5M pixels versus 12M pixels - Comparison and Explanations

Applied Spectral Imaging's (ASI's) latest camera is a modern 5M pixel camera which is used for all its product line for cytogenetics, pathology and research applications.

The 12M pixel model of the same camera type has been evaluated. This camera model is based on the same IMX technology, SONY sensor, same pixel size and sensitivity as the 5M pixel model. Although 12MP is higher than 5MP in terms of number of pixels in a single frame, we found out that the practical performance and fit for the cytogenetics applications is actually better with the 5M model.

The following table compares the two cameras with green marking advantages. Some further graphical explanation is included further bellow.

The camera models are:

Size	Sensor Vendor	Camera model
5M	SONY	IMX250 or IMX264
12M	SONY	IMX253

Feature /Operation	5MP CMOS (C-mount=0.5)	12MP CMOS (C-mount=1.0)	Application	Remarks & Benefit
Sensitivity	High	High	FISH and Immune fluorescence	High sensitivity leads to better detection of LSI probes and to higher SNR which is best for imaging of FL slides
Pixel size	3.45 µm	3.45 µm	Metaphase Finder Whole Slide Imaging	Affects digital zoom in, the smaller the pixel size the better the image quality is when using the zooming function
Digitization depth	12 bit	12 bit	All applications	
Field of view (with C-mount)	**22mm (C-mount 0.5x, fit widest microscope offer)**	17.5mm (with 1x C-mount)	All scanning applications: Metaphase Finder FISH scanning Whole Slide Imaging	**Wider field of view contributes to a "bigger" image without floater chromosomes and faster scanning and higher productivity rate of the scanning system**
Readout speed	**35 or 75 fps**	31 fps max	Whole Slide Imaging Metaphase Finder FISH Scanning	**Faster frame rate corresponds to faster focus and faster capture/scan**
Aspect ratio	**6:5 Optimal for cells/metaphases since it is close to a square**	4:3 good but less optimal for cells /metaphases	Metaphase Acquisition	**Especially relevant to capture of metaphases where a square aspect ratio is preferred. The squarer the sensor – the better area coverage of the circular microscope view (see advantage also in next item)**
Quality of low resolution mets in scan	**Scanned in 10x Captured**	Scanned in 4x or 5x objective	Metaphase finder (low resolution)	**Due to the C-mount differences, the actual quality and pixel resolution is better with the 5Mp camera: Better objective and similar or better pixel resolution.**
Quality of high magnification metaphases	**Captured in 100x high quality objective**	Captured with 40x objective	Metaphase capture (High resolution)	To compensate for the lower field of view in 12Mp and to reduce file size, Metasystems captures the metaphases in 40x objective. **The outcome is that the practical resolution of metaphases is LOWER with the 12Mp camera compared to our 100x objective**
FISH applications	**Higher sensitivity & Faster scan**		FISH (manual & automation**)**	While actual pixel specs (size and sensitivity) are the same, due to the C-mount difference and the resultant difference if field of view **the light collection if FISH is better with the 5M camera, as well faster scanning time to cover a region**.
Single image Resolution	2448px X 2048px	**4096px X 3000px**	Metaphase Acquisition FISH image acquisition Whole Slide Image	The added resolution of the 12M does not contribute to image quality but does degrade speed performance.