

LED mini lidar for Planetary Exploration

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Dust exists universally in space. Especially, it plays an important role in discussing the evolutions of solid bodies. For instance, it is considered that dusts exist on the surfaces of and around the asteroids, and the existence reflects the surface evolution. Although it is considered that dusts on the asteroid surfaces are horizontally transported by the electric fields formed with electrification by the sunlight, and a similar transport mechanism may also occur on the lunar surface, details are unclear. The hypervelocity dust particles can be detected with conventional dust monitors utilizing the phenomenon like the impact ionization, while levitating dusts are hardly detected with the original place observation. Hence, we are studying a lidar for the observation of levitating dusts that have low velocities. Normally, pulse laser for light transmission source are used, however, we consider using light emitting diode (LED) for it. The benefit of LED is easy handling, for instance, it is strong against surge, and the driver's composition is simple. Hence, the entire lidar instrument can be miniaturized by using LED, LED mini lidar. Lidar was a part of the meteorological observation station onboard to Mars lander Phoenix. LED mini lidar can be utilized for such a mission. Moreover, because LED light has a lot of diversities of the wavelength of luminescence, for instance, it is relatively easy to probe a certain particular atmospheric constituent by using as difference absorption lidar. In this paper, we describe our study on LED mini lidar for planetary exploration.

Keywords: LED, LIDAR, Planetary Exploration, compact, dust observation