

Xenium In Situ platform

Summary

The Xenium In Situ platform is an end-to-end solution from 10x Genomics that provides highly sensitive, targeted gene expression information at subcellular resolution. The platform includes the Xenium Analyzer, a versatile instrument for high-throughput single cell spatial imaging, consumables, panels, and software. Additionally, the platform is backed by the full support of 10x Genomics expertise, from tissue preparation to data analysis. Xenium single cell spatial imaging combines the power of single molecule RNA and optional protein detection with powerful optics, data acquisition, and decoding technology to rapidly detect analytes at high plexity and subcellular resolution across entire tissue sections. The Xenium Analyzer comes with onboard analysis capabilities to process image data, localize RNA and protein signals, and perform secondary analysis. The platform uses a unified assay that is compatible with both fresh frozen and FFPE tissue, and does not require optimization. A diverse menu of validated fit-for-purpose gene panels, with the ability to add custom gene sets, are available for highly sensitive profiling of up to 5,000 genes. Fully custom panels are also available for up to 480 genes, including advanced designs for isoforms, SNVs, TCRs/BCRs, xenografts, and bacterial/viral sequences. For a multiomic readout, Xenium Protein subpanels comprised of 27 immunology and cancer-related markers are available and compatible with ready-to-use and custom panels up to 480 genes in human FFPE tissues.

Xenium Analyzer

The Xenium Analyzer is an easy-to-use instrument with integrated fluidics, wide-field epifluorescence imaging, sophisticated image processing, robust data analysis capability, and data visualization. Up to two slides, each with a large imageable area of about 10.5 x 22.5 mm, can be loaded onto the Xenium Analyzer and imaged simultaneously. X, Y, and Z dimension image acquisition and processing is performed in parallel through the Xenium analysis software to localize detected transcripts with a <30-nm XY localization precision and <100-nm Z localization precision.

Analyte detection and image acquisition are performed on the Xenium Analyzer in cycles. The reagents, including fluorescently labeled probes for detecting RNA and protein molecules, are automatically cycled in, incubated, imaged, and removed by the instrument. An optical signature specific to each RNA transcript is generated, enabling identification of the target gene. For antibody labeled proteins, the antibody barcode is fluorescently detected and mapped back to each protein for identification. At the end of the instrument run, a spatial map of transcripts and proteins is built across the entire tissue section.

Xenium In Situ workflow

The Xenium workflow starts with sectioning tissues onto a Xenium slide. The sections are then treated to access the RNA for labeling with circularizable DNA probes. The DNA probes contain a gene-specific barcode sequence flanked by two regions that independently hybridize to the target RNA. Ligation of the DNA probe ends on the targeted RNA region generates a circular DNA probe which is enzymatically amplified and bound with fluorescent oligos, creating a bright, easy-to-image signal. Ligation does not occur if both ends of the DNA probe are not securely matched to a single RNA target, ensuring a unique level of probe specificity to the target region. For optional same-section, same-run protein detection, the tissue can also be stained with barcode-labeled antibodies. The sample undergoes successive rounds of fluorescent probe hybridization, imaging, and removal. Cell boundaries are inferred from morphological imaging via a single-tube multi-tissue stain mix consisting of seven morphological markers across four imaging channels for distinct cellular compartments (nuclear, cell boundary, interior RNA, interior protein). Finally, cells are mapped onto the image and transcripts and proteins assigned to cells. Acquired data is easily transferred off the instrument to perform visualization and further analysis with the 10x Genomics-provided Xenium Ranger, Xenium Explorer desktop software, or third-party tools of the user's choice.

10x Genomics is the only manufacturer of the Xenium Analyzer platform.

Unique platform characteristics

- Proven technology, validated across diverse sample types and applications, with numerous publications by end users in high-impact, peer-reviewed journals
- An imaging-based, high-plex RNA assay that utilizes rolling circle amplification (RCA) to enable direct, in situ transcript detection while eliminating the need for RNA sequencing
- Diverse menu of validated fit-for-purpose panels work off-the-shelf to profile up to 5,000 genes and can be customized with up to 100 custom targets; standalone custom panels of up to 480 genes can also be ordered for v1 chemistry
- Pre-optimized and validated protein subpanels work off-the-shelf for simultaneous detection of up to 480 genes and up to 27 proteins, including 4 cell segmentation markers, in human FFPE tissues
- Proprietary design algorithm for the generation of highly specific probes
- Probe chemistry is designed to maximize specificity through dual hybridization and ligation stringency, enabling detection of expressed single nucleotide variants (SNVs) and isoforms
- Unified assay compatible with both fresh frozen and FFPE requires no optimization and is non-destructive, which allows the same section to be H&E and/or IF stained post-workflow
- Run up to 1,400 mm² of tissue per week; industry-leading run time of two 2 cm² slides in 55 hours for v1 chemistry panels up to 480 genes
- Large 10.5 x 22.5 mm imageable area per slide
- Data is processed in real time during the run, enabling immediate access to high-resolution spatial transcriptomic results upon completion and eliminating the need for additional sequencing or cloud-based analysis to produce primary outputs; Output data files per slide are below 200 GB when optimized with pre-designed panels
- Concurrent onboard analysis capabilities process image data, localize RNA and protein signals, and perform secondary analysis—including multimodal cell segmentation, transcript and protein assignment to cells, clustering, and differential expression results
- Each decoded transcript is assigned a Phred-style calibrated Q-score, ensuring confidence in the transcript's identity; final Q-scores are calibrated using built-in negative controls to ensure accurate and reliable signal confidence across the full range of raw Q-scores
- Proprietary cell segmentation algorithm trained specifically on data from the Xenium platform separately interprets boundary, interior, and nuclear channels for each cell and provides transparency on the segmentation input used
- Ability to detect transcripts with <30-nm XY localization precision and <100-nm Z localization precision
- Comprehensive and intuitive 10x Genomics Xenium Explorer software suite to analyze and interpret acquired data locally—or in the 10x Genomics Cloud, when available
- Fully portable data with open standard file formats allows scientists the freedom to use other analysis tools of their choice

References

1. Gate D, et al. Clonally expanded CD8 T cells patrol the cerebrospinal fluid in Alzheimer's disease. *Nature* 577: 399–404 (2020).

Approved patents from 10x Genomics			
U.S. Pat. 10,227,639	U.S. Pat. 11,566,276	U.S. Pat. 12,372,771	EP Pat. 4326900
U.S. Pat. 11,021,737	U.S. Pat. 11,566,277	U.S. Pat. 12,400,733	CA Pat. 2,859,761
U.S. Pat. 11,111,521	U.S. Pat. 11,639,518	U.S. Pat. 12,406,371	CN Pat. 113906147
U.S. Pat. 11,293,051	U.S. Pat. 12,188,087	U.S. Pat. 12,417,646	CN Pat. 117730161
U.S. Pat. 11,293,052	U.S. Pat. 12,234,507	U.S. Pat. 12,516,369	HK Pat. 40067204
U.S. Pat. 11,293,054	U.S. Pat. 12,258,624	EP Pat. 2794928	HK Pat. 40086703
U.S. Pat. 11,542,554	U.S. Pat. 12,319,956	EP Pat. 4108782	JP Pat. 7239465
U.S. Pat. 11,549,136	U.S. Pat. 12,360,105	EP Pat. 4107285	MX Pat. 412181

Xenium Analyzer specifications

Weight	Xenium Analyzer: ~550 lb [249.5 kg] Xenium analysis computer: ~57 lb [25.8 kg] Vibration Isolation Table: ~575 lb [260.8 kg]
Dimensions (W x D x H)	Xenium Analyzer: 52.5" [133.3 cm] x 27" [68.5 cm] x 31" [78.7 cm] (59" [149.8 cm] with door open) Xenium analysis computer: 7" [17.8 cm] x 26.5" [67.3 cm] x 18" [45.7 cm]
Electrical specifications	200–240 VAC, 50–60Hz, 6 A* *Electrical requirements dependent on region/country
Operating temperature	19–25°C (66–77°F) Use in a typical indoor laboratory environment. Extreme temperature conditions will affect the sensitive reagents used with the instrument.
Humidity	30–80% Relative Humidity (non-condensing)
Resolution	<30-nm XY localization precision and <100-nm Z localization precision.
Throughput	Analyze up to 236 mm ² per slide and up to 1,400 mm ² per week (for nuclei-based segmentation).
Sample type compatibility	FF and FFPE tissue sections
Gene expression and multiplex capacity	Currently supports detection of 50–5,000 genes, with in-line 27-plex protein detection compatible with up to 480 gene panels in human FFPE tissues.
Cell segmentation	Automated multimodal cell segmentation solution validated for human and mouse FF and FFPE tissues.

Sole Source

I hereby confirm that 10x Genomics, Inc. is the exclusive manufacturer of Xenium In Situ and the patents listed represents exemplary patents and patent applications from the 10x Genomics, Inc. portfolio.

Signed: *Niro Ramachandran*

Name: Niro Ramachandran

Title: Senior Vice President, Marketing

Date: July 8, 2026

Contact us

10xgenomics.com | accounting@10xgenomics.com

TAX ID Number: 45-5614458 | DUNS Number: 078703994

© 2026 10x Genomics, Inc. FOR RESEARCH USE ONLY. NOT FOR USE IN DIAGNOSTIC PROCEDURES.

SAM000584 - Rev L - Sole Source - Xenium In Situ Platform

