

Development of high speed microtomography system with high definition detector

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High speed micro-tomography system has been developed at BL20B2 and BL47XU in SPring-8. A high definition and high speed CCD camera is used as an image detector. The properties are shown in the table. Using the CCD camera in 2 x 2 binning mode the total scanning time for 1500 projections was reduced to 30 minutes or less while the scanning time of previous system was a few hours. This enables us to image soft materials and to do time resolved observations in three-dimension. They deform or change during the scanning.

At BL20B2, the image detector consisted of Beam Monitor 4 (f=105mm) and C4880-41S. The effective pixel size was 11.7 μm x 11.7 μm . The field of view was about 23.4 mm x 15.3 mm. The three-dimensional image of non-fixed dead animal is shown in figure. The scanning time was about 5 minutes therefore the total scanning was done before deformations of the animal.

At BL47XU, the image detector consisted of Beam Monitor 3 (x20) and C4880-41S. The effective pixel size was 0.47 μm x 0.47 μm . The field of view was about 0.94 mm x 0.61 mm. The CT images of multilayer test patterns showed that the spatial resolution of the system achieved about 1 μm . This system has achieved a large field of view and high spatial resolution. It is very suitable for many areas of materials science.

At the conference the detail of the system and some experimental results are presented.

Table. Properties of high definition CCD camera (C4880-41S, Hamamatsu.)

pixel pitch	5.9 μm
format	4000 x 2624
full well	13,000 e ⁻
frame rate	1.7Hz
ADC bits	12bits
cooling temp.	-50°C

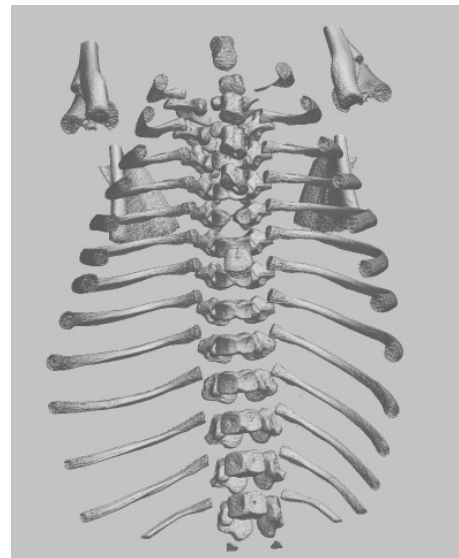


Figure. Three-dimensional image of bones of body of rabbit's pup taken with high speed CT scan (25keV, 5minutes). Width of the image is about 25mm.