Cytation™ Imaging Readers
See Possible.
Cytation™ imaging multi-mode readers combine automated digital microscopy with conventional multi-mode microplate detection, providing both phenotypic cellular information and well-based quantitative data. Equipped with BioTek’s patented Hybrid Technology™, Cytation includes variable bandwidth monochromators and high sensitivity filter-based detection for unmatched versatility and performance. The microscopy module provides cellular visualization up to 60x magnification in fluorescence, brightfield, H&E and phase contrast channels. Gen5™ software is specifically designed to make sample detection, image capture and analysis uncomplicated and efficient.
Cytation Cell Imaging Multi-Mode Reader
Automated Microscopy & Multi-Mode Detection

Cytation offers a powerful package of imaging modes, methods and processing capabilities to rival high end dedicated microscopes and imaging systems, bringing affordable imaging to a wide variety of laboratories. Among the features designed for easy use are its unique automation capabilities.

Fully Automated Imaging System
- **Auto X Y Stage** simplifies precise sample positioning and stage movement
- **Auto LED** controls up to 100% intensity output
- **Auto Exposure** applies an average exposure setting across the plate
- **Auto Focus** determines the plane of focus automatically based on plate or sample vessel dimensions
- **User-Trained** auto focus improves reproducibility and allows customization per user and sample

Multi-Mode Detection
The multi-mode detection system available in Cytation can measure fluorescence intensity, time resolved fluorescence, fluorescence polarization, AlphaScreen®/AlphaLISA®, luminescence and UV-Vis absorbance. The patented Hybrid Technology™ brings filter-based and monochromator-based optics together to provide the powerful detection capabilities required for cell-based and other biochemical assays.

Modular & Upgradable
Cytation has a modular architecture, so it’s easy to select any combination of the independent systems now, and upgrade as the laboratory’s needs change.
Grow It.
Cytation can be outfitted with a CO₂ / O₂ gas control module along with programmable temperature control to 65 °C and orbital and linear shaking to provide the optimal environment for live cell-growth assays. An available dual reagent injector module provides precise reagent dispensing in all read operations and detection modes.

See It.
There’s never been an easier or faster way to image your cells than in Cytation! The versatile imaging system provides up to four fluorescent color channels plus brightfield, H&E and phase contrast imaging, making it the ultimate benchtop automated microscopy workstation. Gen5 software offers Auto Easy functions for all steps of imaging, from managing focus to LED intensity for users at all levels (manual operation is also available). Excellent image quality is assured with the 16 bit grayscale CCD camera with Sony chip, along with other high quality optical components.

Read It.
Plate measurement options are nearly limitless in Cytation. The multi-mode microplate detection system offers fluorescence intensity, time-resolved fluorescence, fluorescence polarization, AlphaScreen/AlphaLISA, UV-Vis absorbance, flash and glow luminescence. All modes are available for measuring samples in 6- to 384-well plates, Petri and tissue culture dishes to suit a wide range of applications. If cell imaging is the next step in your workflow, Gen5™ offers a hit-picking function to select just those wells whose intensity meets the imaging threshold. Hit-picking saves time and greatly reduces data analysis and storage requirements.

Count It.
Cytation is controlled by Gen5 software for quantitative and image data collection, processing and analysis. Cell counting is fast and easy, and Gen5 offers comprehensive cellular analyses along with cell counts... automatically. Analysis and results options are intuitive, powerful, and customizable.
Do what you never thought possible.

Typical Applications:

- 2D and 3D cell imaging and analysis
- Cell proliferation studies
- Cytotoxicity
- Biomarker quantification
- Drug discovery
- Genetic analysis
- Drug absorption and metabolism
- Biologics drug discovery and development
- Environmental testing
- Food safety
- Nucleic acid quantification
- Protein quantification

Think Possible:

“Cytation is the ultimate machine for studying protein-protein interactions.”

“With Cytation I can visualize neurotransmitter release in neurons to better understand how they communicate with each other.”

“Cytation will allow high-throughput, high-content analysis of our unique model of 3D cultured patient derived cells.”

“The Cytation will, for the first time, enable a high throughput assessment of the impact of a panel of drugs on cell proliferation and cell viability.”
**Imaging Modes**

**Fluorescence**

Acquire amazingly detailed images from 2.5x to 60x, allowing visualization of whole organisms to sub-cellular details. Up to 4 channels are available, and with more than 13 colors available, Cytation is well suited to work with a very wide range of dyes to meet a myriad of cell imaging applications.

**Brightfield**

Cytation offers a brightfield channel to image samples using transmitted light. This mode is very useful for live-cell experiments where label-free conditions are preferred. Specialized auto focus algorithms are included to make sure cells remain in focus throughout time-lapse experiments. Brightfield microscopy is often combined with fluorescence imaging to help define sample boundaries (e.g. 3D samples, cellular compartments).

**Phase Contrast**

Phase contrast imaging is an important tool to discern structures that are difficult to see with brightfield microscopy. Typically, “difficult” cells have poor contrast among the cell structures, similar transparencies, or very little natural pigmentation. Phase contrast allows cells to be imaged in their natural states without fixing and staining. This mode also provides improved image analysis (compared to brightfield) because of the better foreground/background intensity separation. Phase contrast is especially useful for HCS applications and is available in 4x, 10x, 20x and 40x magnification with Cytation 5.

**Color Brightfield**

Cytation uses a high quality monochrome camera and sequential red, green and blue LED illumination to capture color images, which are then precisely combined to provide RGB sampled color without interpolation. This unique method requires only one camera, keeping both hardware and software simple...and takes advantage of monochrome sensitivity to provide exceptional image quality. Cytation’s color brightfield imaging mode is particularly suited to H&E stain imaging.
Z-stacking & Z-projection

Z-stacking is an essential capability for 3D imaging applications, such as spheroid, tumoroid and hanging droplet assays whose biology can’t be adequately captured with an objective’s typical depth of field. Whole organism (zebrafish, C. Elegans) imaging and assays performed in matrigel, such as angiogenesis and tube formation are also important 3D applications where z-stacking provides a multilayered image, acquired over multiple focal planes. With Cytation 5, up to 50 slices can be acquired to capture all important details of the 3D sample. Gen5’s z-projection methods offer great flexibility to combine z-stack slices into a single information-rich image.

Digital Phase Contrast

The conventional brightfield and phase contrast imaging modes work very well for samples in larger diameter microplate wells. In 96- and 384-well formats, a meniscus effect can cause uneven illumination of the sample, resulting in a distorted ‘bullseye’ effect. Digital Phase Contrast is an enhancement technique that digitally corrects the uneven illumination of the brightfield image creating a much more consistent contrast across the image.

Image Stitching

With Cytation and Gen5, it’s possible to collect a montage of images – which is commonly necessary when imaging:

- Many cells for analysis (as in rare event biology)
- Large objects span out of the field of view of the objective
- Tissue sections, like H&E slides
- Live cell kinetics, where cells can move in or out of the field of view

Gen5’s image stitching allows multiple image tiles to be software-aligned to create a complete picture of the sample with great accuracy, providing more meaningful data.

Cell Counting & Measurement

With Gen5 software, cell counting is both accurate and intuitive. Advanced pre-processing tools like image smoothing and background flattening help obtain relevant, meaningful images for analysis and details like size, circularity and intensity are automatically calculated.

Subpopulation analysis

When multiple sub-populations are present in a sample, Gen5 can sort by intensity or morphology, enabling analysis of transfection efficiency, nuclear translocation and cell cycle assays.
Monochromator bandwidth
Variable from 9 nm to 50 nm in 1 nm increments
Fixed, 16 nm

Detection system
Two PMT detectors: one for monochromator system, one for filter system

Dynamic range
7 decades
5 decades

Luminescence

Sensitivity
Monochromator system: 20 amol ATP (flash)
Filter system: 10 amol ATP (flash) 100 amol ATP (glow)

Wavelength range
300 - 700 nm

Alpha Detection

Light source
680 nm laser, 100 mW
n/a

Wavelength selection
Filter (top only)
n/a

Sensitivity
100 amol LCK peptide
(384-well low volume plate)
n/a

Absorbance

Wavelength range
Monochromator
230 - 999 nm, 1 nm increment

Bandwidth
4 nm (230-285 nm), 8 nm (>285 nm)

Dynamic range
0 - 4.0 OD

Resolution
0.0001 OD

Reagent Injectors

Number
2 syringe pumps

Supported detection modes
All modes

Dispense volume
5 - 1000 μL in 1 μL increment

Dead volume
1 mL, 100 μL with back flush

Plate geometry
6- to 384-well plates, Petri dishes

Dispense precision
≤2% at 50-200 μL

Dispense accuracy
±1 μL or 2%

Physical Characteristics

Power
250 Watts max.
130 Watts max.

Dimensions
20° D x 16.5° W x 17.5° H (50.8 cm x 41.91 cm x 44.5 cm)

Weight
80 lbs (36.3 Kg)

Regulatory

Regulatory
CE and TUV marked. RoHS Compliant. Models for In Vitro Diagnostic use are available.
At BioTek, our philosophy transcends conventional thinking and challenges the old ways. We develop fresh, original solutions by unifying concepts that often appear to be opposed. It means to shape and reshape. To engineer, build, deliver and support products that best serve the marketplace by providing what you need, when you need it.

Think Possible. It’s the difference between leading and following.