

s-process Xe and Kr enrichment in the Allende CAI *Curious Marie*: Case for a presolar SiC carrier

O. PRAVDIVTSEVA^{1*}, F. L. H. TISSOT²,
N. DAUPHAS³, A. MESHNIK¹, S. AMARI¹

¹ Physics Department, Washington University, Saint Louis,
MO 63130 (*correspondence: olga@physics.wustl.edu)

² Department of the Earth, Atmospheric and Planetary
Sciences, MIT, Cambridge 02139

³ Origins Lab, The University of Chicago, Chicago 60637

Curious Marie is an extremely altered fine-grained CAI, characterized by a group II REE pattern with extensive replacement of high-T phases by low-T alteration products such as nepheline and sodalite [1]. It is U-depleted but contains large ²³⁵U excess [2], attributed to the presence of live ²⁴⁷Cm in the Early Solar System.

Here we present results of the first comprehensive noble gas study of the Allende CAI *Curious Marie*.

Xe and Kr isotopic compositions are dominated by a mixture of trapped and natural radiogenic components, resulting in a correlation between radiogenic ¹²⁹Xe (from ¹²⁹I decay) and ¹²⁸Xe (from cosmogenic neutron capture), and in correlated ^{80,82}Kr contributions from cosmogenic neutron-capture on ^{79,81}Br. ²⁴⁴Pu-fission Xe is also present. Nevertheless, combination of 50°C-step extraction and high sensitivity mass-spectrometry [3] allowed us to resolve ¹³⁰Xe and ⁸⁶Kr excesses consistent with s-process enrichment. Maximum s-process enrichments are observed in 1200-1300°C extractions, similar to ones previously reported for the neutron-irradiated *Curious Marie* [4], and they are not accompanied by spallation on ¹²⁴Xe. ⁸⁶Kr s-process contributions correlate not with Kr release but with ¹³⁰Xe-S at 1200-1300°C, consistent with a presolar SiC carrier [5]. Ne is a three-component mixture of chondritic cosmogenic Ne, Ne-E(H) and one produced by spallation on Na [6], with 1200-1300°C points falling on a mixing line between Ne-E (H) and cosmogenic Ne. If all ²²Ne excess in these extractions is from Ne-E(H), (²²Ne/¹³⁰Xe)_G is ~ 100, suggesting finer-grained SiC grains that are typical for the Murchison KJ separate [7] but in the size range of astronomically observed grains [8].

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