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# Partial melting of an enstatite chondrite at 1 GPa: Implications for early planetary differentiation

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We present new time series partial melting experiments performed on a natural enstatite chondrite (EL6), aimed at investigating the textural and geochemical changes induced by silicate-metal equilibration during early planetary differentiation. The starting material of our experiments consisted of small fragments (ca. 50 mg) obtained from the interior of the enstatite chondrite MCY 14005 (MacKay Glacier, Antarctica), collected during the XXX° Italian Expedition in Antarctica (PNRA). Experiments were performed in graphite capsules at a pressure of 1 GPa, at temperature ranging from 1100 to 1300 °C, with run durations from 1 to 24 h. The initial phase assemblage of the enstatite chondrite, mostly composed by granular enstatite and Fe-Ni metal (up to 400 µm in size) with minor amounts of sulphides and plagioclase, undergoes significant changes with increasing temperature and run duration. At 1100 °C, no silicate melt is produced and subsolidus reactions occur at the contact between the metal and silicate phases. At 1200 °C, small amounts of silicate melt are produced at the grain boundaries and enstatite grains in contact with the melt grow Fe-enriched rims. The metal portions are characterized by two immiscible liquid phases that exhibit rounded shapes when in contact with the silicate melt, whereas smaller (micrometric) liquid metal spheres occur isolated within the silicate melt throughout the experimental charges. These features are already observed in the 1 h experiment but become increasingly evident with increasing run duration, and at higher temperatures. In the experiments performed at 1300 °C, the amount of silicate melt increases and new silicate minerals form (olivine and low-Ca-pyroxene).

Enstatite chondrites are characterized by an oxygen isotope composition similar to that of the bulk Earth and Moon, and are considered to have initially formed in the terrestrial planetary zone of the solar nebula. For this reason, they represent a suitable material to investigate the early planetary differentiation processes that occurred in the proto-Earth system. Preliminary results from our experiments indicate that, at the investigated oxygen fugacity (1-2 log units below the IW buffer), the Fe-Si exchange between the metal and silicate phases allows the formation of silicate melt and silicate phases such as olivine and low-Ca-pyroxene. At the same time, the change in shape of the metal grains (increasingly circular/spherical with increasing temperature) and the overall reduction of their number density with increasing experimental time point to rapid aggregation of the metal phase and, possibly, to fast silicate-metal differentiation in small planetesimals.

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**This abstract will not be presented.**