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Isotopic analysis by SIMS: comparison between IMS 1270 and IMS 1280 HR2 Caméca ion microprobes

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During these last years, measurements and applications of non-traditional stable isotope measurements have been widely developed in various domains (cosmochemistry, primitive Earth, environment...). Although MC-ICP-MS plaid a main role in these developments, the multi collection SIMS also demonstrated its ability to provide in situ high precision data. On samples ranging from a few nanograms to a few tens of nanograms, the SIMS precision and accuracy are more or less similar to those reached by other techniques: ± 0.3 ‰ for silicon isotopes (Marin et al., 2009), ± 0.3 ‰ for magnesium isotopes (Villeneuve et al., 2009), and ± 0.15 ‰ for iron isotopes (Luais et al., 2009).
Nevertheless, higher precisions are needed to answer to given scientific questions. For example, a precision in the range of 100 ppm on the magnesium isotopes ratios will allow to date with a good accuracy chondrules or CAI with lower Al/Mg ratio, or to better understand the behaviour of the environmental proxies such as Mg isotopes in carbonates.
The new Caméca ion microprobe (IMS 1280 HR2 - High Reproducibility and High Resolution) has been designed to reach an higher mass resolution and an higher precision for FC-multicollection isotopic measurements. We will present here the first results obtain with this new instrument for stable element isotopic ratios, and make the comparison with the results obtained on the previous generation of ion microprobe (IMS 1270), to point out the key parameters for high precision SIMS measurements.

References:
Luais et al. (2009) AGU Conference, San Francisco.
Marin et al. (2009) AGU Conference, San Francisco.
Villeneuve et al. (2009), Science, 325, 985-988.