The performance of Multi-Band Camera (Engineering Model) on SLIM

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Smart **L**ander for **I**nvestigating **M**oon (SLIM) project will demonstrate a “pin-point” landing within a radius of ±100 m on the lunar surface. It will be launched in FY2021. Recently, from the viewpoint of science and resource exploration, there is need for technology to “landing to where we want to land”. The technologies of SLIM enable to satisfy such needs for future surface explorations on a celestial body with gravity. Although the main scope of SLIM project is demonstration of technology and operation, additional small scientific payloads (Multi-Band Camera and Lunar Excursion Vehicle) will also be employed. SLIM aims recently named “SHIOLI” crater (13.3º S, 25.2º E) to derive the detailed mineralogy of the olivine-rich exposures to investigate an olivine bearing lithology for understanding their origin and investigating the composition of the lunar mantle or deep crustal material. We have never collected the sample which identified mantle material. Based on observational data of the SELENE (Kaguya) Spectral Profiler (SP), there is a high possibility that the mantle material is exposed around SHIOLI crater [1]. Therefore, we expect to estimate Mg# (= molar Mg / (Mg + Fe)) of lunar mantle materials [2].

MBC is a compact visible to near-infrared spectral camera composed of an imaging sensor (Vis-InGaAs), a turret with 10 band-pass filters and read-out electronics, which can panoramically scan using a telephoto optical system, and a movable mirror for panning and tilting. The observational wavelength range is from 700 to 1700 nm, which covers the characteristic absorption bands of major minerals on the Moon. In order to estimate Mg# of lunar mantle materials, signal to noise ratio (S/N ratio) of MBC is required 100. The Engineering Model of MBC (MBC-EM) has been already manufactured and mechanically/electrically tested. And then, we examined the optical performance of MBC-EM under the carious conditions. The obtained image data shows good linearity, high S/N ratio and no stray light. In this study, we report on the results of environmental and optical tests of MBC-EM.

[1] Ohtake M. et al. (2019) 50th LPSC abstract #2342.
[2] Saiki K. et al. (2020) 51st LPSC abstract.

Keywords: Moon, SLIM, Spectroscopy, Olivine, Landing Mission

