

## **Tin isotopes and the origin of planetary materials- A novel methodology with external and internal mass-bias correction, and double spike MC-ICP-MS analysis**

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Tin with the highest number of 10 stable isotopes, and being moderately volatile, chalcophile and siderophile, is an interesting element to explore various isotope fractionation processes in nature. Due to instrumental limitations, mostly concerning the high ionization potential of Sn (7.3 eV), and also insufficient Sn yields during chemical separation using ion-exchange methods, the use of Sn stable isotope fractionation is not well explored [1,2,3,4].

We formulated a novel technique to determine mass-dependent and mass-independent isotope fractionation of Sn in natural materials with high precision using ~20-1000 ng of Sn, and taking into consideration the sensitivity of Sn fractionation during sample handling, and possible artefact introduced, by using different mass-bias correction procedures which includes a double-spike MC-ICP-MS method. NIST SRM 3161a Sn standard solution provided the best external reproducibility amongst several Sn reference materials analysed [5], and therefore was selected as the in-house Sn-isotope standard. Considering the volatile nature of Sn with certain halic acids, the sample digestion process was designed to work with HF and HNO<sub>3</sub> only, and at low temperatures (≤ 70° C). A 3-stage ion chromatographic technique has been developed to achieve complete separation of Sn from elements like Cd, In, and Te, which have isobaric interference with Sn. A new technique is also implemented to remove organics introduced into the sample from the resin during chromatography. A <sup>117</sup>Sn-<sup>122</sup>Sn double-spike method was designed for precise measurements of mass-dependent Sn isotope fractionation.

[1] Laeter & Jeffery, 1965. JGR, 70(12) 2895-2903. [2] Laeter & Jeffery, 1967. GCA, 31(6) 969-985. [3] Loss et al., 1990. GCA, 54(12) 3525-3536 [4] McNaughton & Rosman, 1990. GCA, 55(2), 499-504 [5] Pathak D & Mezger K (2017) Goldschmidt Abstracts, 2017 3067