

# Is measurement of Si isotope ratios by inductively coupled plasma mass spectrometry realistic?

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Natural variations in Si isotope ratios can be used to monitor silica cycling, as biogenic and geological silica differ significantly in isotopic composition. However the use of  $\delta^{29}\text{Si}$  and  $\delta^{30}\text{Si}$  as a geochemical tracers has been limited because measuring Si isotopes is analytically difficult and hazardous, most often carried out using laser fluorination followed by isotope ratio mass spectrometry.

Inductively coupled plasma mass spectrometry (ICP-MS) is widely used for isotope ratio measurement, but its application for Si isotope ratios has been limited because of interferences from polyatomic ions such as  $^{14}\text{N}_2$  and  $^{14}\text{N}^{16}\text{O}$ . While several researchers [1],[2] have demonstrated that precise measurement of  $\delta^{29}\text{Si}$  (0.1‰) by multicollector (MC) ICP-MS is possible,  $^{14}\text{N}^{16}\text{O}$  compromised the precision and accuracy of  $\delta^{30}\text{Si}$ .

Here we report on recent investigations that have demonstrated that a single collector sector field (SF) ICP-MS, capable of variable resolution, can resolve interferences for  $^{28}\text{Si}$ ,  $^{29}\text{Si}$  and  $^{30}\text{Si}$  using a relatively low resolution setting ( $M/\Delta M < 1500$ ). A method for measuring  $\delta^{29}\text{Si}$  and  $\delta^{30}\text{Si}$  has subsequently been developed, focussing on appropriate sample preparation and minimisation of background Si levels. The precision achievable was ultimately controlled by whether an electrom multiplier or Faraday detector was used for isotope counting. Whether ICP-MS is a realistic option for precise and routine measurement of  $\delta^{29}\text{Si}$  and  $\delta^{30}\text{Si}$  is assessed in terms of precision achievable and the time required for analysis.

## References

- [1] De La Rocha C.L. (2002) *Geochem. Geophys. Geosy.*, **3**, Art. No. 1045. [2] Cardinal D., Alleman L. Y., de Jong J., Ziegler K., André L. (2003) *J. Analyt. At. Spectrom.*, **18**, 213-218.