Study on lunar Mg, Fe and carbon-bearing rocks formed at extreme condition

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The Moon has been discussed as to whether it has evolved from water-Earth or is an unique Earth planet compared to air-planets of Mars and Venus, or water-planet Earth. Author studied in present study is based on recent model that the Moon produces local gas and fluids remained on surface basaltic rocks with carbon-volatiles but without global active system, which is main purpose of the present paper as follows.

1. Solid rocks in any celestial bodies (including the Moon basically) have been accumulated from nano-particle to macro-grains by evaporating volatile-elements as buffer roles above the solidified rocks.
2. There are three types of global systems in the Earth-type planets. The solid rock system is remained globally by various collision phenomena, but generation of local gas or liquid states above the rock. Mars and Venus have global air-system, and our Earth has global air- and water-systems above the solid rock as different planets.
3. Carbon-bearing solidified grains exist in fine scale widely during the three-state changes of celestial bodies development. The carbon can be remained during extreme condition by exchanged states state, which suggests that the elemental abundance of carbon element is richer in quenched carbonaceous chondritic meteorite than the crust rocks of Earth clearly. The carbon-bearing solid grains is considered to be an "extreme-condition (shocked) indicator" showing active state change.
4. Lunar basaltic rocks show high Mg, Fe and carbon contents in the Apollo lunar and meteorite samples. The basalts are therefore volcanic rocks solidified on the surface in the extreme state of meteoritic impacts on the primordial periods of the Moon. Basaltic compositions formed by extreme condition are difficult to be distinguished from the surface shallow or deep interior of mantle origins at the present evolved today. The carbon element mixed in the solidified grains during basaltic formation can be found as high pressure-type carbons (as diamond sources) now, where volatile carbon can be found even in deep interior today. Quenched rock containing carbon-bearing fine grains can be observed by nanotechnology with an high-sensitive electron microscopy, which will be shown in author’ s presentation in the plenary session of the JpGu-AGU 2017.

The present study can be summarized as follows. 1. The basaltic rocks on the lunar surface can be pointed out from the bulk compositional characteristics formed in the extreme impact condition. 2. Fe, Mg and carbon are remained in the rock surface of the shocked glassy solids. 3. Carbon-bearing fine grains called here as "extreme-condition (shocked impact) indicator" can be observed on the solidified surface rocks. 3. Igneous rocks formed by the impact process are widely formed on the shallow surface of a celestial body to deep interior during its evolution process finally, which can be also applied to the igneous rocks contained carbon volatiles in the mantle rocks globally. 4. The present results of primordial basaltic rocks with carbon remnants indicate that there is no global fluid ocean water-Earth system in the Moon and other planets relatively.

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