Contribution ID: **37** Type: **ORAL**

Subpixel Response of Double-SOI Pixel Detectors for X-ray Astronomy

Thursday, 13 December 2018 09:25 (25 minutes)

We have been developing the X-ray SOI (Silicon-On-Insulator) pixel detector named XRPIX for the future astrophysical satellites. XRPIX is a monolithic active pixel sensor composed of high-resistivity Si sensor, thin SiO2 insulator and CMOS pixel circuits by utilizing the SOI technology. Since XRPIX is capable of event-driven readout, it can achieve a high timing resolution better than ~10 μs, which enables a low background observation by adopting the anti-coincidence technique. One of the major issues in development of XRPIX was the electrical interference between the sensor layer and the circuit layer, which caused problems in the detector response: non-uniform detection efficiency and low charge collection efficiency at pixel boundaries. In order to reduce the interference, we recently introduced a Double-SOI structure, in which a thin Si layer (middle Si) was added in the insulator layer of SOI structure. In this structure, the middle Si layer works as an electrical shield to decouple the sensor layer and the circuit layer. In this work, we measured the detector response of the XRPIX with Double-SOI structure at KEK. We irradiated X-ray beam collimated with 4 μmΦ pinhole, and scanned the detector with 6 μm pitch, which is 1/6 of the pixel size. In this presentation, we will present the improvement of uniformity of the detection efficiency and charge collection efficiency in the Double-SOI detectors, and discuss the detailed X-ray response and its physical origin.

Primary authors: HAGINO, Kouichi; Mr OONO, Kenji (Tokyo University of Science); NEGISHI, Kousuke (Tokyo University of Science); YARITA, Keigo (Tokyo University of Science); KOHMURA, Takayoshi (Tokyo University of Science); TSURU, Takeshi (Kyoto University); TANAKA, Takaaki (Kyoto University); HARADA, Sodai; Mr KAYAMA, Kazuho (Kyoto University); Dr MATSUMURA, Hideaki (Kavli Institute for the Physics and Mathematics of the Universe); MORI, Koji (University of Miyazaki); TAKEDA, Ayaki (University of Miyazaki); NISHIOKA, Yusuke (Miyazaki University); Mr FUKUDA, Kohei (University of Miyazaki); Mr HIDA, Takahiro (University of Miyazaki); YUKUMOTO, Masataka; ARAI, Yasuo (High Energy Accelerator Research Organization (JP)); KISHIMOTO, Shunji (KEK); Prof. KURACHI, Ikuo (High Energy Accelerator Research Organization (KEK))

Presenter: HAGINO, Kouichi

Session Classification: Pixel SOI, X-ray

Track Classification: Pixel for X-ray imaging