# Nucleosynthetic Os isotope anomalies expressed by melting in ureilites

S. GODERIS[12], A. D. BRANDON[2], B. MAYER[3] AND M. HUMAYUN[3]

[1]Earth System Science, Vrije Universiteit Brussel, B-1050 Brussels, Belgium (Steven.Goderis@vub.ac.be)

[2]Dept. of Earth and Atmospheric Sciences, University of Houston, Houston, TX 77204, USA

[3]National High Magnetic Field Laboratory and Dept. of Earth, Ocean & Atmospheric Science, Florida State University, Tallahassee, FL 32310, USA

Pervasive nucleosynthetic anomalies in differentiated meteorites involving a deficit of the s-process isotopes are observed for several elements (e.g., Ru, Mo). For Os however, large nucleosynthetic isotope anomalies are known from acid leachates and residues of primitive chondrites, but not for bulk chondrites and differentiated meteorites. This implies that constant relative proportions of presolar s- and r-process Os carriers were maintained in primitive chondrites during nebular and planetary processes.

In this work, heterogeneously distributed s-process Os isotope enrichments are reported for ureilites, which are carbon-rich ultramafic achondrites dominantly composed of olivine and low-Ca pyroxene. These correlated Os isotope anomalies reach up to $\mu^{186}Os_i$=336±13 ppm, $\mu^{188}Os$=60±4 ppm, and $\mu^{190}Os$=34±2 ppm. Given the observed homogeneity of Os in all types of primitive chondrites, this enrichment must have been caused by the selective removal of r-process Os host phases, probably metal, during rapid localized melting on the ureilite parent body [1]. The melting and mixing history of ureilites undoubtedly affected other presolar carriers, such as silicates and oxides, differently, resulting in hard to predict preservation of nucleosynthetic anomalies in other elements in ureilites. As such, the Os isotopic heterogeneity reported here for ureilites implies that isotopic anomalies measured for other elements, interpreted to reflect nebular heterogeneities [2], may partly or wholly result from parent body processing of carbonaceous chondritic precursor components. Further, the complementary metallic melts extracted from ureilites are predicted to have an Os isotope anomaly with an s-process deficit, like those observed for Mo and Ru in other meteorites. Planetary differentiation must now be considered a factor in expressing nucleosynthetic anomalies in differentiated meteorites before such anomalies can be attributed to nebular processes or injections from nearby stellar sources.

[1] Rankenburg, et al. (2008) *GCA* **72**, 4642-4659. [2] Warren (2011) *GCA* **75**, 6912-6926.