

⁸⁴Sr anomalies in meteorites?

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Strontium has 4 stable isotopes ⁸⁴Sr (0.56 %), ⁸⁶Sr (9.86%), ⁸⁷Sr (7.00%) and ⁸⁸Sr (82.58%). ⁸⁶Sr, ⁸⁷Sr, ⁸⁸Sr were all created during the nucleosynthesis process of slow neutron capture (*s*-process), whereas ⁸⁴Sr is a *p*-process proton-rich nuclide. The isotopic composition of the Solar System, as defined by chondrites, reflects mixing of isotopically variable proto-nebula materials generated during nucleosynthesis in different stellar environments. Thus, unravelling isotopic anomalies within chondritic components may reveal proto Solar sources of the elements.

It has previously been demonstrated that presolar SiC from the Murchison carbonaceous chondrite have Sr isotopic compositions radically different from 'normal' Solar System material, with significant possible enrichments in *s*-process isotopes, through contributions from Asymptotic Giant Branch stars [1]. Conversely, the relative abundances of *s*-process ⁸⁶Sr, ⁸⁷Sr, and ⁸⁸Sr in the Murchison SiC are very close to early Solar System materials (CAIs from Allende [2]). In view of the different *s*-process superpositions and other contributions to all three of these isotopes, the close agreement is puzzling and requires resolution. A possible issue is that to correct for instrumental mass fractionation, Allende CAIs were spiked with ⁸⁴Sr, assuming this isotope to be 'normal' with respect to bulk chondritic values [2].

Here, we assess the presence of ⁸⁴Sr anomalies in CAIs and bulk meteorites. Early studies have demonstrated ⁸⁴Sr anomalies in FUN inclusions from Allende of upto $\epsilon^{84}\text{Sr} = -42$ [3] (ϵ = part per 10000 deviation from terrestrial). Following these results, we are performing unspiked static measurements by TIMS (UMd Triton). Preliminary results on terrestrial samples and bulk meteorites (Murchison [CM2], Ornans [CO3], Allende [CV3], Pasamonte [Eucreite]) reveal no resolvable ⁸⁴Sr anomalies ($\epsilon^{84}\text{Sr} = 0.26 \pm 0.52$, 2σ) at levels of external precision obtained from the terrestrial ⁸⁴Sr/⁸⁶Sr ratio = 0.0564673 ± 14 (50ppm, 2σ ; steady 5V signal intensities for ⁸⁸Sr on NBS SRM-987, ⁸⁷Sr/⁸⁶Sr = 0.7102492 ± 23), confirming recent results by [4]. Measurements of CAIs and further bulk meteorites are in progress.

- [1] Podosek *et al.* (2004) *Ap. J.* **605**, 960–965. [2] Podosek *et al.* (1991) *Geochim. Cosmochim. Acta* **55**, 1083–1110. [3] Papanastassiou & Wasserburg (1978) *GRL* **5**, 595–598. [4] Andreasen & Sharma (2007) *Ap. J.* **665**, 874–883.

Mobilization of sorbed and co-precipitated arsenic from biogenic Fe(III) (hydr)oxides by the Fe(III)-reducer *Shewanella oneidensis* MR-1

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Elevated arsenic concentrations in South-East Asian groundwater and soils have a vast impact on the health of many people. Consequently, research has focused on the geochemical and biogeochemical processes leading to mobilization (release) and immobilization (removal) of arsenic from aquifers and soil. Recent studies by Hohmann *et al.* [1] demonstrated that Fe(II)-oxidizing bacteria can efficiently immobilize arsenic in aqueous systems. By forming biogenic Fe(III) hydroxides, these microorganisms form co-precipitates of Fe(III)(hydr)oxides and arsenic and sorb arsenic to the mineral surface. However, the co-existence of Fe(II)-oxidizing with Fe(III)-reducing bacteria in the environment could result in a cycling of Fe by the reduction of biogenic Fe(III) hydroxides. This could lead either to a dissolution of the Fe(III) minerals causing a release of the bound arsenic or alternatively to the formation of secondary Fe mineral phases [2] and an immobilization of arsenic. In this study, we followed the reduction of biogenic arsenic-bearing Fe(III) minerals by the Fe(III)-reducer *Shewanella oneidensis* MR-1. We then compared As (im-)mobilization during reduction of these biogenic Fe(III) hydroxides to As (im-)mobilization from chemically-synthesized Fe(III) minerals that contained sorbed and co-precipitated arsenic. Additionally, we quantified the microbial release of arsenic from granulated iron minerals (GEH minerals, consisting of akaganeite and Fe(OH)₃) which are used as filter material in municipal and industrial water treatment plants worldwide in order to immobilize harmful metals and metalloids.

- [1] Hohmann *et al.* (2010) *ES&T* **44**, 94–101. [2] Tufano & Fendorf (2008) *ES&T* **42**, 4777–4783