Extreme ^{16}O-rich CAIs in Isheyevo chondrite

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Oxygen in the solar system is believed to be formed by mixing of ^{16}O-rich and ^{16}O-poor reservoirs [e.g. 1 and references therein]. The ^{16}O-poor end member ($\Delta^{17}O$ = +85‰) was found from magnetite in cosmic symplectite and infers that the ^{16}O-poor reservor is H_2O [2]. Nevertheless candidates of ^{16}O-rich end member were reported from one chondrule named a006 ($\Delta^{17}O$ = -37‰) [3], 4 Ca-Al-rich inclusions (CAIs) ($\Delta^{17}O$ = -37 to -32‰) [4,5] and the Sun ($\Delta^{17}O$ = -28‰) [6] relative to other CAIs ($\Delta^{17}O$ = -23‰) [e.g. 7], characteristics of the reservoir are unclear because of the diversity of few samples. In this study, we surveyed extreme ^{16}O-rich CAIs in Isheyevo chondrites to investigate the ^{16}O-rich end menber.

Thirteenthick sections of Isheyevo chondrite were newly prepared. X-ray elemental maps were obtaind for whole sections by FE-SEM-EDS. Al-rich inclusions on the sections were picked up as many as possible for isotope analysis in order to prevent biased sample selection. Oxygen isotope analysis for the inclusions were performed by SIMS.

Oxygen isotopic compositions of 263 CAIs were measured and 4 extreme ^{16}O-rich CAIs were found. Two CAIs are composed of grossite core rimmed by spinel, melilite and Ti-rich diopside layer and others lack diopside and/or melilite. While the heterogeneous composition of grossite ($\Delta^{17}O$ = -36 to -32‰) would be affected by altered feature of grossite, the spinel grains have uniform ^{16}O-rich compsition ($\Delta^{17}O$ = -37‰). If we draw a line in 3 oxygen isotope diagram with the extreme ^{16}O-rich spinel and spinel in chondules near the CAI, the slope is in good agreement with a slope of olivine in a006 chondrule and porphiritic olivine chondrule infer that the oxygen isotopic composition of the spinel grains maintain the signature of an^{16}O-rich end member of the Solar System.

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