Cropped Mode (non frame-transfer CCD)

Understanding cropped mode for non frame-transfer CCD

If an experiment demands fast temporal resolution, but requires a sequence of images greater than the maximum storage available with the on-chip array, then it is possible to readout Andor camera families in a special user-selectable 'cropped mode'

In this mode, the user defines a 'sub-array' size from within the full image sensor area, such that it totally encompasses the region of the image where the sensor is illuminated by the signal of interest (e.g. a 'beam spot'). The camera will subsequently process the sensor array of this smaller user defined array size. This is achieved through the firmware/software executing special readout patterns and this benefits the user because the readout is at a proportionally faster frame rate. The smaller the defined array size, the faster the frame rate achievable. The selected region should be placed in the area adjoining the shift register, therefore close to the readout amplifier, to achieve the fastest repetition rate. Full and cropped image mode shown in Fig. 1 and 2.

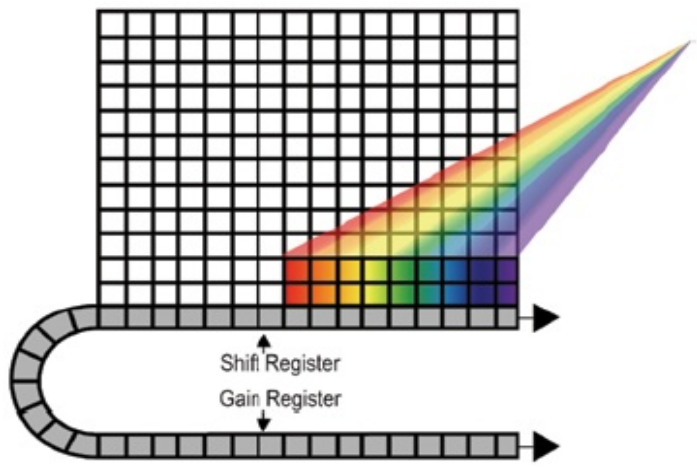

Fig. 1. Full EM Sensor

In order to use cropped mode effectively, one has to ensure that no light is falling on the light sensitive area outside of the user defined region. This is because any light collected outside the cropped area will be clocked through the region of interest thereby corrupting the desired images being acquired in this mode. Cropped mode has the end result of achieving a much faster frame rate than that obtainable in a conventional 'sub-array' / ROI readout (during which we would still have to vertically shift the unwanted rows) as the frame rate increase is achieved by not reading out (i.e. discarding) the unwanted pixels.

Cropped Mode

The active imaging area of the sensor is user defined with a small sub section of the entire chip used for the actual imaging . The remaining array has to be masked to prevent stray light leakage or charge blooming from this region. This would compromise the signal from the defined imaging area. By cropping the sensor one achieves faster frame rates because the temporal resolution will be dictated by the time that is required to read out, the now smaller section of the sensor.

Fig. 2. 'Cropped' EM Sensor