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Lunar Elemental Mapping by XRS Onboard SELENE: Science and Instrument

TATSUAKI OKADA[1], KEI SHIRAI[1], YUKIO YAMAMOTO[1], TAKEHIKO ARAI[3], KAZUNORI OGAWA[4], HIROAKI SHIRAISHI[1], KOZUE HOSONO[2], YOKO MARUYAMA[4], TATSUTOSHI INOUE, TOMOKA INOUE[2], MASAHIKO ARAKAWA[5], MANABU KATO[1], THE SELENE XRS TEAM [1]

[1] *Institute of Space and Astronautical Science, Japan Aerospace Exploration Agency, Japan*

[2] *University of Tokyo, Japan*

[3] *Sokendai, Japan*

[4] *Tokyo Institute of Technology, Japan*

[5] *Nagoya University, Japan*

XRS onboard SELENE is being developed for major elemental mapping of the Moon through remote X-ray fluorescence spectrometry. The instrument is based on charge-coupled deviec, 16 chips of which are arrayed to have 100cm2 in total detection area. It has proven energy resolution (full width at the half maximum) of $<$ 200 eV at Mn-Ka (5.9KeV) in the laboratory when all the CCD chips are driven simultaneously. For remote XRF spectrometry, excitation source is solar X-rays. XRS has a pair of direct solar X-ray monitors based on Si-PIN diode, both of which point the northern and southern hemisphere, respectively. XRS also has a CCD-based X-ray fluorescence calibrator using an onboard sample. The SELENE spacecraft will orbit around the polar circular orbit of the Moon at the altitude of 100 km. The footprint size of the XRS observation is originally designed about 20 km. But the launch is delayed so that the nominal mission period is during the solar minimum activity. Now there can be the alternative way that the XRS should have larger footprint to observed statistically significant counts of photons in a relatively short period. During the nominal phase, the XRS will observe several times for each part of lunar surface. Then by analyzing those data, the effective surface spatial resolution is improved. The lunar elemental mapping data can highly contribute to the progress in lunar science. Further information on the science and instrument will be presented in detail.