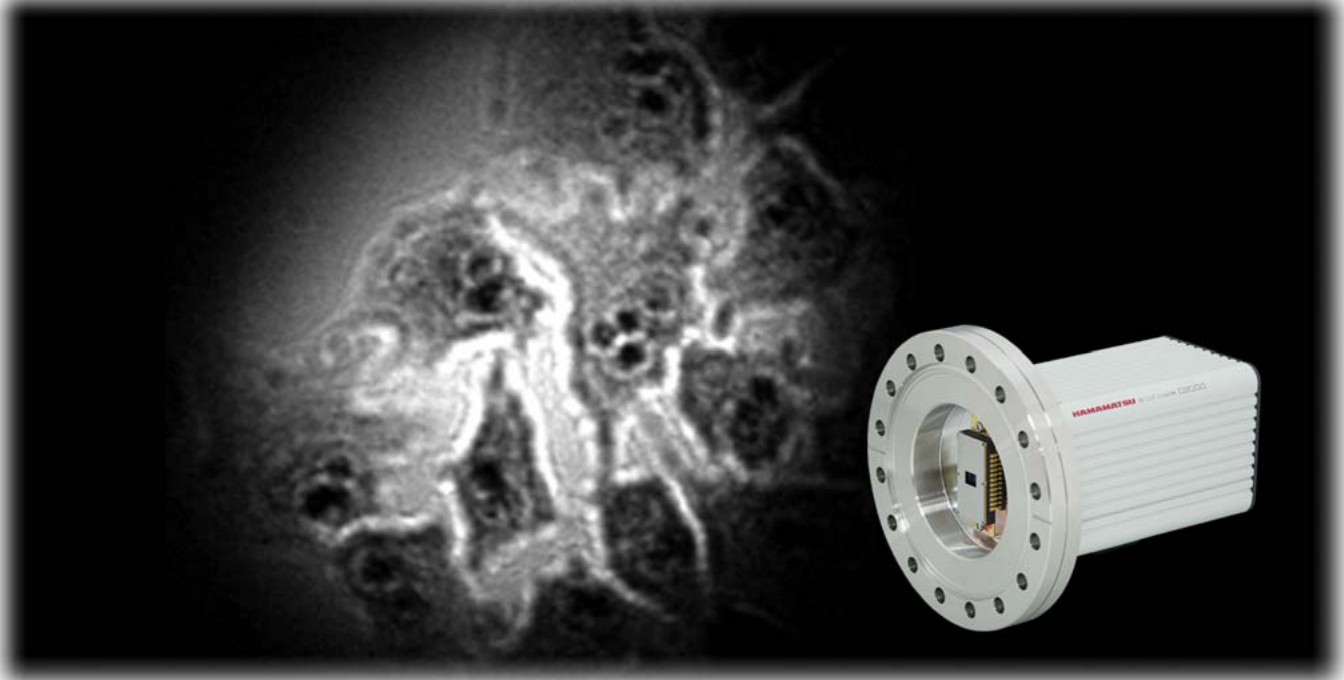


X-ray Direct CCD Camera

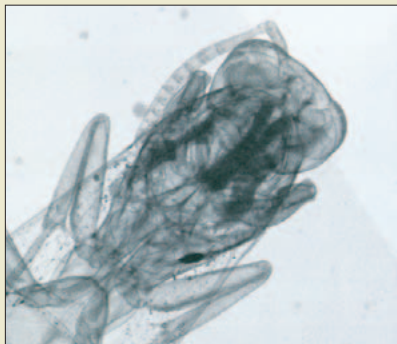


The X-ray Direct CCD Camera is the structure which is irradiated EUV and soft X-ray photons into CCD directly without using scintillator. Many electrons are generated into CCD by irradiating high energy photons, so high sensitive detection is realized. The energy range of 20 eV to 10 keV is covered by back illuminated CCD. Beryllium window type and vacuum chamber type can be selected for camera front structure.

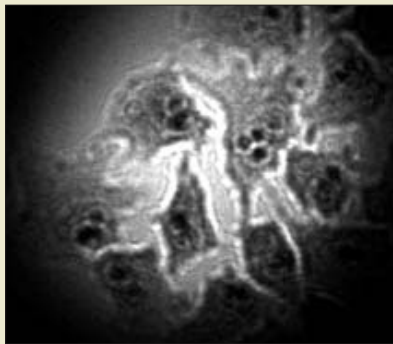
X-ray has high energy, so it can easily damage the sensors forming the CCD, causing a drop in sensitivity and rise dark current according to the total incident light energy. When using in the X-ray, take steps not to apply excessive X-ray light. In addition, extended exposure causes a drop in sensitivity, even if the intensity is not excessive. When not shot, take care to protect the CCD from X-ray.

APPLICATIONS

- X-ray microscope
- X-ray spectroscopy
- Micro-CT
- EUV lithography
- X-ray energy analysis

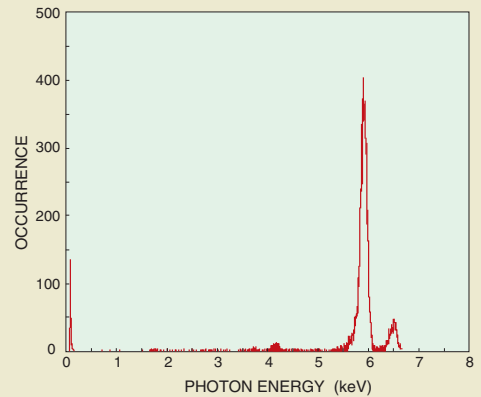


▲ X-ray transmission of a bee captured directly with CCD. Resolution and dynamic range are significantly improved over those possible with a conventional X-ray imaging method.



▲ Human HeLa cells
 $\lambda=15 \text{ \AA}$ (826.6 eV), Pinhole: 1 μm , pre-pinhole: 100 μm

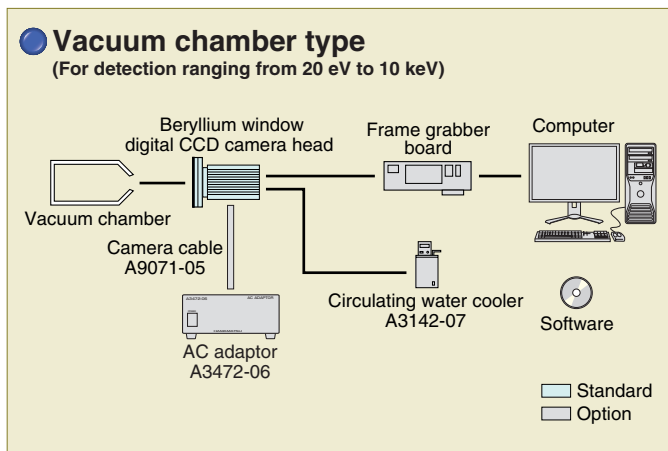
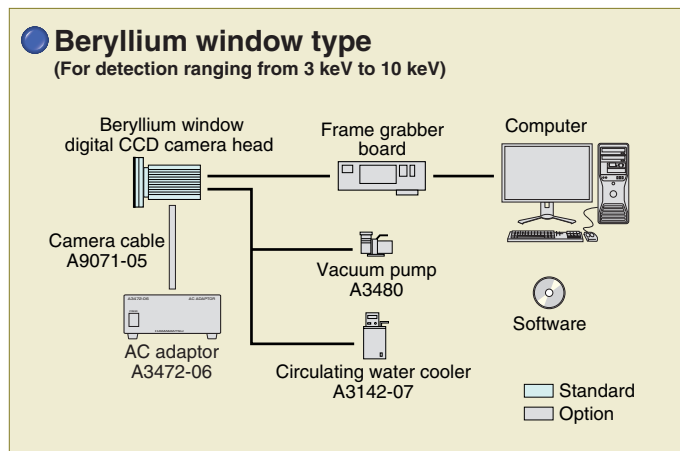
Photo courtesy of Prof. Ito, Department of Nuclear Engineering, School of Engineering, Tokai University, Japan



▲ Fe-55 Single Pixel Event (3% extraction)

SYSTEM CONFIGURATION

Two types of camera heads are available: Beryllium window type which presupposes imaging under atmospheric conditions, and vacuum chamber type which can be coupled to a vacuum chamber.



FEATURE



▲ Vacuum chamber type

High frame rate

Energy-range

- **3 keV to 10 keV**
(Beryllium window type)
- **20 eV to 10 keV**
(Vacuum chamber type / without AR coating)

SPECIFICATIONS

Type number	C8000-30D
Pixel number	640 × 480
Pixel size	14 μm × 14 μm
CCD effective area	8.96 mm × 6.72 mm
Frame rate	31.4 frames/s
Readout noise (typ.)	100 electrons
Cooling temperature	+ 5 °C (Ambient temperature : + 20 °C)
Full well capacity	30 000 electrons
A/D converter	12 bit
Interface	Camera Link

Please consult with HAMAMATSU for other camera selection.

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