The 441st Geodynamics Seminar

HP-HT phase relation of lunar rocks: a clue for locating the lost Hadean crust ?

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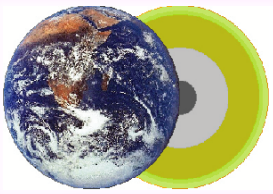

EHIME UNIVERSITY GRC GEODYNAMICS RESEARCH CENTER

Abstract

Geological studies of the lunar surface showed that the Moon is essentially covered by a ~50 km thick anorthosite crust and basalts crystallized from erupted lava flow, which are enriched in potassium (K), rare-earth (REE) and phosphate (P) (e.g. KREEP basalt). Since there is no plate tectonic on the Moon, the anorthosite + KREEP crust (e.g. Hadean crust thereafter) is likely to represent the preserved primordial crust of the Moon. Due to the high degree of similarities in their isotopic compositions, terrestrial and lunar surface rocks are speculated to have crystallized in the same lithologies and therefore a similar anorthosite/KREEP crust should have been present at the surface of the Earth after its crystallization from the magma ocean in the Hadean (~4.4-4.3 Ga). However, there is nowadays no geological record of anorthosite or KREEP rocks on the Earth neither at the surface nor in its shallower layers. One possible whereabouts of the Hadean crust is that it was completely subducted into the Earth's deep interior where it could form chemical and/or density heterogeneities. In order to verify this assumption, we examined the phase relations and equation of state of anorthosite and KREEP compositions by a combination of multi-anvil press experiments using sintered diamond anvils up to 36 GPa, and synchrotron based laser-heated diamond anvil cell experiments up to 125 GPa. The possible whereabouts of the Hadean crust will be discussed based on our new experimental data on constituent minerals at high pressures and high temperatures relevant to the Earth's deep mantle.

詳細は当センターホームページ：http://www.grc.ehime-u.ac.jp/ をご覧ください
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