

Introducing the PhenoCycler-Fusion System

THE FASTEST SINGLE-CELL SPATIAL BIOLOGY SOLUTION

INTRODUCTION

To unravel the complexities of biology at the cellular level, scientists must understand cellular organization in a tissue context. Spatial organization of cells uniquely reveals localization while also providing insight into cell-to-cell communication and how these interactions influence the tissue microenvironment. This information can also shed light on cellular processes such as cell fate determination, cell activation state, and cell-to-cell signaling patterns. Building spatial maps composed of trillions of cells in the human body require tools that can enable ultra-high parameter spatial studies at unprecedented scale and speed.

While single-cell technologies, such as flow-cytometry and single-cell RNA-seq, enable the detection of numerous parameters, they lack spatial dimension. The advent of recent spatial technologies like spatial transcriptomics has alleviated this concern. However, these technologies are based on spot-based or region-of-interest based methods leading to a trade-off in resolution. Conversely, standard imaging methods, like immunofluorescence (IF) and immunohistochemistry (IHC) enable single-cell resolution and provide spatial context but are limited to measuring just a few parameters simultaneously. Spatial Phenotyping enables mapping of every single cell across the whole slide at true single-cell resolution thereby facilitating unbiased discoveries.

Akoya is the only commercial manufacturer of the PhenoCycler-Fusion™ system. The PhenoCycler-Fusion system is the fastest spatial biology solution that enables ultrahigh-plex spatial phenotyping of whole slides at single-cell resolution by integrating automated fluidics and iterative imaging. Capable of imaging 1 million cells in 10



minutes, the system allows unbiased spatial phenotyping of tissues, accounting for every single cell across the whole slide. Moreover, it is high-throughput, multiomic, and the only system that enables translation of spatial discoveries into actionable biomarkers.

Akoya Biosciences has an exclusive worldwide license to patents from the lab of Dr. Garry Nolan at Stanford University for the underlying PhenoCycler (formerly CODEX) technology (9,909,167; 10,000,796; 10,006,082; 10,017,808; 10,370,698; and others pending). The company exclusively provides liquid crystal tunable-filter based spectral imaging technology covered by one or more of the following US patents: 7,534,991 and 7,655,898. The software tools integrated with PhenoCycler-Fusion are covered by one or more of the following patents: 7,555,155, 7,953,264, 8,639,043, 8,280,140, 8,391,961, and other related granted patents or pending applications throughout the world.

Akoya retains exclusive rights to all the above-listed patents, and no licenses have been granted to other manufacturers for tissue-based applications.

KEY BENEFITS

- Automated cycling and iterative imaging of up to 100+ biomarkers across the whole slide depending on barcode availability
- Seamless integration of fluidics and imaging capability driven by a single software
- Imaging of 4 colors per cycle in under 45 minutes (15 mm X 15 mm)
- Up to 250 nm resolution, enabling true single-cell and sub-cellular resolution
- Compatible with archived whole-slides, FFPE tissues, fresh-frozen samples, tissue microarrays, tissue sections, and organoids
- Single-step staining and gentle reporter removal to preserve sample integrity for downstream analyses such as H&E staining or Region-of-interest analysis
- Imageable area of up to 18 mm x 34 mm

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KEY BENEFITS (CONTINUED)

- Walk-away automation
- Ability to image non-rectangular shapes leading to efficient imaging and tissue coverage per slide
- Enhanced autofocus technology and shorter exposure times leading to rapid image acquisition
- Whole slide imaging enabled at 10x, 20x, or 40x
- Imaging and data processing in parallel resulting in faster turnaround time
- Automated and fully integrated reporter delivery and imaging
- Output file (.QPTIFF) is compatible with Akoya software solutions (phenoptrReports) or third-party solutions such as Visiopharm and Indica Labs software (HALO)
- Integrates with inForm® Image analysis software
- Part of an end-to-end spatial biology solution including reagents, software, and specialized support

SPECIFICATIONS:

Dimensions (W X D X H in)	PhenoCycler: 28" X 22" X 14.5"; Fusion: 25" X 20" X 26"
Weight*	PhenoCycler: ~67 lbs. / 30.3 kg ; Fusion: ~120 lbs. / 54.4 kg
Sample Type and Tissue Format	Whole-slide, FFPE, Tissue Microarray and Tissue Sections
Speed (1.5cm X 1.5cm)	Fluorescence: 45 min
Resolution	Up to 0.25 µm/pixel (40X)
Throughput	1 slide
Multiplexing Capability	Supports up to 100+ biomarkers depending on barcode compatibility
Image Analysis Software	inForm® and phenoptrReports
File format	Akoya Biosciences' whole slide scan image (.QPTIFF)
Platform Electrical	
Input Voltage	100 to 240 VAC, 50/60 Hz
Backup UPS (Optional, but Recommended)	APC Smart-UPS 1500VA
Operating Environment	
Temperature	+20°C to +26°C (68°F to 80°F)
Humidity	30% - 60%, No condensation

* Measurements are approximations and could vary slightly for the final shipments