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# Concept of a MidWave InfraRed(MWIR) Spectrometer for the Korean Lunar Exploration Program

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An Infrared spectrometer has been utilized as one of most useful instruments for lunar and planetary sciences because spectra of the terrestrial objects show the characteristics of their atmosphere and surface.

A MidWave InfraRed(MWIR), which is a wavelength range between 3 and 5 microns, spectrometer can efficiently investigate the properties of dust particles or atmospheric constituents of planets and the Moon because the MWIR spectra are strongly affected by fine dust particles, water, carbon monoxide/dioxide, hydrocarbon molecules, and other ions and molecules. In particular, the Moon has poorly known properties for levitated dusts and a controversial issue of water presence although LADEE spacecraft is carrying out the measurement of lunar dust particles and a few lunar spacecraft had detected indirect evidences of the lunar water presence. However no lunar spacecraft has detected a direct evidence for the water presence. We suggest that a MWIR spectrometer can detect a direct or invincible evidence for the lunar water presence because an absorption band of water(ice) are appeared in around 3.1 microns. Lunar levitated dust may be also detected by light scattering in the wavelength range since highly levitated dust particles have a radius of several microns. However there are few MWIR spectrometers onboard lunar spacecrafts even though ShortWave InfraRed (SWIR; 1∼3 microns) or LongWave InfraRed (LWIR; 8∼15 microns) spectrometers have been loaded on several lunar spacecrafts since the first lunar exploration.

South Korea has a plan to launch the Korea Pathfinder Lunar Orbiter in late 2017 or 2018, and tentatively further mission to the Moon in 2020s. Thus we propose a MWIR spectrometer as one of scientific payloads for the Korean Lunar Exploration Program in order to investigate the characteristics of lunar levitated dust and the evidence of water presence, and for science objectives in future planetary explorations. We present a concept and critical specifications of the MWIR spectrometer for the Korean Lunar Exploration Program. The scientific payload candidates for the Korean Lunar Exploration Program are also presented in the EGU 2015.