

Development of a large format charge-coupled device (CCD) for X-ray use in near future.

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We have been developing a charge-coupled device (CCD) for X-ray astronomical use in collaboration with NAOJ, Kyoto University and Hamamatsu photonics K.K. What are required for X-ray use are low noise read-out, thick depletion layer, thin absorption feature and large format. So far, we developed a 2.5cm square chip for MAXI mission. The pixel size is 24 um square. There are several models developed. They have various depletion layer thicknesses from 15 um to 80 um. They are front illumination (FI) chips with Al coating on its surface. We developed a 2.5 cm x 5 cm chip (NeXT-1). The pixel size is 12 um. This chip can function both as a full frame mode and as a frame transfer mode.

We have also developed a P-channel CCD in order to have a thicker depletion layer. Test devices show that the depletion layer is thicker than 200 um. Based on this device, we will proceed to fabricate a chip of 3 cm x 6 cm. The pixel size is 15 um square. This can be employed as a back illumination (BI) CCD so that we can improve the quantum efficiency at low energy (below 0.5 keV). This is also applied to the SD-CCD so that we can expand the effective energy range up to 100 keV. In optical region, it can have good quantum efficiency both in ultra-violet and in infra-red.