

# Large Format, Direct And Indirect Detection CCD Cameras For Soft X-Ray

Since the invention of charge-coupled-device (CCD) technology in 1969, the possibility to use such devices in application starting from the NIR to the x-ray region of the electromagnetic spectrum has attracted the interest of scientist in a wide range of areas like astronomy, Bose-Einstein condensates, fluorescence imaging, photometry, plasma research, Raman spectroscopy and x-ray imaging.

The use of CCDs for VUV and X-ray imaging and spectroscopy however, suffers for the strong absorption of UV radiation by materials utilized in the layer above the CCD's epitaxial photon-absorption layer (depletion layer). Therefore it is very important to make sure that any layer above the depletion layer is as thin as practically possible.

In order to address the challenge of having imaging tools extremely stable and sensitive in the soft x-ray to VUV energy, special enhanced-process and other back-illuminated CCDs without AR coating now provide unprecedented sensitivity in the soft x-ray to VUV range.

Results of ultimately technological achievement it will be presented outlining mostly (1) standard- process, back-illuminated CCDs; (2) enhanced-process, back-illuminated CCDs; (3) deep- depletion, back-illuminated CCDs; and (4) deep-depletion, front-illuminated CCDs. Sensitivity differences within the soft x-ray to VUV energy range will be discussed and several models of large format CCDs will be described.

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