IRRADIATION RECORDS OF GAS-RICH OR BRECCIATED METEORITES STUDIED FROM Sm AND Gd ISOTOPIC SHIFTS BY NEUTRON CAPTURE REACTIONS.

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Introduction: Noble gas studies show that some of regolith brecciated meteorites like Pesyanoe contain significant amount of solar gas component [1]. This suggests near surface irradiation history of such meteorites on the parent bodies. Recent neutron capture study on the Sm and Gd isotopes of Pesyanoe also shows the early irradiation and regolith processes in the parent body [2]. In this study, Sm and Gd isotopic analyses of gas-rich or regolith brecciated meteorites other than aubrites were performed to find a possibility of the early irradiation on the parent bodies.

Samples and Experiments: Four samples of gas-rich or brecciated meteorites, Cook011 (L3-5), NWA801 (CR2), SaU290 (CH3), and Zag (H3-5) were used in this study. Each sample weighing about 200 mg was decomposed by $HF+HClO_4$. After evaporation to dryness, the sample was re-dissolved in 2M HCl. Conventional ion exchange techniques using two column procedures were carried out to chemically separate Sm and Gd [2]. A Micro-mass VG 54-30 thermal ionization mass spectrometer equipped with seven Faraday cup collectors was used for the isotopic measurements of Sm and Gd.

Results and Discussions: Figure 1 shows a correlation diagram between $^{149}Sm/^{152}Sm$ and $^{150}Sm/^{152}Sm$. Sm isotopic shifts can be clearly identified in NWA801 and Cook011, which correspond to the neutron fluences of $(3.6 \pm 0.3)\times10^{15}$ and $(1.7 \pm 0.3)\times10^{15}$ n cm^{-2}, respectively. No correlation between the calculated neutron fluences and CRE ages suggest the early irradiation of their meteorite parent bodies.

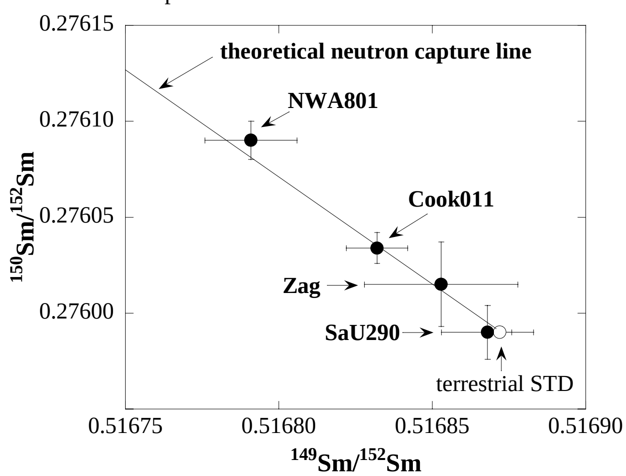

FIG. 1 A correlation diagram between $^{149}Sm/^{152}Sm$ and $^{150}Sm/^{152}Sm$ for NWA801, Cook011, Zag and SaU290. Error bars are 2σ of the means.

References: [1] Lorenzetti S. et al. 2003. *Geochimica et Cosmochimica Acta* 67: 557-571. [2] Hidaka H. et al. 2006. *Geochimica et Cosmochimica Acta* 70: 3449-3456.