Mo, Sr, Ba, and Sn nucleosynthetic anomalies in meteorites

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Nucleosynthetic anomalies in meteorites are a measure of the level of heterogeneity that survived mixing and high temperature events in the early solar nebula.

Testing mixing models of building blocks to make terrestrial planets using nuclesynthetic anomalies give a great opportunity to use robust characteristics of the objects considered, i.e. that are not modified by processes such as evaporation, condensation, or metal-silicate differentation, which all induce mass-dependent fractionation.

Nucleosynthetic anomalies in meteorites have not yet been measured in all meteorite classes for all isotope systems, and some of them can now be measured, or re-measured with better precision, thanks to recent anaytical advances. We have developed a chemical procedure allowing to measure Mo, Ba, Sr, and Sn isotopes from the same aliquot. Ba and Sr isotope measurements will be more specifically shown in Yobregat et al. (this meeting), and Sn isotopes in Wang et al. (this meeting).

The detection of Mo nucleosynthetic anomalies by MC-ICPMS requires very high levels of separation prior to sample introduction in the mass spectrometer. We have compared the performances of two state-of-the-art instruments (i) Nu1700 equipped with an enhanced sensitivity interface and a DSN desolvator to (ii) Neptune Plus with an Aridus II desolvator, equipped with high sensitivity Jet cones. We tested various chemical separation methods and compared the ε values normalized to $^{97}Mo/^{95}Mo$ using NIST 3144 and various matrices. Production/transmission of molecular isobaric interferences on the Neptune Plus was much greater using this set up. These interferences could not be corrected with on peak zero and are thus unrelated to compounds introduced by the solvant or the gas (Ar, N, Kr). They clearly involve low level impurities in the final chemical separation of Mo from its matrice. Measurements of Mo isotope compositions on terrestrial samples and meteorites will be reported at the meeting.