Tracking the origin of the depletion volatile element of the Earth with indium isotopes

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The chemical composition of terrestrial planets is the results of various processes including evaporation during accretion and differentiation and metal/silicate fractionation during core formation. In particular different planets exhibit a depletion in moderately volatile elements that is more or less correlated with their 50% condensation temperature. One exception is indium that plots over this volatile depletion trend and therefore is apparently over-abundant in the Earth mantle. Since Indium is both siderophile and volatile, it is difficult to decipher whether its abundance is controlled by core formation or volatilization. A possibility would be that the temperature of evaporation of Indium is not well represented by the 50% condensation temperature which has been evaluated in very reduced conditions relevant to the solar nebula but not to more oxidizing conditions relevant to planet formation. Another scenario would be that the indium content of the Earth mantle has been set by late accretion of material later in the Earth history. Furthermore, the metal/silicate partitioning of indium is not well constrained, especially at high pressure relevant to the Earth's core formation. A series of evaporation and metal/silicate experiments involved indium have been performed to respond these issues which were known very limited.
An indium isotope measurement method has been established by MCICPMS and some preliminary results of concentration and isotopic composition of indium of these experiments have been carried out, which could help to constrain the evaporation conditions which caused indium loss during the Earth formation and differentiation, and provide a understanding of In metal/silicate partitioning and isotopic fractionation as a function of variable temperature, pressure and oxygen fugacity.
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