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Evaluation of a pulse counting type SOI pixel using synchrotron radiation X-rays

Application of the Silicon-On-Insulator (SOI) technology [1] to a pixelated detector for imaging experiments using Synchrotron X-rays is expected as a good method for developing a fine pixelated detector because there is no mechanical bump bonding in the SOI device. The first beam test for a proto type chip of a pulse counting type SOI pixel, CPIXTEG3b, was performed in BL-14A at Photon Factory, KEK. CPIXTEG3b was designed under the Double-SOI technology [2] for defending from the cross talk and increasing the radiation hardness. It has a 64×64 -pixel array where the area size of each pixel is $50 \mu\text{m} \times 50 \mu\text{m}$. Sensitivity for X-rays respect to the incident position in a pixel was measured with the pencil beam having a diameter of $10 \mu\text{m}$ at 8 keV and 16 keV of X-ray energy. Because of its small size of a pixel, this data also contained the charge sharing effect. Hence this data could be used for a study of the point spread function. Response of the discriminator in the analogue circuit of the pixel was calibrated by the electric pulse and this result was checked about all pixels by use of the flat field beam.

In this conference, we will introduce some results of this performance tests.

References

- [1] Y. Arai et al., Nucl. Inst. and Meth. A 636 (2011) 531.
- [2] T. Miyoshi et al., Nucl. Inst. and Meth. A 732 (2013) 530.

Autore principale: Dr. HASHIMOTO, Ryo (Institute of Materials Structure Science, KEK)

Coautore: Dr. IGARASHI, Noriyuki (Institute of Materials Structure Science, KEK); Prof. OUYANG, Qun (State Key Laboratory of Particle Detection and Electronics (Institute of High Energy Physics, CAS)); Prof. KUMAI, Reiji (Institute of Materials Structure Science, KEK); Sig. NISHIMURA, Ryutaro (School of High Energy Accelerator Science, SOKENDAI); Prof. KISHIMOTO, Shunji (Institute of Materials Structure Science, KEK); Dr. MIYOSHI, Toshinobu (Institute of Particle and Nuclear Studies, KEK); Dr. ZHOU, Yang (State Key Laboratory of Particle Detection and Electronics (Institute of High Energy Physics, CAS)); Prof. ARAI, Yasuo (Institute of Particle and Nuclear Studies, KEK); Dr. LU, Yunpeng (State Key Laboratory of Particle Detection and Electronics (Institute of High Energy Physics, CAS))

Relatore: Dr. HASHIMOTO, Ryo (Institute of Materials Structure Science, KEK)