Japan Geoscience Union Meeting 2011
(May 22-27 2011 at Makuhari, Chiba, Japan)

PPS003-04 Room:202 Time:May 26 15:15-15:30

Effects of meteoroid impacts on lunar crust

Tomoko Arai[1*]

[1]Chiba Institute of Technology

Lunar feldspathic crust is considered to be a product of a primordial magma ocean crystallization. Mineral distribution and chemical composition of the lunar crust provides us with keys to understand the composition and the mode of crystallization of a magma ocean. Rock types and compositions of the lunar crust have been understood by Apollo samples, lunar meteorites and remote sensing. Most of the rock samples originated from the lunar feldspathic rust are brecciated and thermally altered to the variable extent due to the multiple meteoroid impacts on the lunar surface. Since mineral distribution and composition of the primary crust is critical to discuss the magma ocean composition, the effect of meteoroid impacts on the petrology, mineralogy and chemistry of the primary lunar crust should be properly evaluated.

Mineralogical studies of lunar feldspathic meteorites indicate that fragments of the possible primary crust are preserved in some, but many are thermally altered. The thermally metamorphism on the lunar crust tends to occur in a local extent around the target sites of the meteoroid impacts. The mode and degree of the thermal metamorphism are variable, resulting mainly in the change in mineral distribution and composition, but less likely in the bulk-rock chemical composition. Some paired meteorites, which are blasted off the moon by a single meteoroid impact, are geochemically identical, but mineralogically distinct.

Recent lunar remote sensing, such as Kaguya enable us to understand the mineralogy of the lunar crust with a high spatial resolution (20m/pixel). These data reveal that the lunar crustal mineralogy is diverse with a variable proportion of low-Ca pyroxene and olivine plus dominant plagioclase. Such apparent mineralogical diversity may be resulted from the secondary metamorphism by the meteoroid impacts, rather than the initial crystallization from a magma ocean.

Keywords: Meteoroid impact, Moon, Lunar crust, Thermal metamorphism