation Electron Gun for analysis of electronegative elements (e.g. carbon, oxygen, sulfur).

In single-collector mode, sub-permille analytical precision can be achieved at a rate of <20 minutes per spot. The multi-collector provides even higher precision in a much shorter time.

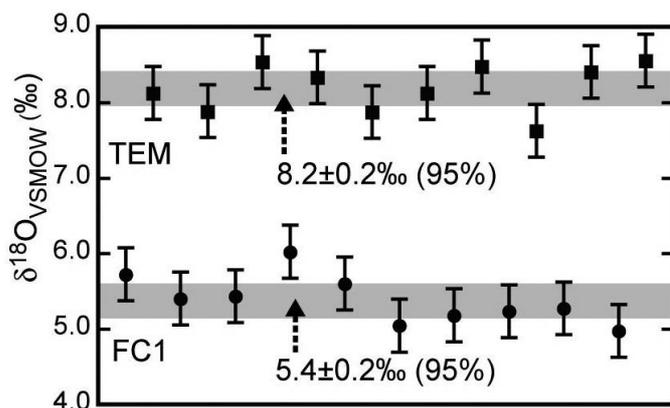
[<-] Oxygen isotope compositions of Ordovician to Early Silurian conodonts and brachiopods. Shaded band is *SHRIMP II*-derived data from conodont bioapatite, compared to earlier calcite brachiopod and conodont data. J.A. Trotter, I. S. Williams, C. R. Barnes, C. Lécuyer & R. S. Nicoll, *Science*, 321, pp. 550-554, 25 July 2008.

High Precision Stable Isotope Analyses (Cont.)

The multi-collector allows a combination of up to five electron multipliers and up to three Faraday cups, with detector type, detector spacing and slit width all adjustable under computer control, without breaking vacuum.

The multi-collector is combined with advanced, computer-configurable electrometers, which operate under vacuum to provide very low noise, stable baselines. This combination enables superb precision and highly efficient measurement of scarce samples.

Single spot oxygen isotope analyses of zircon standards



The finely-focused primary beam and exceptional spatial and depth resolution afforded by the *SHRIMP IIe* Kohler primary ion optics enables maximum efficiency in fine scale surface sampling and resolution of micron-scale lateral and vertical complexity.

Despite the *SHRIMP's* high specification, its operation is straightforward. The sample material is prepared as thick or thin section, or grain mount, as standard sized or 'mega'-mounts.

The multi-collector, like the overall *SHRIMP IIe*, can be operated by remote control over the web.

A typical sampling depth is less than 3 μm , minimising the effects of vertical heterogeneity or providing a within-run depth resolution of $<0.1 \mu\text{m}$, essential, for example, in diffusion studies. Minimal sample damage leaves the target intact for repeat analyses, future work and post analysis examination.

This unrivalled combination of performance, ease of use, reliability and even better versatility of the multi-collector, stable isotope *SHRIMP IIe* opens up exciting avenues for innovative researchers, with the proven reliability and productivity of *SHRIMP IIe* instruments.

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