# Reaction between liquid iron and Mg-perovskite: Implications for light elements in the Earth's core

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The Earth's core is supposed to contain light elements and identification of the elements is essential for understanding thermal and compositional convections in the core to create geodynamo, and temperature distribution in the core which constrains the heat flow from the core and the thermal structure of the mantle. Here we report an evidence for a reaction with liquid iron and Mg-perovskite which is the major constituent of the lower mantle; liquid iron and Mg-perovskite react to form magnesiowustite and liquid iron containing Si and O at 2710 and 2940 K and 27 GPa. The solubility of Si and O in liquid iron, which are 1.7 wt% for Si and 2.3 wt% for O at 2940 K and 27 GPa, increases significantly with increasing temperature. Pressure and temperature dependency of solubility of Si and O implies that the solubility of Si and O in liquid iron descending adiabatically through the lower mantle in the core formation stage increases with depth, indicating Si and O are plausible candidates for the light elements in the core and existence of magnesiowustite layer at the core-mantle boundary as a result of a reaction between the lower mantle and the core.