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Evolve™ 128 EMCCD Camera

Weak Fluorescence Imaging

Shuo Wang, PhD Student

College of Chemistry and Chemical Engineering, Xiamen University

BACKGROUND

The College of Chemistry and Chemical Engineering at Xiamen University was established in 1922, and through the tremendous efforts made by several generations of chemists, it is recognized as one of the leading institutions in China for chemical research, education, and training of future chemists.

The facility is equipped with various high end microscopes from Olympus and Nikon. Using a high numerical aperture objective on a wide field microscope and laser scanning confocal microscope, the research team is achieving high spatial resolution fluorescence imaging for different applications.

Their research interest is to record and analyze the blinking of quantum dots. Currently, blinking of quantum dots limit its application in biological and medical fields. Their goal is to investigate the mechanism of blinking, and find the relation between the degree of blinking phenomenon and the optical properties of quantum dots, measured by a bulk method. Understanding the mechanism will help suppress blinking of the quantum dot, hence play a very important role in extending the application of quantum dots in other fields.

CHALLENGE

The team is monitoring the blinking of quantum dots in their experiments. They do this by immobilizing a single quantum dot on the top of a glass cover slip, then monitoring its intensity fluctuation over time. However this blinking happens on a very short time scale. A normal CCD camera is not sensitive enough to image within such a short exposure time (few ms). In addition, the speed of the CCD is not fast enough to provide the time resolution required.

In order to successfully record the blinking of multiple single quantum dots, a different instrument was needed, which could provide great sensitivity and speed, as well as quantification in fluorescence signal.

SOLUTION

The team selected the Evolve 128 high speed EMCCD for fluorescence imaging of the quantum dots. "The Evolve 128 camera helps us monitor the signal fluctuation much more quickly. We avoid missing important events during the experiment. At the same time, its great sensitivity guarantees a good signal to noise ratio in such high speed acquisitions," explains Shuo Wang, PhD Student.

Since its different capability compared to a normal wide field fluorescence microscope using a CCD or laser scanning confocal microscope, the Evolve 128 will also help the team extend their research into other areas in future. They are currently considering biological relevant projects such as imaging the weak fluorescence on mitochondrial and liposome.

> "Evolve 128 helps us monitor the signal fluctuation **much more quickly...** its great sensitivity **guarantees a good signal to noise ratio in such high speed acquisitions.**"

Additional information about the College of Chemistry and Chemical Engineering at Xiamen University is available at:

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http://chem.xmu.edu.cn/

English:
http://chem.xmu.edu.cn/indexen.asp

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