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Iris 15™ Scientific CMOS Camera

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Light Sheet Microscopy

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BACKGROUND

The [Optical Manipulation Group](#) at the University St. Andrews, led by Prof. Kishan Dholakia, looks at the science of light in terms of physics and biomedical research, fundamental and applied, in order to further the agenda for healthcare applications.

Prof. Dholakia wishes to take very high quality images, in his terms: “A large field of view with high resolution, very quickly, very accurately, using the lowest possible photon dose.” For these reasons, the group uses light sheet microscopy for the ability to take images with a lower light dose over a large field of view, with an aim to shed light on numerous biological processes.

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CHALLENGE

With live samples, the need to avoid photodamage is necessary in order to avoid affecting biological functions, when samples need to be imaged for days. Prof. Dholakia outlined some other issues: “We had challenges in how do we create the field of view, and how do we do Nyquist sampling across this field of view succinctly and accurately.”

Previous CMOS solutions did not have the capability for the desired image quality, meaning that a new solution was needed in order to achieve the large field of view images, while retaining enough sensitivity to use lower light levels and preserve live samples for longer, as well as the ability to image with high resolution at low magnifications.

SOLUTION

Prof. Dholakia and team are now using the Iris 15 sCMOS, with features a rectangular 25 mm field of view, ideal for light sheet. As Prof. Dholakia stated: "What we found exciting was the very small pixel size, which means we can retain the resolution but still get the big picture." The small 4.25 μm pixel size allows for high resolution at low magnifications with Nyquist sampling, in combination with the large field of view this makes the Iris 15 an ideal solution over other sCMOS cameras.

Prof. Dholakia also liked the camera dimensions: "The size of the camera is quite advantageous, we have been using other sCMOS cameras but the smaller physical size of the Iris 15 is important, we are interested in building platforms of microscopes that can fit on small breadboards, space is a premium and the Iris 15 fills a need there."

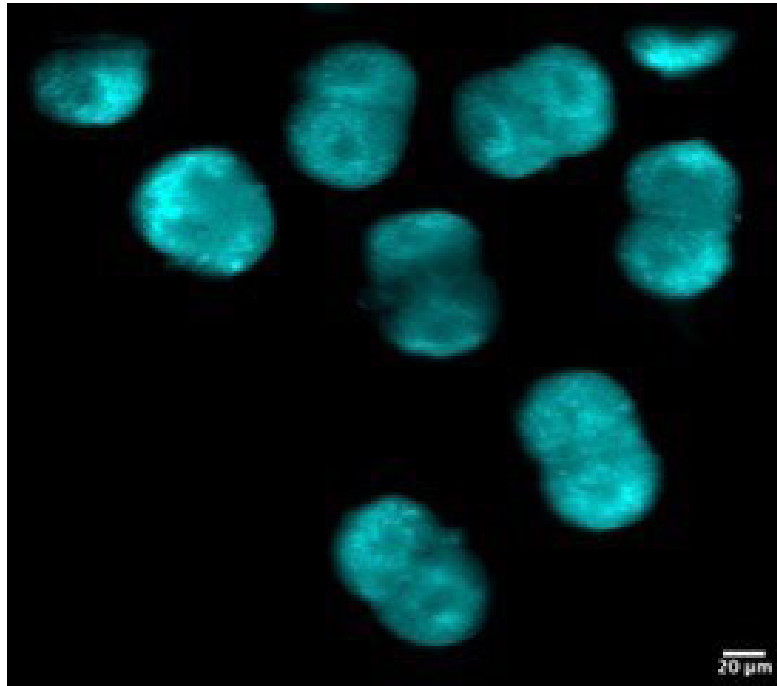


Figure 1: Mouse embryos at the two-cell stage, stained with the mitochondrial stain JC1 and imaged with the Iris 15 using an open top light sheet setup with 900 nm resolution. The Iris 15 can Nyquist sample the resolution over a large field of view due to the small pixel size.

