

## Oxygen isotopic compositions of Fe-Ni metals in the NWA801 CR2 chondrite

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Oxygen isotopic compositions in chondrites provide important constraints on the origin and early evolution of the Solar System. It is generally accepted that mass independent fractionation (MIF) recorded by meteorites resulted from mixing of two isotopically distinct nebular reservoirs,  $^{16}\text{O}$ -rich and  $^{17,18}\text{O}$ -rich (Clayton, 1993). Since the Sun concentrate masses of more than 99% in our solar system, the oxygen isotopic composition of the Sun corresponds to average oxygen isotopic composition of the solar system. In order to measure oxygen isotopic compositions of sun, we have to measure oxygen isotopic composition of solids implanted solar wind and solar energetic particles (SEP) discharged from the sun. Fe-Ni metals are almost free of oxygen. If SEP (MeV-GeV) implanted in Fe-Ni metals, the penetration depth could be achieved to several hundreds micrometers inside the Fe-Ni metals. Recently, Svetina et al. (2004) reported high concentration of solar noble gas in metals from NWA801 CR2 chondrite. Here we try to measure the oxygen isotopic compositions in Fe-Ni metals from NWA801 CR2 chondrites.

The sample used in this study is a polished thin section of the NWA801 CR2 chondrite. A carbon evaporation film of about 30 nm was coated on the thin section in order to reduce electrostatic charging during high-energy electron and ion bombardments for chemical and isotopic analyses. In-situ oxygen isotopic analyses were performed by a Cameca ims-1270 SIMS instrument of Hokkaido University. A  $\text{Cs}^+$  primary beam of 20 keV was homogeneously irradiated on the sample surface of approximately 60 x 100 micrometers in size with a beam current of  $\sim 8$  nA. The field aperture gated the analytical area to 15 micrometers in diameter to prevent contaminating adsorbed oxygen on the sample surface and inclusions in the irradiated area. Secondary ions of  $^{16}\text{O}^-$ -tail,  $^{16}\text{O}^-$ ,  $^{17}\text{O}^-$ ,  $^{16}\text{OH}^-$ , and  $^{18}\text{O}^-$  were measured by an electron multiplier using magnetic peak switching. Terrestrial metal standards (NIST SRM 665 electrolytic iron) were used to normalize secondary ion-ratios to the delta O-values for metals in NWA801 CR2 chondrite. In order to evaporate adsorbed water on the sample surface, the standard metal and the thin section hold in ultra high vacuum over 20 days under room temperature. In order to reduce contamination of water components from the vacuum in the sample chamber, a liquid nitrogen cold trap was used to keep vacuum level of 1.0-1.5 x E-9 torr. The mass resolution of  $\sim 9000$  was applied to separate interfering  $^{16}\text{OH}^-$  peak against  $^{17}\text{O}^-$  peak. The analytical reproducibility (1 sigma) of the capital  $^{17}\text{O}^-$ -values in standard metal is estimated to be  $\sim \pm 10$  permil.

Measurement areas were positioned in Fe-Ni metals inside more than 100 micrometers from the rim. The approximated concentration of oxygen was 1-10ppm. The oxygen isotopic compositions of Fe-Ni metal showed isotope anomalies, indicating capital  $^{17}\text{O} = +40 \sim -30$  permil. The oxygen isotopic compositions of inclusions in the Fe-Ni metal show no isotope anomaly. The positive isotope anomalies correspond to the reported values of Ireland et al. (2006), in contrast, the negative isotope anomalies correspond to the values of Hashizume and Chaussidon (2005). In order to establish the range of anomalies, more evaluation of analytical uncertainties is required.