Carbon isotope variations of carbon deposits synthesized in the laboratory by arc discharge

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Carbon has many allotropes such as diamond, graphite, fullerene, etc. Such carbon allotropes are important in the noble gas study because they could be good noble gas carriers in meteorites. In fact, the presolar diamond (host phase of HL noble gas component) and Q (host phase of normal noble gas component) are carbon phases. Heymann (1986) also suggested that fullerene could be a noble gas carrieer in carbonaceous chondrites. Thus, it is very important to study the trapping effiency of noble gases in carbon at the syntheses. The isotope effect of carbon itself should be also very important.

Thus we newly set up a new apparatus to synsesize the carbon deposit including fullerene under noble gas atmosphere. The method is so-called "arc method" which is widely used to make fullerene. We use graphite as electrodes and apply 0-30V and 0-170A electric power to have an arc dissharge. The graphite of anode is vaporized by the bombarment of electrons, and deposits on the cathode and the surrounding wall as soot under noble gas atmosphere. We collect cabon soot from the wall for our experiment. We made these syntheses under various experimental conditions, and measued carbon isotopic ratios and the trapping efficiency of noble gases in the carbon soots.

The interesting result is obtained in carbon isotopes. Our preliminally results suggest that there were about several permil difference of carbon isotopes between the carbon soots deposited at the different place inside the apparatus. We had thought that there should be no isotope difference for the sample that was vaporized at such high temperatures. There might be some isotopic effect at the deposition or during the frying of vaporized carbon. It is likeky that light carbon flies in the long distance inside the apperatus.

Reference

Heymann D. (1995) *Meteoritics, 30,* 436-438.

Lu-Hf systematics of the earliest crust in Antarctica: The Napier Complex of Enderby Land

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We have conducted Lu-Hf systematics of mineral separates and whole-rock samples from the Napier Complex of the East Antarctic Shield in order to constrain Archean crustal and mantle evolution and to assess the robustness of Lu-Hf isochrons during UHT metamorphism. Evidence that at least portions of the Earth's mantle were already chemically depleted before formation of the oldest surviving crust comesfrom Sm–Nd isotopic data However, doubts have arisen because the Sm-Nd system can be perturbed by younger events. Our measurements on individual zircon grains have yielded a remarkably uniform range of initial $^{176}Hf/^{177}Hf$ values between 0.280399 ± 5 and 0.280469 ± 7. Because the samples were collected from different localities and in different rock types, it had been assumed that they would have a wide range in isotopic compositions, indicating a complex history of mantle melting and crustal recycling. Instead, these results now indicate that the source of the crustal materials that formed the Napier Complex at 3.8 Ga were depleted relative to the chondritic uniform reservoir, or CHUR. Moreover, the results demonstrate that even the silicic rocks in the Napier Complex are juvenile products of mantle melting or are remobilized crustal materials recycled on a very short timescale.

Measurement of Lu-Hf isotopic compositions for garnet, opx, sapphirine, osmulite, rutile and whole rock samples from several localities in the Napier Complex have yielded isochrons with ages between 2459 ± 23 Ma and 2173 ± 37 Ma with rather uniform initial ratios between 0.280876 and 0.280884. Although the calculated errors are larger than those often obtained from zircon U-Pb dating, it should be noted that they are only slightly large than one percent. Besides producing isochrons, one major contribution of this work has been demonstration of what happens to the Lu-Hf system at the mineral and whole-rock scale during ultra high temperature (UHT) metamorphism. The main rock-forming minerals record an initial Hf ratio acquired during metamorphism while zircons "see through" this event and record the initial ratio of the rocks acquired at the time of crystallization.