

### TRACE ELEMENT ABUNDANCES OF CAIS FROM R CHONDRITES.

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**Introduction:** Recently, Ca,Al-rich inclusions (CAIs) from R chondrites were studied in great detail [1-3]. These studies mainly focused on the mineralogy and major element composition of CAIs as well as on O- and Mg-isotopes of phases within selected inclusions. However, so far no trace element compositions have been determined for these inclusions. Trace element compositions are important to reveal information on the formation processes of individual CAIs. Here, the rare earth element (REE)-patterns of 7 inclusions are presented.

**Methods and Samples:** Seven randomly selected CAIs (NWA 753-143, -46, -131, -35, and DaG 013B-15, -118, -119) described by Rout and coworkers [1-3] were measured using a Finnigan Element single collector ICP-MS coupled to a laser ablation system with an output wavelength of 193 nm at the Institut für Mineralogie. The laser operated with a uniform energy density of 8-9 J/cm<sup>2</sup> and a 5 Hz repetition rate. The spot size was varied between 25 and 60 µm depending on the individual inclusion size. In some cases several points were measured on one CAI and the mean was calculated for the bulk composition. NISTSRM-612 was used as an external standard and BCR2-G for additional verification of the precision and accuracy of the analyses. The concentrations of 50 elements were obtained. Data was processed with Glitter using Ca or Mg as internal standard.

**Results:** Six CAIs show REE-enrichments between ~5 and 30 times CI for most elements and the patterns are generally flat. Inclusion DaG 013B-119 has almost chondritic REE-abundances. Based on the obtained REE-patterns CAIs can be subdivided according to [4] into different classes. Three inclusions (NWA 753-131, -35, DaG 013B-118) were classified as Group V displaying flat patterns. NWA753-46 is also classified as Group V inclusion, although it is slightly enriched in Yb. Inclusion NWA 753-143 has a Group III-pattern with negative Eu and Yb-anomalies, and DaG 013-119 can be characterized as a Group I CAI with a positive Eu anomaly. The latter shows a small positive Tm anomaly. Inclusion DaG 013-15 possesses a negative Eu anomaly with an additional slight depletion of Lu.

**Discussion:** The REE patterns of Group I, III, and V can be interpreted in terms of equilibrium condensation. Group V indicates complete condensation, whereas Group III points towards incomplete condensation of the most volatile elements Eu and Yb [e.g., 4,5]. Since the analyzed inclusion DaG 013-119 (Group I) is rich in plagioclase, the positive Eu anomaly may be due to the presence of abundant plagioclase. Similarly, the fassaite in the spinel-rich inclusion DaG 013-15 might explain the pattern having only a negative Eu anomaly. Similar patterns were reported for spinel-rich refractory inclusions in Mighei (CM2) [4].

**References:** [1] Rout S. S. and Bischoff A. 2008. *Meteoritics & Planetary Science* 43:1439-1464. [2] Rout S. S. et al. 2009. *Geochimica et Cosmochimica Acta* 73:4264-4287. [3] Rout S. S. et al. 2010. *Chemie der Erde* 70:35-53. [4] Mason B. and Martin P. M. 1977. *Smithsonian Contributions to the Earth Sciences* 19:84-95. [5] Davis A. M. and Grossman L. 1979. *Geochimica et Cosmochimica Acta* 43:1611-1632.