Image Registration Using Essen ImageLock™ Plates

IncuCyte™ Product Note

Introduction

The IncuCyte family of products provides a convenient and affordable method of long-term, live-cell imaging. By placing the imaging system inside the incubator, users have the ability to perform true time-lapse imaging, in a labor-free, automated fashion and without removing cells from the incubator environment. The IncuCyte system also has the capacity to image several large vessels concurrently, for example up to six microplates. The IncuCyte database supports hundreds of different cell culture vessels.

In this product note, we describe the use of a specially modified microplate, which, in conjunction with IncuCyte software, allows high-quality image registration for time-lapse imaging even in circumstances when the microplates are temporarily removed from the system.

Methods and Approach

A key advantage to the IncuCyte imaging methodology is the ability to revisit and image the same cells at multiple time points. Depending on the application, image registration to about 1/10th of the field of view is adequate for precisely recording time-lapse metrics such as confluence, cell number, or micro-tubule length.

However, in some instances (e.g. movie generation, cell motility studies or overcoming spatial inhomogeneity) image registration down to a few microns is desired. Achieving this level of motion accuracy over large scan areas is a demanding mechanical constraint, requiring expensive components. Furthermore, even with this level of mechanical accuracy, image registration cannot be insured if the microplate is removed for inspection, media changes or for other reasons during the experiment.

In order to keep the IncuCyte affordable, and yet capable of image registration to a few microns when needed, Essen developed a specially-modified microplate called an ImageLock plate. The ImageLock plate technology is enabled by fiducial markers on the bottom of the plate which provide points from which image locations can be accurately referenced. The marks are so fine that they do not interfere with images acquired at the cell plane. Since the mark moves with the plate, the technique works even if the plate is removed from the system and later replaced.

We offer two different formats of ImageLock plates, 24-well (cat. #4365) and 96-well (cat. #4379). All plates are individually wrapped, tissue culture treated, and sterile. Fiducial marks allow for up to three locked images per well.

Figure 1. Essen BioScience ImageLock Plates: Essen offers both 24- and 96-well ImageLock Plates. Plates are individually packaged, sterile, TC –treated, and in conjunction with IncuCyte software allow for highly accurate image registration even when plates are moved and replaced.

Conclusion

Essen ImageLock plates provide a solution for customers with applications which require time-lapse imaging with registration down to a few microns. It also allows for precise image registration even when the microplate is manually removed and replaced in the system, e.g. for feeding or manual inspection. This capability is especially useful for multi-day, long-term live-cell imaging applications.

About the IncuCyte Live-Cell Imaging System

The Essen BioScience IncuCyte Live-Cell Imaging System is a compact automated microscope. IncuCyte resides inside your standard tissue culture incubator and is used for long term kinetic imaging. To request more information about the IncuCyte please visit us at www.essenbioscience.com.

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