EPSC Abstracts,
Vol. 2, EPSC2007-A-00486, 2007
European Planetary Science Congress 2007

Global mapping of the elemental composition of the Moon surface with SELENE GRS.

C. d'Uston(**1**), N. Hasebe(2)

(1) Centre d'Etude Spatiale des Rayonnements, CNRS/UPS, Colonel Roche, B.P. 4346, France

(2) Adv. Res. Inst. for Sci. and Eng. Waseda Univ.,3-4-1 Okubo, Shinjuku-ku, Tokyo, 169-8555 Japan

The major objectives of the SELENE mission are to obtain scientific data on lunar origins and evolution, and to develop the technology for future lunar exploration. The scientific data will be also used for exploring the possibility of future utilization of the Moon.

The Moon has been observed and explored extensively as the most familiar body. Although the Moon is more thoroughly studied than any other planetary bodies in the solar system, its origin and evolution process are still controversial. The SELENE mission targets are the global characterization of lunar surface and detailed gravimetry. This mission will provide globally the high-quality and high-resolution data on element abundance, mineral assemblage, surface topography, sub-surface structure, magnetic and gravity field, and precession. It aims at better understanding the origin and evolution of the Moon by these observations.

Determining the distribution of major and important trace elements in the lunar surface is essential in the lunar science. A lunar chemistry and the relative abundances of refractory and volatile elements provide clues to the conditions which prevailed during the formation of the Moon. Combining planetological studies with elemental study can help improve our understanding of the evolution of the Moon including the Earth. Gamma-ray spectroscopy is well suited for measuring elemental composition in the lunar surface.

We present the high resolution Gamma Ray Spectrometer (GRS) for the Japan's lu-

nar explorer SELENE which will cover the whole lunar surface by its polar orbit at a nominal altitude of 100 km. A germanium semiconductor crystal cooled by a Stirling cryocooler to below -180˚C, is used as a gamma-ray detector. This GRS has an excellent energy resolution 20 times superior to those used in past lunar missions. Thus, GRS can discriminate the incident gamma-ray energies with high precision and can determine abundances of materials (K, U, Th, O, Mg, Al, Si, Ti, Fe, Ca, H etc.) over the entire lunar surface. The results will be highly accurate and will provide important new clues with respect to understanding the origin and evolution of the moon.

The observations will contribute to lunar resource exploration, especially for water existence. Water is very essential for human activity in a lunar platform in the future and local supply of water is necessary for the sake of cost performance. GRS can identify gamma rays from hydrogen and can map hydrogen.