

DIGITAL CAMERAS WITH RGB COLOR MOSAIC MASK AND MICROSCANNING FOR IMAGING IN BRIGHTFIELD AND FLUORESCENCE MICROSCOPY

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1. COLOR CAMERAS FOR FLUORESCENCE MICROSCOPY

Digital CCD cameras are standard imaging equipment in any modern laboratory. While for common light microscopy cameras using CCD sensors with on-chip RGB color mosaic mask are the natural choice regarding the cost-performance ratio, for fluorescence microscopy still monochrome CCD cameras are preferred.

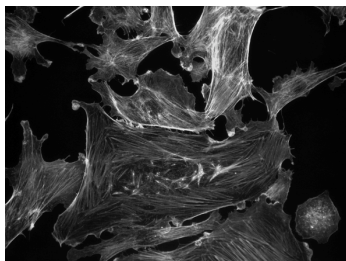


Figure 1: BPAE Cells
prepared with BODIPY
FL phalloidin [1]

The ProgRes STAR microscope camera from JENOPTIK makes a sensitive digital camera system based on a color interline CCD that can be used for brightfield microscopy as well as for fluorescence microscopy. The 3.3 megapixel color CCD provides adequate resolution for most light microscopy applications. At the same time the low-noise readout electronics combined with 12 bit digitization provide sensitivity for low light imaging issues such as common fluorescence contrast techniques (see fig. 1 for an example). Since fluorescence microscopy usually involves higher magnifying optics, binning and decarding color information

can be used for an additional increase of camera sensitivity without loss of spatial information.

Using an appropriate TV adapter, the small sensor area of the approx. ½ inch CCD leads to an indirect increase of camera sensitivity since light intensity on the small area CCD will be significantly higher compared to a large area CCD.

2. IMPROVING SPATIAL AND COLOR RESOLUTION BY MICROSCANNING

When spatial resolution of object details is equal to or higher than CCD matrix resolution or if object texture exhibits regular patterns, the color interpolation in the image processing software can produce image artifacts, e.g. moiré effects. Such undesired side effects of matrix sensors, especially with color mosaic masks, can be overcome by cameras using pixel shifting technology, that scan the image plane thereby gaining resolution without sacrificing sensitivity.

[1] Molecular Probes “FluoCells® prepared slide #1“, Camera: JENOPTIK “ProgRes STAR“ with “ProgRes STAR Capture Basic“ image acquisition software.