CORRELATED MORPHOLOGICAL, CHEMICAL, AND ISOTOPIC SYSTEMATICS FROM MURCHISON (C2M) HIBONITES; T.R. Ireland, Research School of Earth Sciences, The Australian National University, Canberra ACT 2601, Australia.

Forty-three hibonite-dominated refractory inclusions from the Murchison carbonaceous chondrite were identified in polished grain mounts of density separates. The hibonite grains can be morphologically and chemically divided into three groups. The first type is composed of 22 colourless PLAty Crystal fragments (PLACs) with less than 1.5% MgO. Two PLACs are distinctive in having less than 100 ppm Mg. Secondly, there are four pleochroic Blue Aggregates (BAGs) with individual crystals less than 10 µm and MgO contents between 2.5 and 3.0%. Twenty-two Spinel-HIBonite spherules and blebs (SHIBs), often with pyroxene and/or olivine rims, comprise the third group and have MgO contents greater than 1.9%. The PLACs and BAGs have stoichiometric compositions, with coupled substitution of Mg2+ and Ti4+ for 2Al3+. The SHIBs often contain excess Mg which is attributable to intimate mixing of spinel and hibonite.

Mg isotopic compositions of a number of hibonite from each group have been presented elsewhere and have been reproduced in Table 1 along with the morphological groupings. The PLACs, which contain between 0.5 and 1.5% MgO, show a correlated variation between fractionation and residual (Fig. 1). The Δ25Mg ranges from -16 to +3‰/amu while δ26Mg ranges from +15 to -7‰. The slope of the correlation is close to -1. Positive δ26Mg has been generally interpreted as due to addition of 26Mg from decay of 26Al; either in situ 26Al decay in the mineral, or fossil 26Mg from 26Al decay in the interstellar medium. The presence of negative residuals in this data set requires a Mg isotopic composition originally depleted in 26Mg which was subsequently augmented by 26Al decay. However, there is no correlation between Mg content (and hence Al/Mg in the hibonites) and δ26Mg which excludes a single formation event from a homogeneous reservoir. Nor would such a scenario explain the correlation between Mg and Ti isotopes which is not distinctive amongst the three groups. All of the hibonites have probably sampled the same population of refractory dust carriers in which the Ti anomalies were carried. The lack of correlation between Mg and Ti isotopic compositions in the individual grains probably indicates differing astrophysical sites for production of the anomalies in these two elements. Mg isotopic compositions show a high degree of correlation amongst the groups and so the three hibonite groups may have sampled different Mg reservoirs. Mg is also much more volatile than Ti and so solar system processing may have been important. References: 1. Ireland et al. (1986) GCA 50:1413; 2. Ireland et al. (1986) LPS XVI:380; 3. Ester et al. (1986) Nature 319:576; 4. Ireland (1986) LPS XVII:376; 5. Ireland et al. (1985) GCA 49:1989; 6. Niemeyer and Lugmair (1984) GCA 48:1401; 7. Fahey et al. (1985) Astrophys J. 296:L17.
## Correlations in HIBONites

Ireland T.R.

<table>
<thead>
<tr>
<th>Sample Type</th>
<th>%MgO</th>
<th>(\Delta^{25})Mg</th>
<th>(\delta^{26})Mg</th>
<th>(\delta^{46})Ti</th>
<th>(\delta^{47})Ti</th>
<th>(\delta^{48})Ti</th>
<th>(\delta^{50})Ti</th>
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<td>10-55-1</td>
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<td>0.52</td>
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<td>3.09±0.31</td>
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</tr>
</tbody>
</table>

Mg isotopic data from refs. 1, 2

\[ \Delta^{46}\text{Ti} = \Delta^{46}\text{Ti}_{\text{meas}} \times (0.1130 - 1) \times 100 \text{permil} \]

\[ \text{ratios corrected using power law to } \Delta^{46}\text{Ti}_{\text{corr}} \times (0.1130) \]

\[ \delta^{47}\text{Ti} = \Delta^{47}\text{Ti}_{\text{corr}} \times (0.1100 \text{ permil}) \]

\[ \delta^{48}\text{Ti} = 1.01325 \times 12(\text{permil amu}) \]

\[ \delta^{50}\text{Ti} = 0.072924 \times 15 \]

\[ \delta^{51}\text{Ti} = 0.069537 \times 21 \]

\[ \delta^{52}\text{Ti} = 0.101325 \times 12(\text{permil amu}) \]