

Introduction to ToupTek New Released Products

1. Back Ground

In the conventional microscope field and astronomy field, Aptina CMOS sensors and Omnivision CMOS sensors are widely used because their complete product line (from 0.3MP to 18MP) and their competitive price. But they have many well-known defects comparing with CCD sensor as followed:

1. Much noise
2. Low sensitivity
3. Slow frame speed
4. Normally rolling shutter

In the recent years, Sony have invested much on CMOS sensors due to the development of the mobile cellphone market, surveillance market and vehicle related market. They have excellent performance by now. Sony has already decided to stop the CCD production

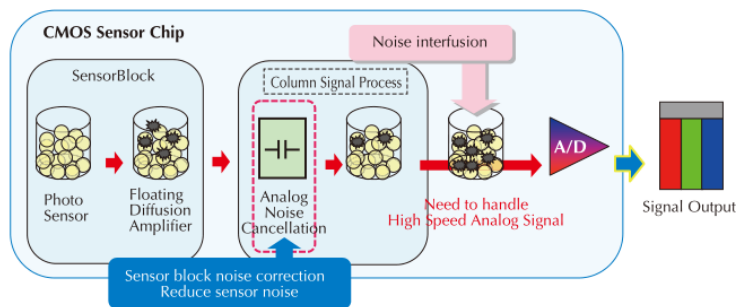
(<http://image-sensors-world.blogspot.com/2015/02/sony-to-discontinue-entire-ccd-products.html>)

since they have full confidence that their CMOS sensor will be as good as their CCD.

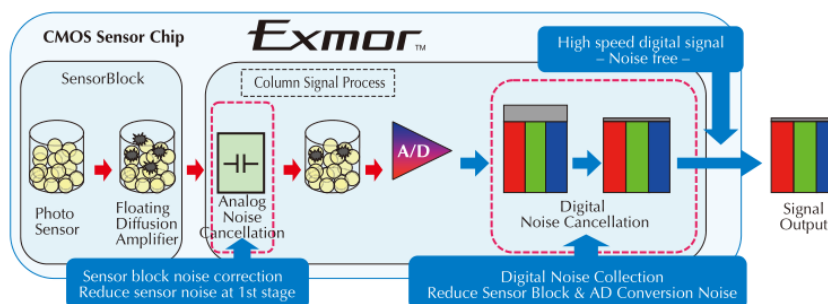
ToupTek developed new cameras by selecting some of the best sensors from the Sony Latest sensor product line. They use Exmor & Exmor R technology and have the following feature:

1) Low noise and High Sensitivity

Conventional CMOS Sensor



"Exmor" CMOS Sensor

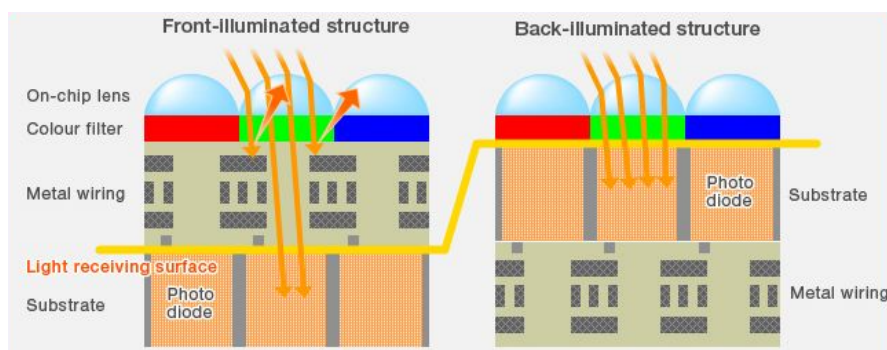


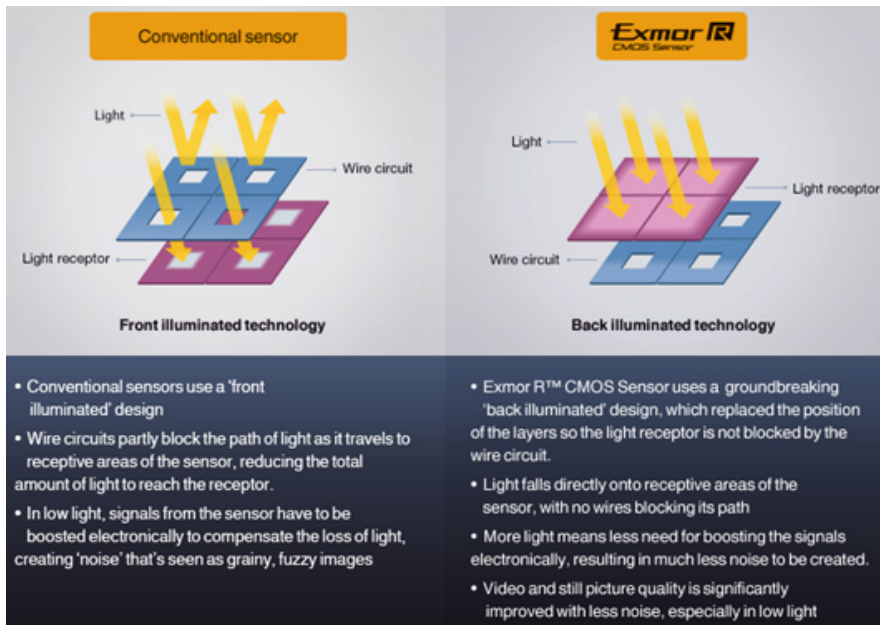
Realize Low Noise Process with Dual Noise Reduction

1. As you can see from the above diagram, the “Exmor” sensor has 2 noise reduction process including analogue noise reduction and digital noise reduction while the traditional one has only analogue noise reduction.
2. Even the smallest amount of signal noise can have a negative impact on a photo. Noise is introduced into an image if defects are present in the silicon from which the pixel is made. By minimizing the occurrence of defects and contamination, and by shielding areas that are vulnerable to defects, Sony has decreased the amount of noise that may be possible in other sensors.
3. Sony enhanced sensitivity of the CMOS sensor by modifying the transistor array and layout, and by making the photodiode as large as possible and creating a system that increases the accuracy of light that is guided to the photodiode.

2) Back-illuminated, High Sensitivity and no CRA Related Defects (“Exmor R”)

Sony further improved the capabilities of the CMOS sensor by developing a back-illuminated structure, with the aim of creating a camera capable of taking exceptional photographs even by candlelight. "Exmor R" is approximately twice as sensitive as a conventional front-illuminated CMOS sensor and also features low noise. In a back-illuminated CMOS sensor, light is directed onto the silicon substrate from behind, allowing light to be used with a level of efficiency not possible with conventional front-illuminated pixel structures. Photographers can now create smooth, high-quality images in low light settings, including night scenes.





The CRA related problem (background not uniform) does not exist anymore.

3) Fast Frame Speed

The key to increased speed can be found in parallel signal processing. CMOS sensors have analog-digital (A/D) conversion circuits that convert analog pixel signals into digital signals. Speed is increased by arranging thousands of these circuits in a horizontal array and allowing them to operate simultaneously. The A/D conversion circuits used in Sony's CMOS sensors have important characteristics, including the reduced size of the analog circuits in which noise is created, and automatic noise cancellation. This circuit design enables noise reduction to be combined with enhanced speed.

The latest Sony sensors can support fast frame speed and USB3.0 could help it to achieve their best performance. This is the reason why ToupTek develop new cameras based on USB3.0. Besides, USB3.0 help the camera to transfer video on 12/14bit.

4) Global Shutter (Some Sensors)

The conventional CMOS use the rolling shutter while CCD use global shutter. Now some Sony "Exmor" and "Exmor R" sensors use global shutter which make the CMOS sensor more like a CCD, such as IMX174, IMX302.

5) Good Continuity

In the near future, Sony will develop and provide better sensors and this will enrich ToupTek E3 and G3 family products.

2. New Product with Sony "Exmor" and "Exmor R" sensor

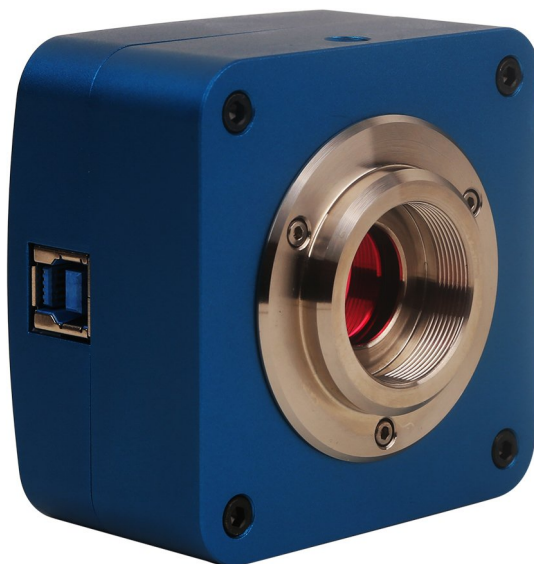
Based on Sony "Exmor" and "Exmor R" CMOS sensors, ToupTek developed two series cameras,

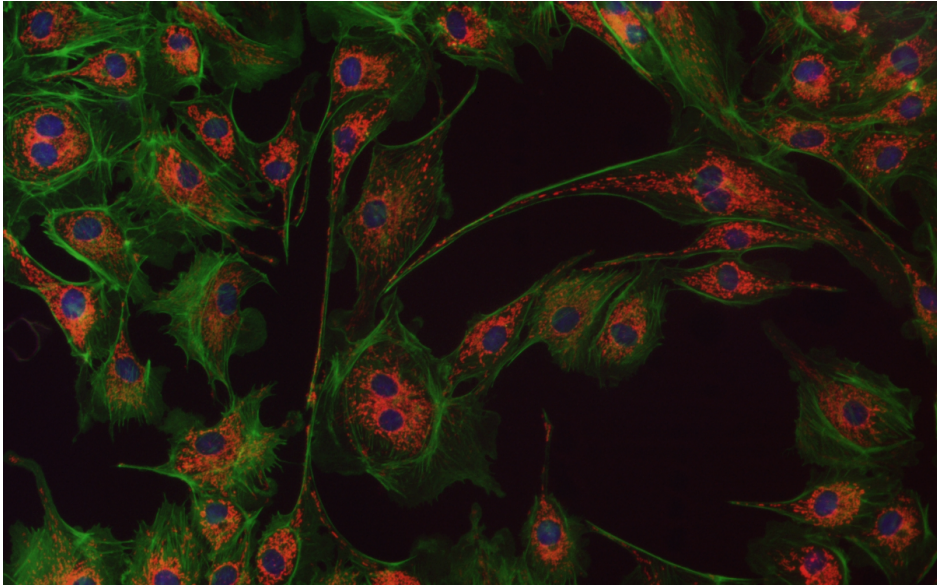
which includes E3 series camera and G3 series camera. Both of them can be used for microscope application and astronomy application. You just need to specify the mounting interface when ordering. They can replace CCD camera on many occasions while they are much more cost-effective. A comparison table of sensitivity will be provided at the end.

1) E3CMOS Camera

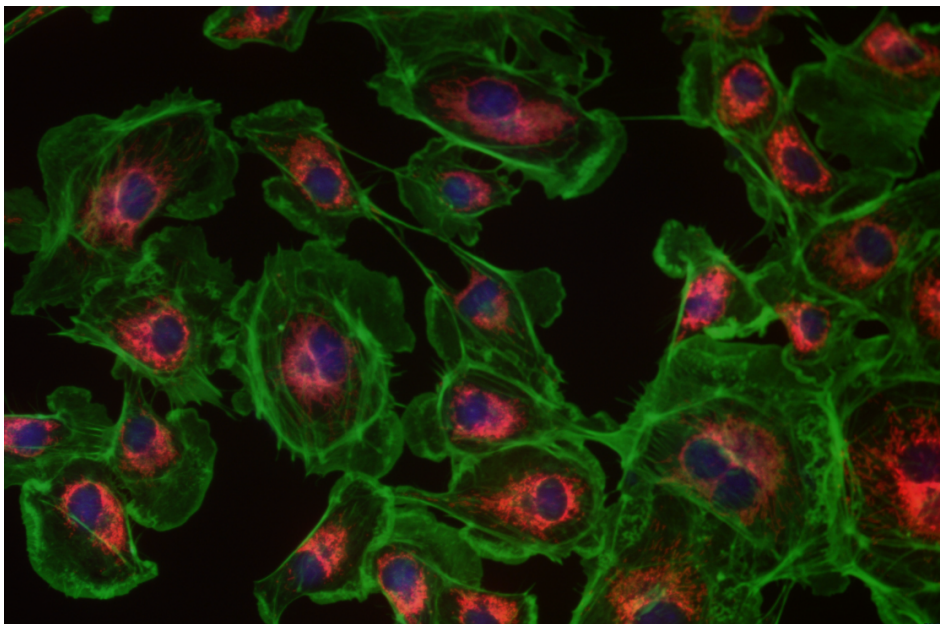
E3CMOS Series is Touptek USB3.0 Camera using the latest Sony “Exmor” and “Exmor R” CMOS cameras. It is perfect for fluorescence microscope application, astronomy application and other dark field environment application, as well as bright field applications. The E3 family now includes:

Camera	USB PORT	Resolution	Sensor	Shutter Type	Status
E3CMOS02300KPA	USB3.0	2.3MP	IMX185(1/1.9")	Rolling shutter	Available now
E3CMOS06300KPA	USB3.0	6.3MP	IMX178(1/1.8", STARVIS class)	Rolling shutter	Available now
E3CMOS12000KPA	USB3.0	12MP	IMX226(1/1.7", STARVIS class)	Rolling shutter	Under Development
E3CMOS03100KPB	USB3.0	3.1MP	IMX123(1/2.8", STARVIS class)	Rolling shutter	Coming soon
E3CMOS02300KPB	USB3.0	2.3MP	IMX174(1/1.2")	Global shutter	Coming soon
E3CMOS02300KPC	USB3.0	2.3MP	IMX302(1/1.2")	Global shutter	Coming soon





E3CMOS02300KPA sample picture



E3CMOS06300KPA sample picture