Phase Contrast Imaging

Phase contrast imaging is an extremely powerful technique for revealing the finest details hidden in soft matter and soft tissue.

The main difficulty is to reveal very subtle contrast fringes that are coming up from the contribution of the imaginary part of the absorption coefficient of the sample imaged. In practice this means working with materials with very little absorption, i.e. the smaller the contribution of the real part of the absorption coefficient the better.

Therefore those fringes are observed onto a large background, and this typically requires wide dynamic range as well as very high spatial resolution.

Those two requirements usually act against each other, and the X-Ray VHR unifies those two essential detector features in a unique camera design by delivering an optical pixel size as small as 4.5 microns with a genuine 16 bit dynamic range.

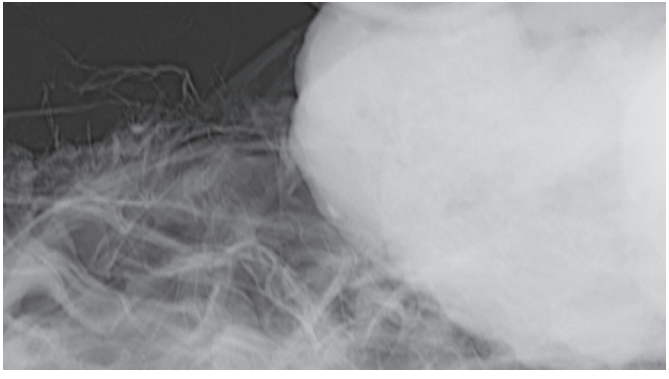
When combined with a submicron laboratory X-ray source, which limits intrinsic blurring effects from the source, we must also count on high sensitivity and very low noise acquisition. Those X-ray sources are indeed delivering low power: i.e. a few Watts at a maximum of 40kV.

Using the X-Ray VHR camera, single photon detection with its extended integration capability enables the weakest scattering samples to be now imaged on a table top phase contrast imaging configuration.

When used with synchrotron sources, having more flux available requires shorter integration periods. It is then possible to use the 100% duty cycle capability offered by the X-Ray VHR camera.

Combined with shutterless, smear free acquisition, the camera allows continuous sample rotation for 3D reconstruction. This is achieved without saturating or blooming the final image, which is important for avoiding 3D reconstruction artefacts.

Careful synchronisation is obtained with direct hardware triggering on the camera with simultaneous read out and exposure.



Plastic foam: 60kV, 2micron resolution

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