Chemical differentiation in Fe-bearing minerals in pressure-temperature-gradient.

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Laser heated diamond anvil cell (LHDAC) is powerful tool to generate high-pressure (several hundreds gigapascals) and high-temperature (several thousands Kelvin) conditions. While its smallness and simplicity of LHDAC one useful in both laboratory experiment and synchrotron X-ray experiments. However, surface of the sample is keep at around room temperature by diamonds, so the sample has a large thermal gradient of over 10^8K/m. Kanver[1] and numerical calculation by Bodea[2]. Kondo[3] reported that iron distribution has been changed in the laser-heated sample. While thermal-gradient-driven material transfers are commonly known as Soret effect, mostly understood for fluid, not for cation in solid-state materials.

In this work, wherein, we heated a portion of natural olivine $(Mg_{0.9}Fe_{0.1})_2SiO_4$ (San Carlos, U.S.A.) with LHDAC to determine how field gradients effect chemical differentiation under high-temperature and high-pressure condition. We found Fe-metal separation around heating spot and heterogeneous distribution of iron in the recovered sample by SEM observation. We will report the results at various conditions in the presentation.

References

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