Development of X-ray tube carried on spacecrafts

Kazunori Ogawa[1]; Manabu Kato[2]; Tatsuaki Okada[3]; Kei Shirai[2]; Yukio Yamamoto[3]; Takehiko Arai[4]

[1] Earth and Planetary Sci., Titech.; [2] ISAS; [3] ISAS/JAXA; [4] SOKEN

http://planetb.sci.isas.jaxa.jp/xrs/

The SELENE-B Mission was started to plan as one of the lunar investigation projects of JAXA by the Steering Committee of Space Engineering on May, 2002. This spacecraft is going to be launched in 2009 and obtain important information about evolution of the lunar crust. The objectives of the mission are evolution and to develop the technology for soft landing to the moon and planets, and scientific investigation of the lunar surface. In the SELENE-B project, an unmanned lander will make a soft landing on the moon and deploy a rover to explore its geological features.

One of the proposed science instruments onboard lander/rover is XRF/XRD instrument, X-ray fluorescence spectrometer and diffractometer., will measure X-ray fluorescence and diffraction simultaneously and determine elemental and mineral composition of lunar sample. These instruments need the source of X-rays inside of own, and to use the X-ray tube is most typical method to generate X-rays. But spacecrafts in the past projects have never carried the X-ray tubes, so it is needed to develop the new X-ray tube can be carried and work on the SELENE-B.

As the result of our previous study, the field emission type X-ray tube with the carbon nanotubes is considered as the most appropriate X-ray generator on the spacecrafts. The plan to develop this new type X-ray tube with a company is considered at present. We show the one of result of the development of this X-ray tubes.