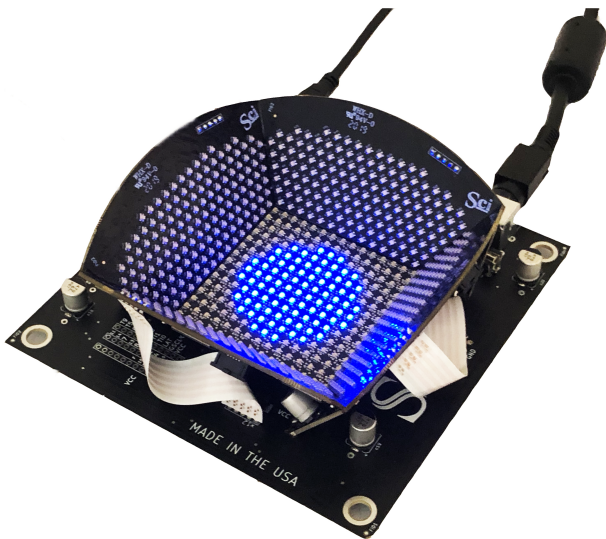# See The Invisible With SCI Programmable Microscope Illuminators

SCI products are crafted to provide you with the finest illumination hardware to meet the needs of your application. Computational microscopy leverages the benefits of modern computational techniques with your existing hardware, enabling exciting new imaging modalities such as quantitative phase imaging and super-resolution imaging using existing hardware. SCI LED arrays are designed from the center-out to provide optimized performance in coded illumination applications. Our easy to use API and example code will get you up and running quickly so you can focus on what matters most - your application.
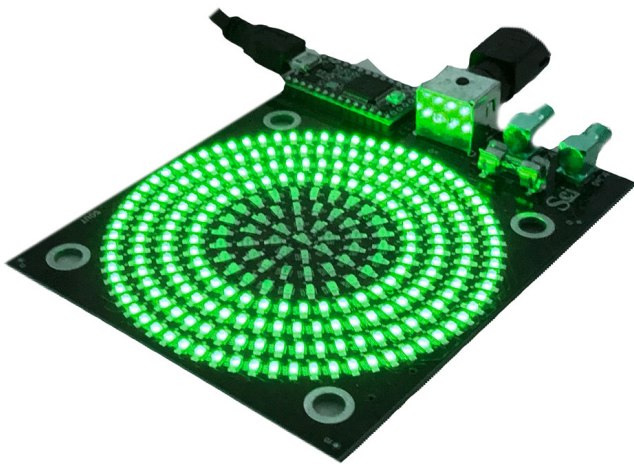
Our devices are compatible with a wide range of inverted microscopes from leading manufacturers such as Nikon, Olympus, Zeiss, and more. And, if your application is built on a breadboard, we offer breadboard mounts in both metric and imperial threaded hole patterns.

Applications:

➔ Quantitative Phase Imaging

➔ Gigapixel-Scale Imaging

➔ Motion Deblurring

50μm

rad
3
-0.6
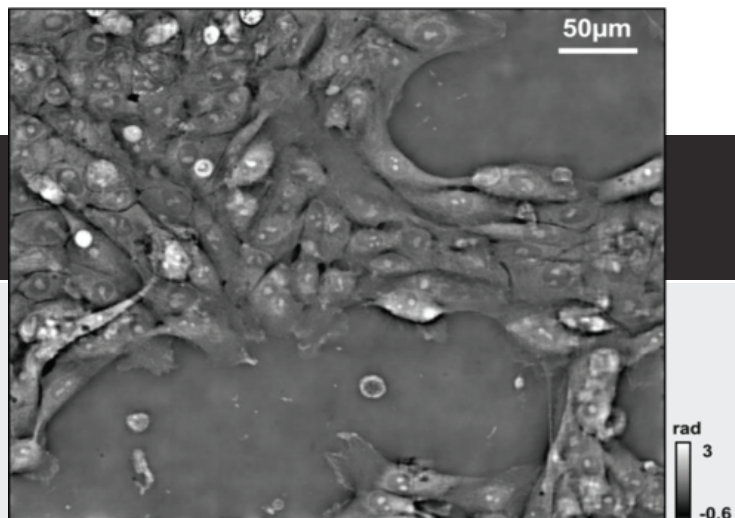
✛ *SCI Microscopy Custom LED Illuminators*

Why Coded Illumination?

A coded illumination microscope uses a programmable light source to illuminate a sample dynamically. A coded illumination microscope allows upgrades on the fly, simply by modifying the pattern on an active light source such as an LED Array.

Changing the light source completely changes the way a microscope works. Brightfield, darkfield, phase, and super-resolution become as easy to use as a conventional system – no touching the microscope. The end result is a more durable, easier to use, and less expensive microscope.
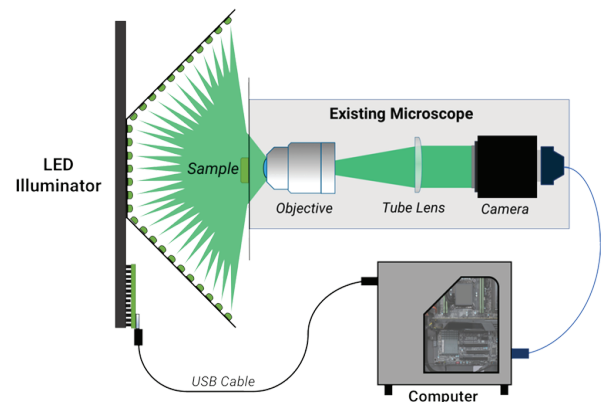
Citations

Learned sensing: jointly optimized microscope hardware for accurate image classification
A Muthumbi, A Chaware, K Kim, KC Zhou, PC Konda, R Horstmeyer et. al.
Biomedical Optics Express 10 (12), 6351-6369

Physics-based learned design: Optimized coded-illumination for quantitative phase imaging
M Kellman, E Bostan, N Repina, L Waller
IEEE Transactions on Computational Imaging

Multiplexed coded illumination for Fourier Ptychography with an LED array microscope
L Tian, X Li, K Ramchandran, L Waller
Biomedical optics express 5 (7), 2376-2389

Quantitative differential phase contrast imaging in an LED array microscope
L Tian, L Waller
Optics express 23 (9), 11394-11403

**3D differential phase-contrast microscopy with computational illumination using an LED array**
L Tian, J Wang, L Waller
Optics letters 39 (5), 1326-1329

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# ✛ *SCI Microscopy Custom LED Illuminators*

Our Products:

LED ARRAYS

Now in our second product generation, we are looking for users who are knowledgeable in the field of computational microscopy and are comfortable modifying their microscope. We have a stock of second-generation LED arrays we can ship within 3-4 days, but are also seeking input on features and designs for the next generation of LED array illuminators for broad distribution.
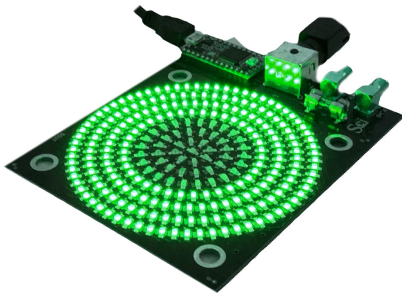
SCI Round LED Array

The SCI Round LED array is ideal for low-NA or cage-built microscopes. With 257 individually-controllable monochrome LEDs, you can easily incorporate coded illumination into existing wide-field microscopes for quantitative phase imaging, 3D imaging, and conventional brightfield or darkfield illumination. Available with
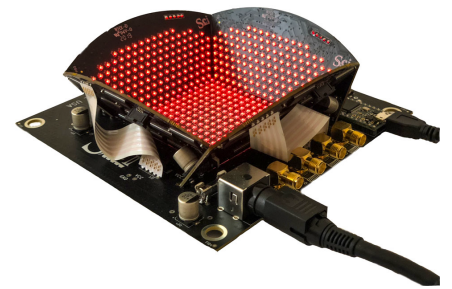
SCI Dome LED Array

The SCI Dome LED array is ideal for high-NA microscopes, providing illumination up to 0.8NA. The SCI Dome uses 5 PCBs to achieve a quasi-some shape, maximizing illumination throughput across 793 individually-controllable LEDs. Unlike the SCI-Round, this device has full RGB

All LED array devices include the following:

- LED array illuminator
- Power supply (120 or 240V input)
- USB cable
- Basic device firmware (Open-Source and available on Github)
- Getting Started Guide

Optionally, we can also provide mounting hardware specific to your microscope or application. Please contact chen@sci-microscopy.com for more information.

Adapters available for most inverted microscopes from major manufacturers!

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Specifications Sheet

	SCI Round	SCI Dome
Number of LEDs	257	781
Number of Color Channels	1	3
LED Pitch (Average)	6.2mm	4.5mm
LED Pattern	Concentric Circles	Cartesian (base), Diagonal (Wings)
Color Options	Green or Custom [1]	RGB Tri-Color
Dimensions	95mm x 115mm x 16mm	120mm x 120mm x 40mm
Mounting Pattern	M6, 75mm Square	M6, 100mm Square
Mounting Clearance	5mm (spacers included)	8mm (spacers included)
Dominant Wavelength	525nm or Custom	465nm / 515nm / 640nm
Refresh Period [2]	17ms	52ms
Update Rate [3]	50Hz	20Hz
Interface Type	USB 2.0 Serial	USB 2.0 Serial
TTL Input	1x SMA (programmable [4])	1x SMA (programmable [4])
TTL Output	1x SMA (programmable [4])	1x SMA (programmable [4])
Maximum Power Draw [4]	5A	8A
Supported Patterns (Static)	Single LED, Multiple LEDs, Brightfield, Darkfield, Annulus, DPC, Darkfield DPC	Single LED, Multiple LEDs, Brightfield, Darkfield, Annulus, DPC, Darkfield DPC, Color DPC
Supported Patterns (Dynamic) [5]	Single LED Sweep, DPC Sweep, Arbitrary Patterns	Single LED Sweep, DPC Sweep, Arbitrary Patterns
List Price [6]	$3,000	$6,000

[1] Units with custom 0402 metric LEDs are available upon request. Additional cost may apply.

[2] Refresh period is the period at which the LEDs flicker. Imaging with exposures near this period will display aliasing artifacts when using a camera in rolling shutter mode.

[3] This is the maximum speed which the LED array may change patterns. Note that the USB connection limits the serial command rate and is slower than this speed. Many commands (single LED sweeps, DPC patterns, etc.) can be initialized on the device with a single serial command, and can therefore meet this specification.

[4] Current limits are imposed by software to prevent overheating. Disabling these limits without first contacting SCI is dangerous and will void the device's warranty.

[5] See SCI firmware support on http://github.com/SCI-Microscopy

[6] Excluding taxes, duties, and shipping

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www.SCI-Microscopy.com

Sales Inquiries: sales@sci-microscopy.com

Technical/Compatability: chen@sci-mircroscopy.com