Trace element distribution between silicate, sulphide, and metal phases in enstatite-rich meteorites

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Most meteorites belong among the oldest materials in our Solar system recording the past processes involved in the formation of their individual parent bodies. Enstatite-rich meteorites include enstatite chondrites (EH and EL groups), enstatite achondrites (aubrites), and some anomalous enstatite-rich meteorites. These meteorites are unique because they formed under highly reduced conditions, which are reflected in their mineralogy. Mineralogical composition mainly consists of enstatite, Si-bearing Fe-Ni metal, Cr-Ti-bearing troilite, and minor sulphides of generally lithophile elements [1]. Trace elements concentrations in meteorites including enstatite chondrites and aubrites have been widely investigated, however, the studies have been focused mainly on whole rock analyses of the meteorites due to demanding separation processes ([2], [3], [4], [5], and references therein). The aim of the present study was to use the LA-ICP-MS for detail investigation of trace elements distribution between silicates, sulphides, and metal phases in enstatite-rich meteorites at the scale of individual mineral grains allowed by relatively small sampling beam spot size. Determination of trace elements distribution between individual minerals in enstatite-rich meteorites will extend our knowledge on trace elements behaviour under the extremely reducing conditions ruling during the enstatite-rich meteorite formation. Comparison of trace element distribution of individual minerals between enstatite chondrites and aubrites may shed more light on their mutual relationship and contribute to answering the widely discussed issue of how and if they are somehow related.

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