Nano-Cyte™ LC

3D Image based stability for live cell imaging

Introduction

Nano-Cyte™LC* is an image based, platform independent stabilization system that changes the nature of live cell imaging. With Nano-Cyte™LC you no longer need to be concerned with temperature gradients, sample drift, and microscope drift. Unprecedented stability in the nanometer regime allows long term experiments as never before.

Nano-Cyte™LC is the complete image acquisition and stabilization instrument for live cell imaging. Factors such as system instability, environmental temperature drift and sample-to-microscope temperature gradients are no longer a factor with Nano-Cyte™LC. Our integrated approach to image stabilization yields image stability within ±10 nanometers in X and Y, and ± 20 nanometers in Z. Nano-Cyte™LC has proven stability over *days* and is a unique offering that promises to revolutionize live cell imaging.

** Patent Pending*

What is Nano-Cyte™LC?

Nano-Cyte™LC is an integrated suite of high precision piezo and motor driven motion control systems with automated, active stabilization software. The Nano-Cyte™LC has been designed to interface with external hardware components such as EMCCD cameras, light sources and shutters.

Hardware

The Nano-Cyte™LC is comprised of a high performance three axis nanopositioning system coupled with a two axis motorized micro-positioning stage. The nanopositioner is a flexure based piezoactuated design with integrated PicoQ® sensors for absolute position sensing and nanometer precision under closed loop control. The micropositioning stage enables the user to have a large range of travel for surveying samples prior to engaging the active stabilization. All motion devices are controlled by the Nano-Cyte™ controller. The controller is USB 2.0 enabled and can additionally control other user devices such as EMCCD cameras, lasers and shutters.

Software

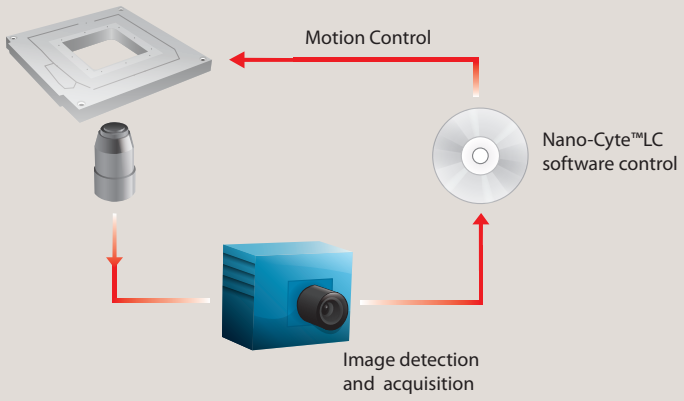
The Nano-Cyte™LC software package simultaneously performs image acquisition and stabilization. The software works seamlessly with the provided hardware and the acquired images can be exported to ImageJ for post acquisition processing.
The image stabilitization algorithms are inherent with the image acquistion system.

Advantages

- Intrinsic to experiment, directly stabilizes the detected image
- 3D stabilization at the nanometer scale
- Active stabilization over days
- Simultaneous image acquisition and stabilization
- Microscope platform independent
- Corrects for temperature gradients and drift
- Particle tracking capability
- Stability of ±10nm (XY), ±20nm (Z)
- Integrated hardware and software
- User friendly graphical interface
- Automated software control

Experiment Intrinsic Stabilization

Nano-Cyte™LC uses an "experiment intrinsic" method to achieve image stability. The diagram below shows the operation of Nano-Cyte™LC feedback control system. The stabilization is based on the imaging pathway.



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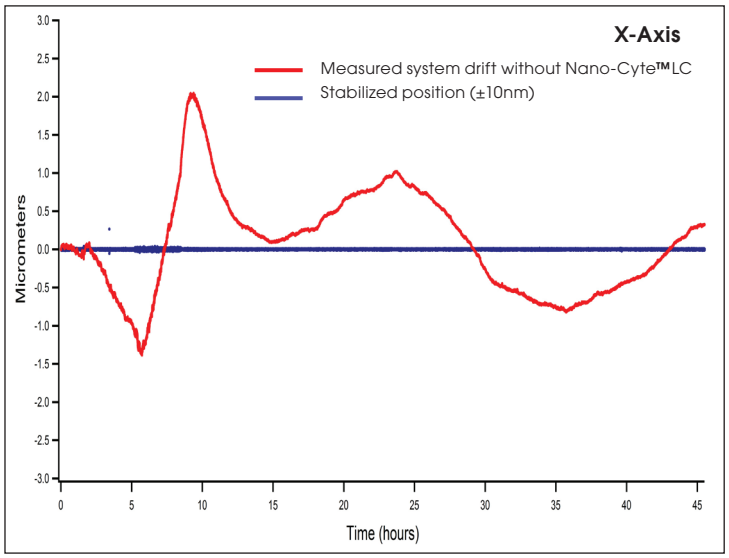
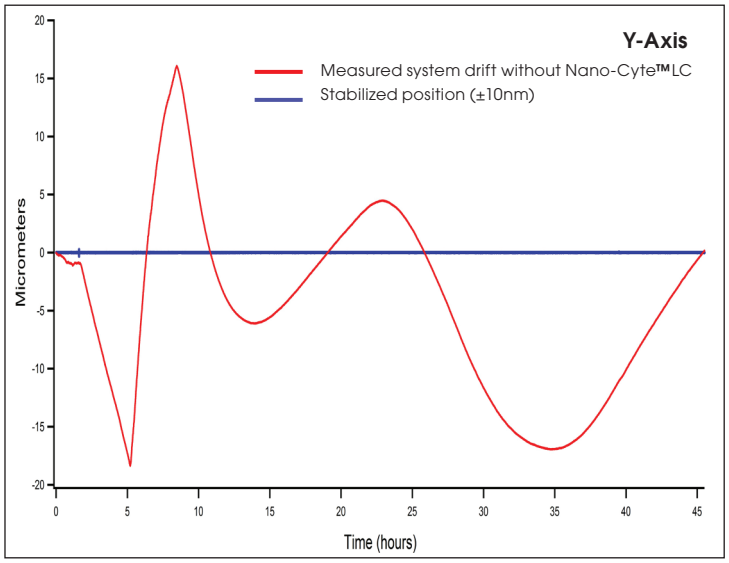
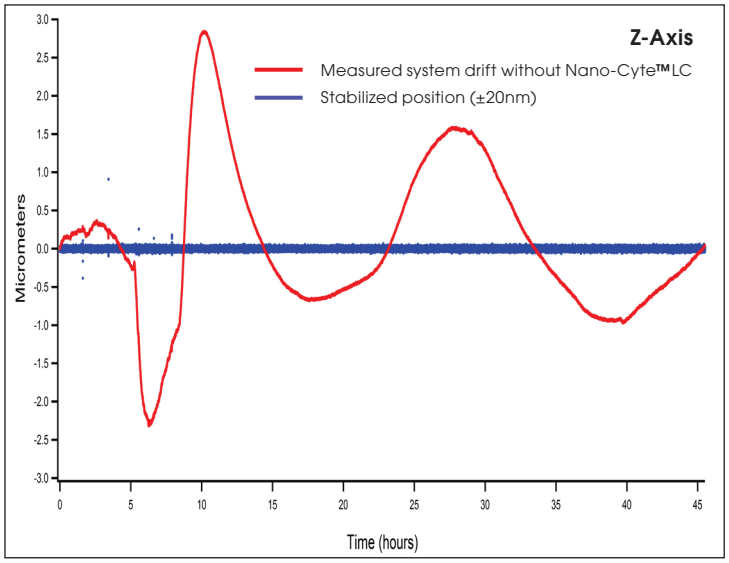
Nanometer Stability Over Days

Image stability data measured over 44 hours. The red line indicates the measured drift. The blue line indicates the stabilized position when using Nano-Cyte™LC.







Nano-Cyte™ LC Specifications

Stability	
X-Axis	± 10 nm
Y-Axis	± 10 nm
Z-Axis	± 25 nm
Tracking Speed/Drift Rate Compensation	10 nm/sec
Dynamic Temperature Range	18 ℃ - 37 ℃

Hardware Specifications	
Nanopositioning Range of Motion	200 µm × 200 µm × 200 µm
Resolution	0.4 nm
Step Size	3 nm
Micropositioning Range of Motion	25 mm x 25 mm
Resolution	20 nm
Step Size	95 nm
Controller	Nano-Cyte™
Interface	USB 16 bit DAC
TTL	4 channels

Compatibility	
Microscope Compatibility	Nikon Ti, TE Series
	Zeiss Axio Series
	Olympus IX Series
Supported EMCCD Camera types	Andor
	Photometrics
	Hamamatsu
Maximum Frame Rate	10 frames/sec
Power Supply	90 - 260 VAC (50/60Hz)
Communication	USB
Operating System	Windows 2000/XP Pro/Vista/7

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