11th International "Hiroshima" Symposium on the Development and Application of Semiconductor Tracking Detectors (HSTD11) in conjunction with 2nd Workshop on SOI Pixel Detectors (SOIPIX2017) at OIST, Okinawa, Japan

Contribution ID: **131** Type: **POSTER**

Investigation of Soft X-ray Performance of Kyoto's Event-Driven X-ray Astronomical SOI Pixel Sensor, XRPIX

Sunday, 10 December 2017 21:27 (1 minute)

We have been developing event-driven X-ray Silicon-On-Insulator (SOI) pixel sensors, called "XRPIX", for next generation X-ray astronomy satellites. XRPIX is a monolithic active pixel sensor and fabricated using the SOI CMOS technology. X-ray CCDs are currently used as the standard imaging spectrometers for X-ray astronomy satellites. However, CCDs suffer from problems such as a poor time resolution (a few seconds). XRPIX has the event trigger output function, and to read out only X-ray event pixels we can get a higher time resolution (~ 10 μs). To observe X-rays in a wide energy band, we have been developing back-illuminated type of XRPIX with a thin dead layer ($\leq$ 1 μm) on the backside. We already achieved a 0.5 μm dead layer with XRPIX3b. In order to achieve an even thinner layer, we produced XRPIX6bD. On the backside of the sensor layer, ion implantation, laser annealing, and vapor-deposition of aluminum (200 nm) for optical blocking are processed. We suppressed the ion implantation energy to reduce the dead layer thickness. First, we search the energy resolution and readout noise, and found that the readout noise is $\sim$ 12 e^- (rms) and the energy resolution is $\sim$ 290 *eV* (FWHM) at 6.4 *keV*. Here, we report the evaluation results of XRPIX6bD.

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Session Classification: POSTER

Track Classification: SOI detectors