

11th Symposium on Nuclei in the Cosmos (NIC XI)

Abstract preview

Abstract no.: NIC_XI_164
Created: 2010-03-17
Updated: 2010-03-20
Status: submitted
Type: Oral presentation
Abstract language: English

Topic: Chemical evolution and signatures of nucleosynthesis I. Pre-solar grains; ISM
Additional topic(s): 9. – Explosive events and massive stars I. Core collapse supernovae

Content English

Title: Extreme ^{54}Cr -rich oxide grains in meteorites: Evidence for a single late supernova injection into the Solar System

Abstract text:**Content**

Systematic variations in $^{54}\text{Cr}/^{52}\text{Cr}$ ratios between different classes of meteorites point to large scale spatial and/or temporal isotopic heterogeneity in the solar protoplanetary disk. These variations have been attributed to nucleosynthetic effects, possibly carried by as-yet-unidentified presolar grains. We have recently identified extremely ^{54}Cr -rich <200 nm oxide grains in the Orgueil meteorite, with estimated $^{54}\text{Cr}/^{52}\text{Cr}$ ratios (after correcting for dilution by neighboring material on the sample mount) reaching more than 50 times the solar system value. The most likely source of these grains is the ^{16}O -rich O/Ne and/or O/C zones of Type II supernovae. When combined with the unusual distribution of O isotopic compositions of other supernova-derived oxide grains, the variability in bulk $^{54}\text{Cr}/^{52}\text{Cr}$ ratios between meteorite classes argues for a heterogeneous distribution of supernova grains, including the ^{54}Cr carrier, injected directly into the solar protoplanetary disk from a single supernova.

Keywords: isotopic anomaly, meteorite, supernova, nucleosynthesis, presolar grains, chromium-54

Authors

Author(s): Nittler, L. ¹, Qin, L. ², Alexander, C. ¹, Wang, J. ¹, Stadermann, F. ³, Carlson, R. ¹
Institutes: [1] Carnegie Institution of Washington, DTM, Washington, DC
[2] Lawrence Berkeley National Laboratory, Center for Isotope Geochemistry, Berkeley
[3] Washington University, Physics Dept., St. Louis

author: Nittler, Larry
Presenting Nittler, Larry
author(s):
Submitting author: Nittler, Larry

print version: [Close window](#) [Print page](#)