Application Note
Cameras for Fluorescence Microscopy

Raptor offers a range of scientific cameras suitable for fluorescence microscopy. We recently compared four cameras each using different sensor technology, EMCCD, sCMOS and CCD under similar conditions to see the advantages of each.

Summary Specs of Raptor's range of Scientific Cameras

Product	Technology	Sensor	Digitisation	Resolution	Pixel sixe	Active Pixels	Frame rate
Kite	EMCCD	Texas Instruments TC247-SPD	16 bit	0.33MP	10x10µm	658x496	50Hz
Falcon	EMCCD	Texas Instruments TC247-SPD	16 bit	1MP	8x8µm	1004x1004	30Hz
Osprey	sCMOS	CMOSIS CMV4000	12 bit	4.2MP	5.5x5.5µm	2048x2048	37.5Hz
Kingfisher	CCD	Sony ICX674	16 bit	6MP	4.54x4.54µm	1940x1460	6Hz

Equipment & Conditions:

We took a series of images on a Leica fluorescence microscope with different cameras looking at the same sample in similar condition using µManager for acquisition and ICY for image processing. We wanted to compare and contrast the images generated by the different cameras and adjusted the exposures to obtain the best images quality from each camera.

Fully automated tri-port microscope with fluorescence capabilities, courtesy of Leica Microsystems.

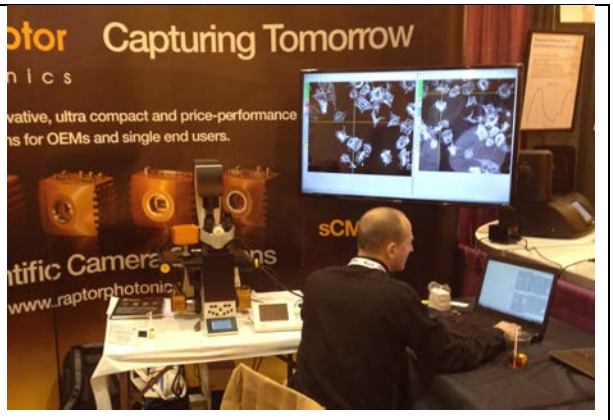
Filters:

- RED: TX2
- GREEN: YFP
- BLUE: CFP

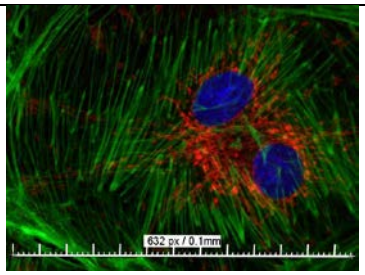
Lens: 63x oil lens

Test slide: Semrock

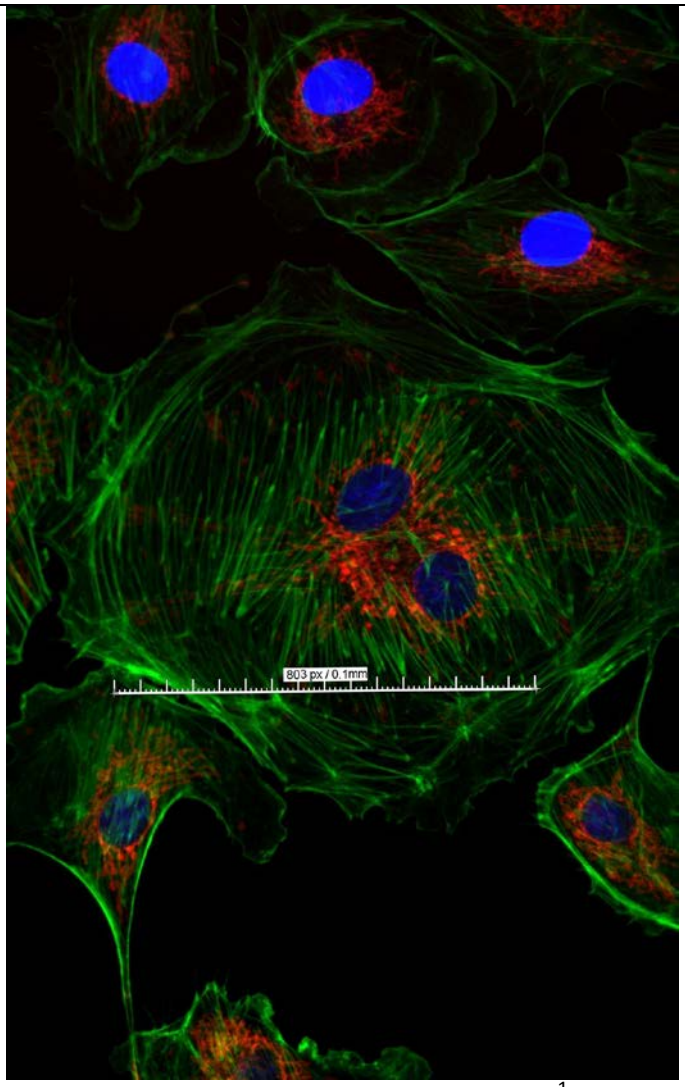
- Bovine Pulmonary Artery Endothelial Cells
- Mitotracker Red CMXRos
- Alexa Fluor 488 - Phalloidin
- DAPI
- Mounted in CytoSeal



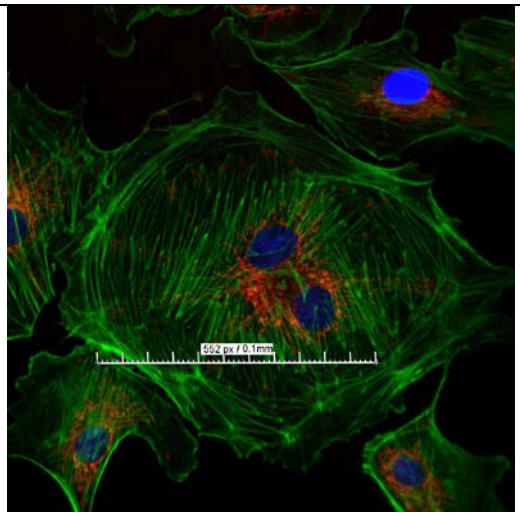
Acquisition:
Dell Laptop Precision M4600
Epix PIXCI-ECB2
ExpressCard Dual Base CameraLink
µManager:
Open Source Microscopy Software
Icy:
Open community platform for bioimaging



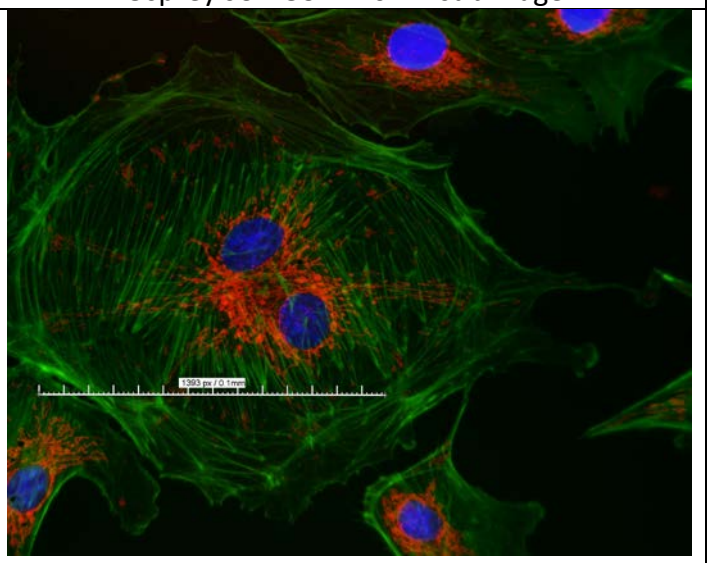
Kite EMCCD 0.33MP



Osprey sCMOS – 2.6MP subimage[1]



Falcon EMCCD - 1MP



Kingfisher CCD – 6MP

Figure	Camera	Exposure times			Benefits
		TX2	YFP	CFP	
1	Kite EMCCD	30ms	60ms	90ms	Sensitivity & speed
2	Falcon EMCCD	25ms	28ms	20ms	Sensitivity & speed
3	Osprey sCMOS[1]	95ms	100ms	90ms	Field of view, resolution & speed
4	Kingfisher CCD	800ms	800ms	400ms	Field of view, resolution & dynamic

About Raptor Photonics

Raptor Photonics Limited is a global leader and manufacturer of high performance, industrial-grade and extremely rugged ultra-low light digital & analogue cameras. Raptor specializes in complete cameras and core engine solutions using CCD, EMCCD, Scientific CMOS and SWIR sensor technology. The extreme low light capability of Raptor's cameras makes them ideal for day/night surveillance, homeland security and scientific markets. Raptor Photonics Ltd is a registered ISO 9001:2008 company and is headquartered in Larne, Northern Ireland.

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[1] 1280x2048 sub image instead of full 2048x2048 resolution because of the bandwidth limitation of the ExpressCard slot.