



The AVITI™ System: Always the Perfect Fit

Affordable quality at any scale, for any application

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For research use only

Founded & led by industry veterans and backed by world-class investors

Founders

Molly He, PhD – Co-founder and CEO

Mike Previte, PhD – Co-founder and CTO

Matt Kellinger, PhD – Co-founder and VP Biochemistry



World-class board & investors



John R. Stuelpnagel, DVM, MBA
Executive Chairman



Jim Tananbaum, MD

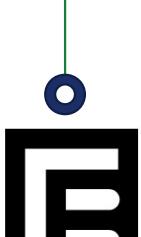


Bryan Roberts, PhD

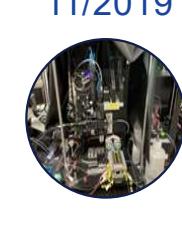


Element has gone from idea to instrument with \$400M in funding in just 6 years

Founded to Challenge the Status Quo



2017



11/2018



11/2019



07/2020



02/2021



02/2022



03/2022



01/2023



06/2023

Innovation & Rapid Iteration

Integration & Ecosystem Partnering

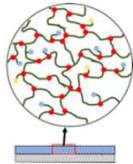
Commercialization & Expansion

First Principles Approach: Sequencing Reimagined

As of November 2022: **22** total US patents issued or allowed; **11** worldwide

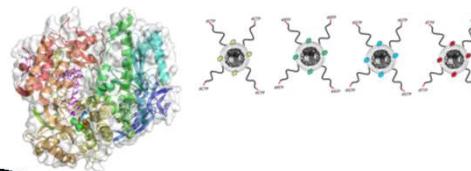
Flow Cell / Surface

Accuracy, Reagent Cost



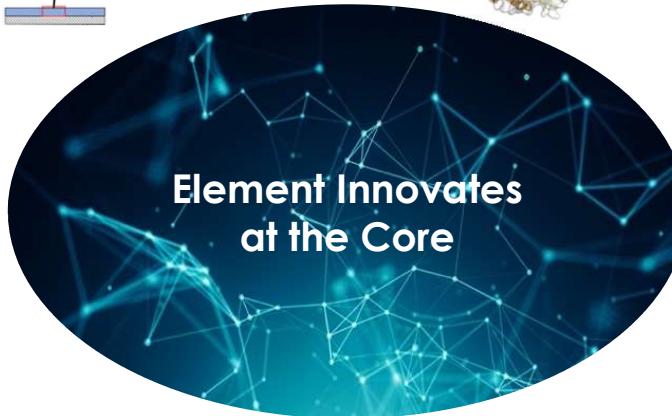
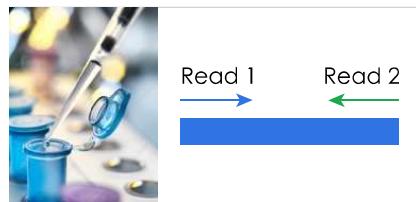
Sequencing Chemistry

Reagent Cost, Accuracy, Turnaround



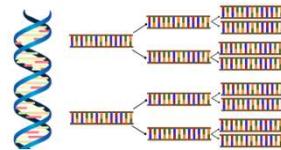
Workflow

Ease of Use, Paired End,
Low Sample Input



DNA Amplification

Ease of Use, Reagent Cost, Accuracy



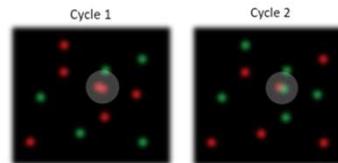
Instrumentation

Throughput, COGS Reduction



Base Calling

Accuracy, Throughput



Element is disrupting longstanding trade-offs that limit scientific creativity by offering:

-  Mid-throughput and factory scale pricing
-  Higher quality and cost savings
-  Sample multiplexing *without* index-hopping
-  Low-diversity samples *without* excessive PhiX



Take your science further, faster with end-to-end applications including bulk and scRNA, exome, and low pass sequencing

Leave no idea behind with accessible, flexible DNA sequencing.

-  >90% Q30 data
-  \$5 per Gb / \$1 per million reads
-  Two fully independent flow cells
-  300 Gb / 1 B reads per flow cell
-  Guaranteed reagent costs
-  Ecosystem compatibility



One year post launch, Cloudbreak chemistry made AVITI sequencing faster and more convenient



- 20% faster runtimes speed data return with more convenient daily and weekly run pacing.
- On instrument template circularization reduces hands on times
- Early indexing allows real time run management
- Improved accuracy at read ends increases confidence in results
- Cloudbreak maintains your lifetime guaranteed price*

Rapid Innovation in Less Than a Year With Cloudbreak

38 Hour 2x150

Save 10 hours compared to v1 chemistry

90% Q30

Highest quality desktop sequencer

Early Indexing

Index and demux report early in the run

On-Board Circularization

Eliminate additional library prep time with
Elevate

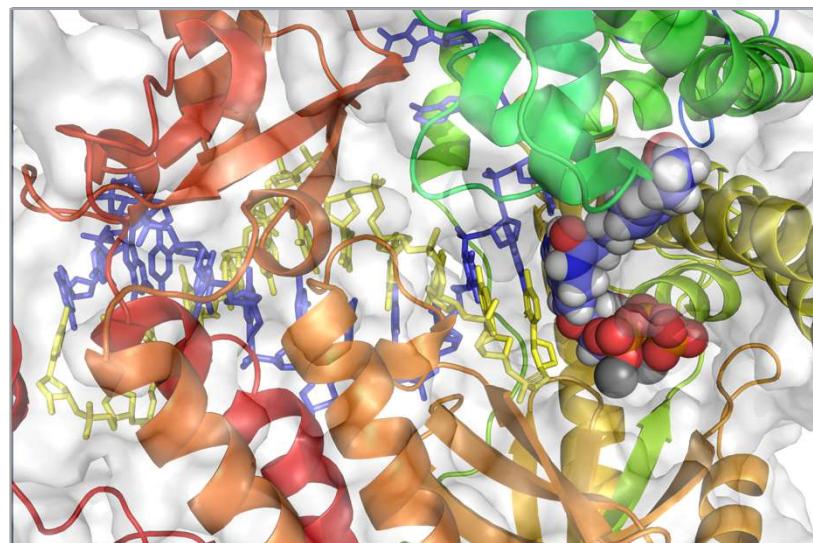
Flexibility

Run configurations to meet your time and
output needs

12mo Shelf-life

2x improvement eases inventory
management

New Enzymes



Element AVITI™ FIT

Empowering More Researchers with Flexible Genomic Solutions



AVITI

Unparalleled performance with
throughput from 100 million to
2 billion reads



AVITI LT

Lower barrier to entry with access
to industry-leading accuracy

Element AVITI™ System

Unparalleled performance and affordability in a benchtop sequencer



AVITI

- Dual independent flow cells operate like two instruments for the price of one
- Exceptional accuracy with greater than 90% of bases yielding > Q30 (2 x 150) at a fraction of the price
- Wide, dynamic output range enables cost-effective runs from 100 million to 2 billion reads on one platform
- A full complement of cycle kits enables the complete range of sequencing applications

Element AVITI™ System LT

Enabling greater access to groundbreaking sequencing technology

AVITI LT

- Dual independent flow cells operate like two instruments for the price of one
- Industry-leading accuracy with Cloudbreak™ chemistry on low- and mid-throughput flow cells
- Lower capital cost alternative with a direct path to upgrade as your science evolves



Cloudbreak™ Flow Cells Enable Any Application at Any Scale

Scale sample batching, extend read length, or run targeted panels



Low

2 x 75

Medium

500M reads



High

1B reads



Compatible
with AVITI
System

Compatible
with
AVITI LT System



2 x 150

250M reads



500M reads



1B reads



2 x 300



100M reads



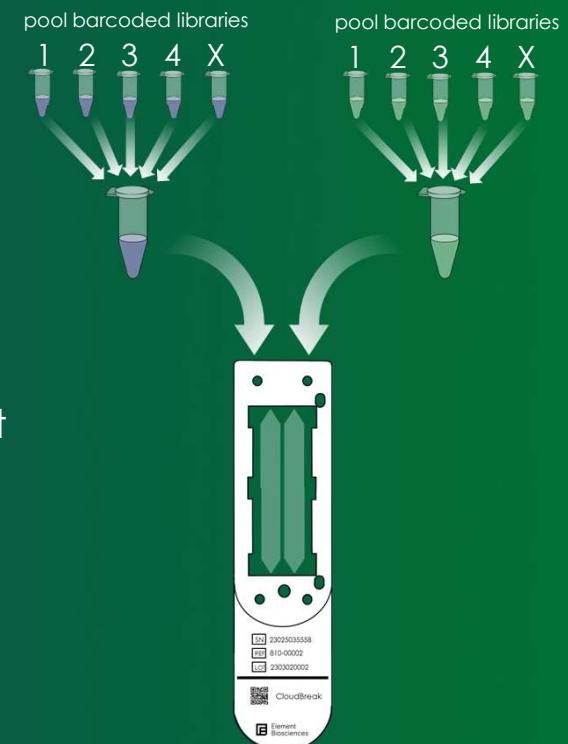
300M reads



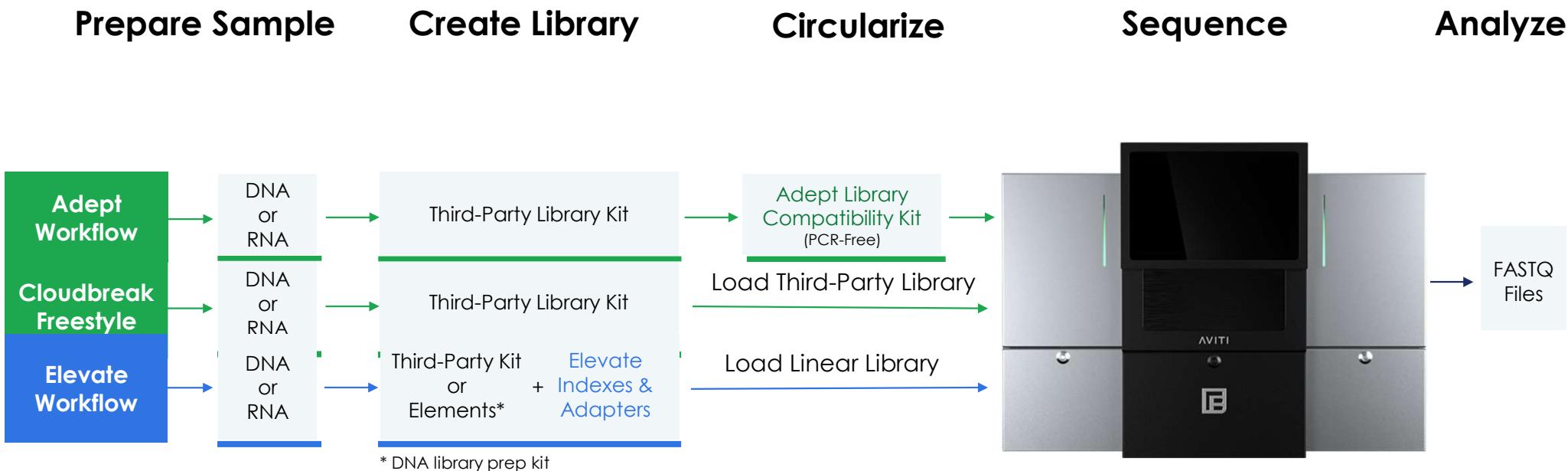
Individually Addressable Lanes

More flexibility when you need it

- Optional upgrade to enable separate libraries/pools to be loaded in each of two lanes in a single flow cell
- Increased multiplexing capabilities
- Greater flexibility for variable sample volume throughput
- Increased control of read distribution within pools
- Available for both the AVITI and AVITI LT Systems



Cloudbreak Freestyle Simplifies the AVITI Workflow Even Further



Cloudbreak Freestyle resolves the majority of circular library incompatibilities

Visit [link](#) for an overview of Cloudbreak Freestyle product compatibility

Simplification of the Sequencing Workflow with 3rd Party Library

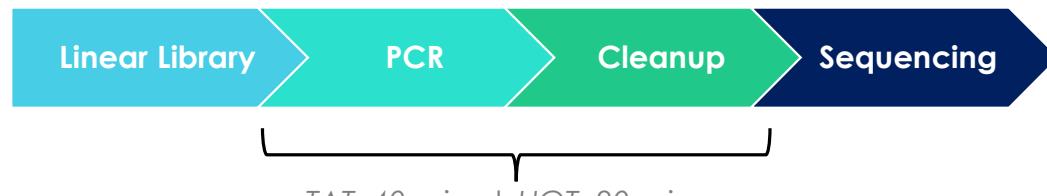
Cloudbreak Freestyle

Cloudbreak / Adept Rapid PCR-Free



On bench circularization | TAT: 40 mins | HOT: 20 mins

Cloudbreak / Adept Rapid PCR-Plus



TAT: 40 mins | HOT: 20 mins

Cloudbreak Freestyle / 3rd party library and Elevate



No additional HOT

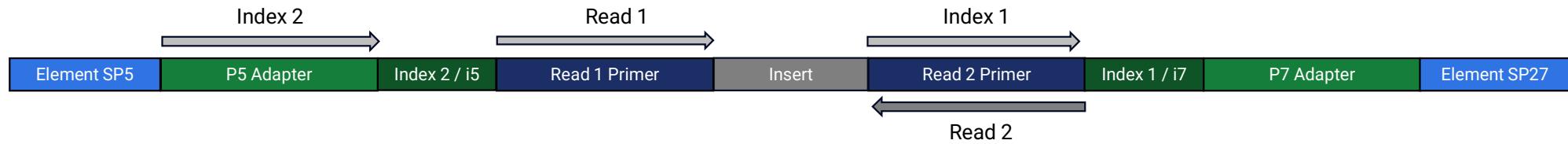
- **Streamline Sequencing with Cloudbreak Freestyle**
 - Linear library input; supporting PCR-free
 - No additional hands-on time for conversion
 - Same flow cell and cartridge combination supports all library inputs
 - High library compatibility

Adept PCR Plus output library

Third-Party Library



Adept PCR Plus Library

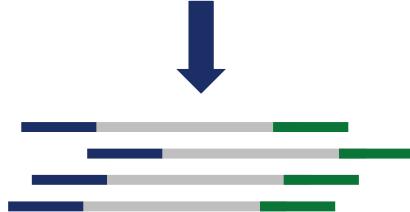


On Flow Cell Circularization

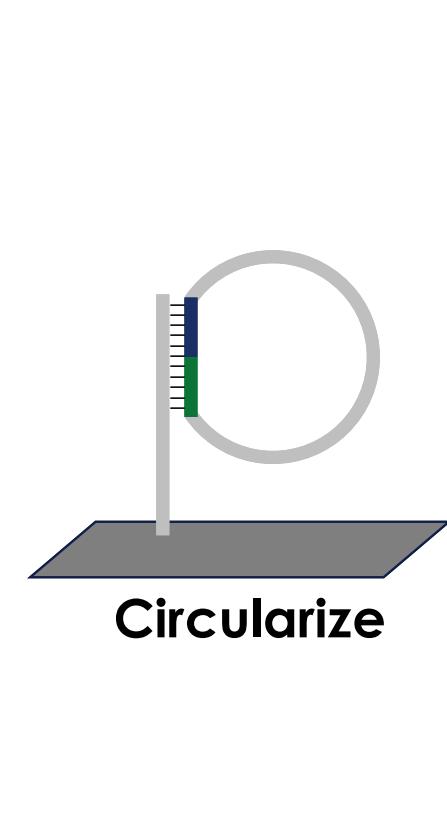
Enabled for Elevate Libraries and Adapt PCR plus libraries

User supplied

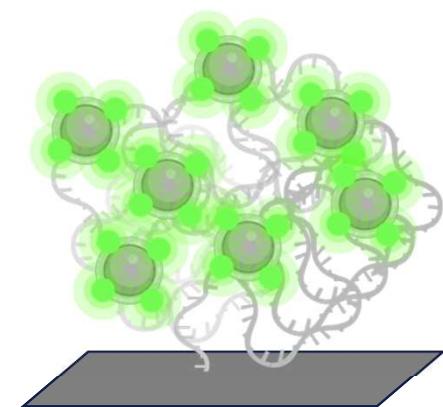
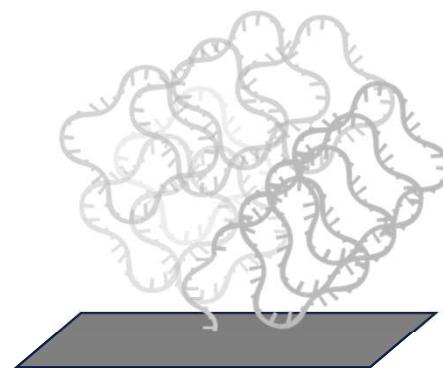
ATAC-Seq library
Adept PCR primer
Adept PCR Plus MM



Adept linear library
with Elevate adapter
ends now input to
AVITI



On AVITI



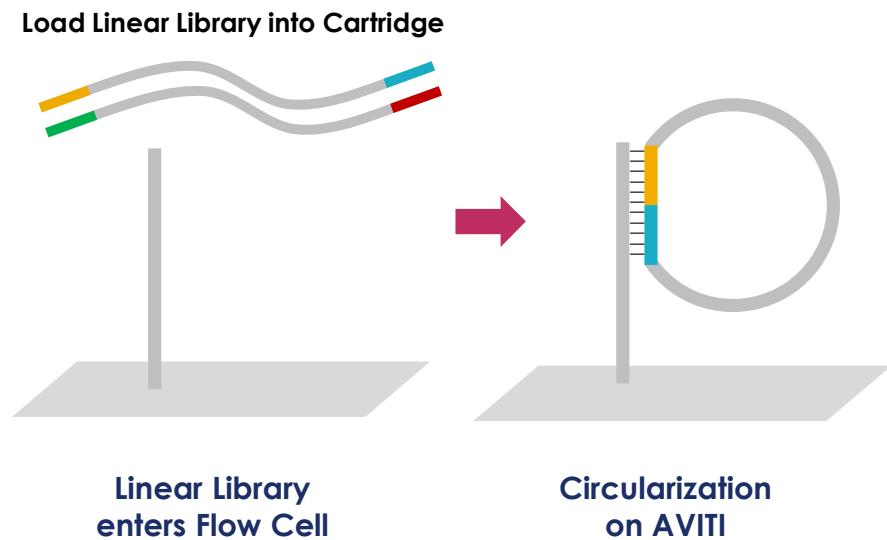
Cloudbreak Freestyle Expands Compatibility of Third-Party Libraries

Compatible

- Existing Adept Compatible Libraries
- Additional base at 3' end
 - i.e. A-Tailing Libraries
- 1 bp Truncated Adapters
- Biotin Modified Adapters

Requires Amplification*

- Bead-Based Normalized Libraries
- IDT Normalase
- Libraries that are “Bottom-Stranded”**



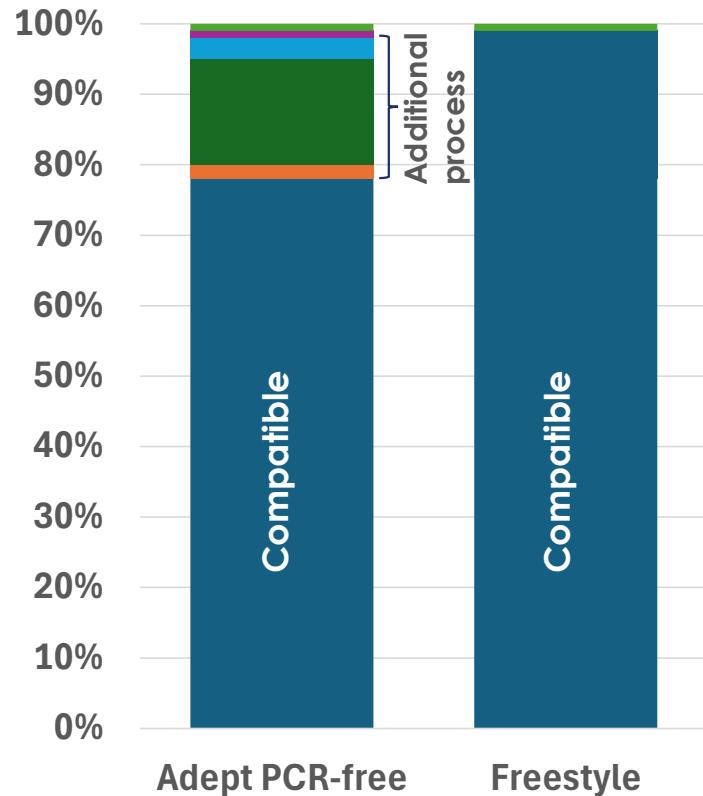
*Element Recommends 4-5 cycles of PCR using KAPA HiFi HotStart Library Amp Kit with Primer Mix (Roche, 07958978001), followed by 1X bead clean up and QC

** IDT UDI-UMI adapters when constructed in a PCR-free library prep

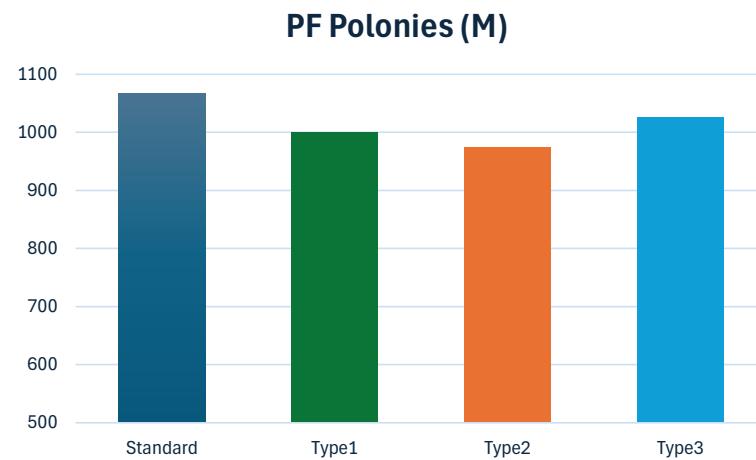
Cloudbreak Freestyle compatibility can also be found here: <https://www.elementbiosciences.com/cloudbreak-freestyle-compatibility-with-third-party-libraries>

Cloudbreak Freestyle Design – Improved Compatibility

*Library types and compatibility**



- **Improved compatibility using Cloudbreak Freestyle**



~ 1B PF polonies are achieved by directly loading linear libraries prepared from compatible and other assays, including truncated, modified, or additional bases at the ends of library, etc.

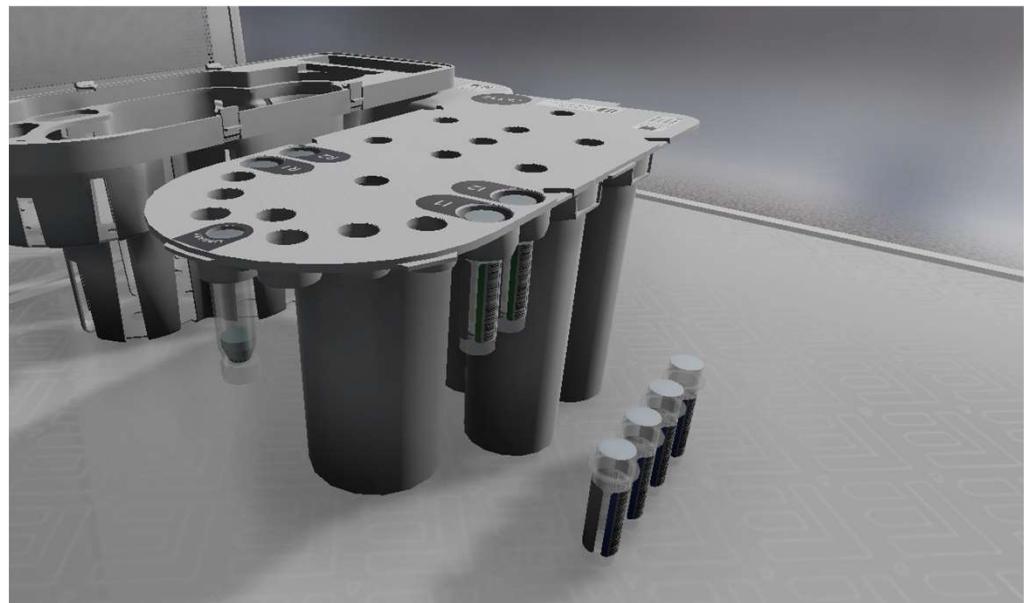
System Overview



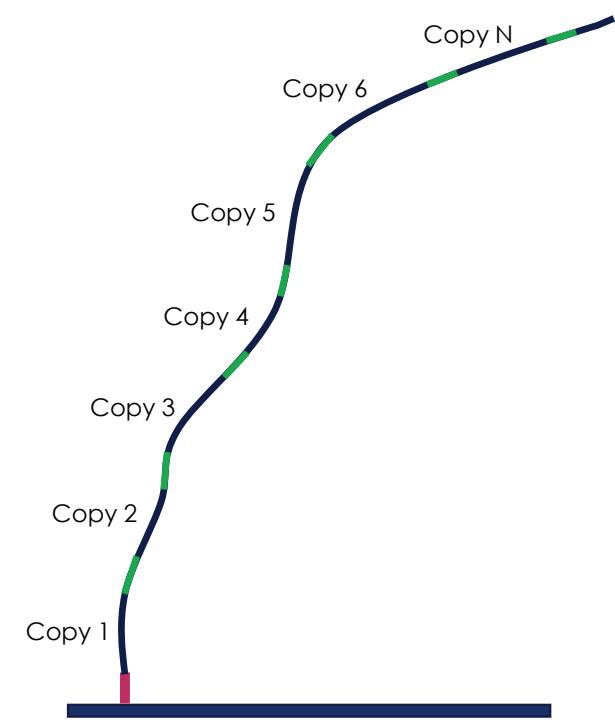
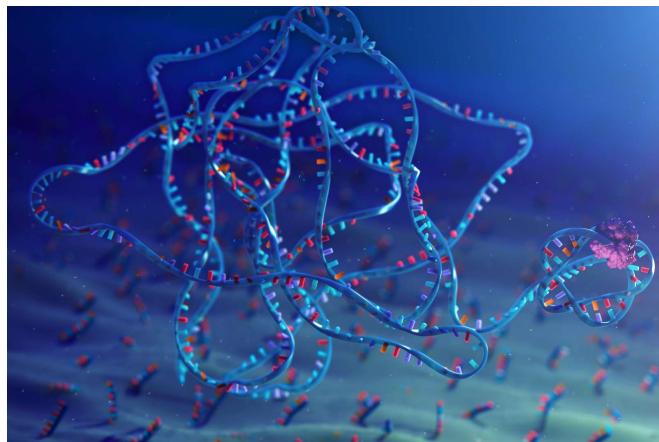
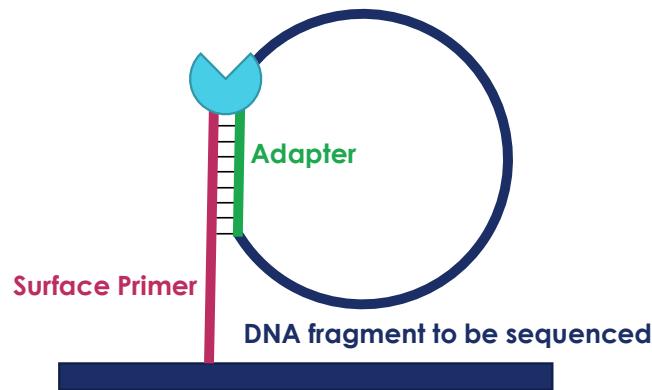
- A** Touchscreen user interface for run setup
- B** Fluidics pump bay side A
- C** Fluidics pump bay side B
- D** Flow cell nest bay
- E** Ventilated housing
- F** Two waste bottles, one per flow cell
- G** Sequencing reagent cartridge side A
- H** Sequencing reagent cartridge side B

AVITI Workflow Overview

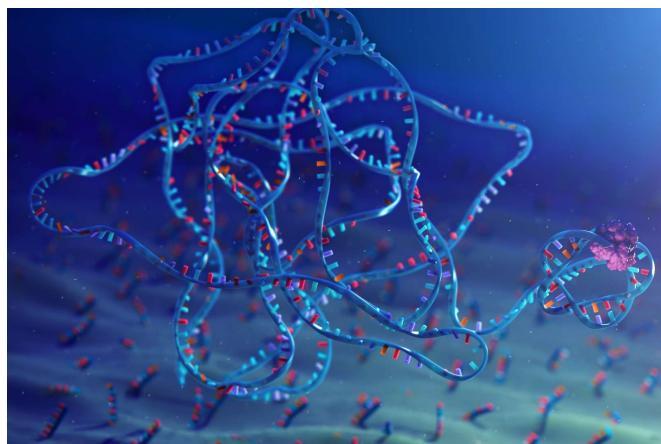
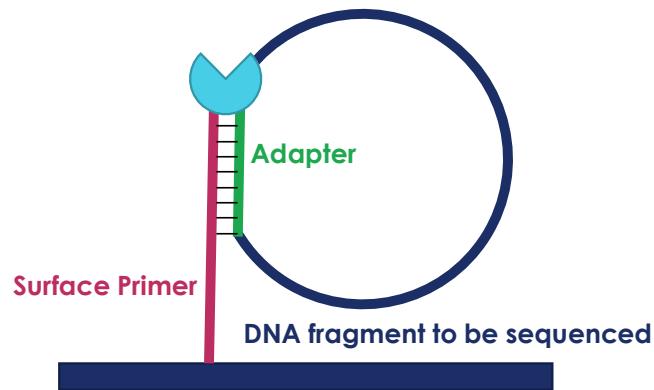
- Steps**
- 1 Prepare the sequencing cartridge
 - 2 Dilute the library and optionally spike in PhiX Control Library
 - 3 Specify the run mode and information
 - 4 Add diluted sequencing library to the cartridge
 - 5 Load the sequencing cartridge and buffer bottle
 - 6 Empty waste
 - 7 Prime reagents through a used flow cell
 - 8 Load a new flow cell onto the nest
 - 9 Review, start, and monitor the run
- Consumable Prep ● Run Setup and Sequencing



Element Workflow – Surface Amplification



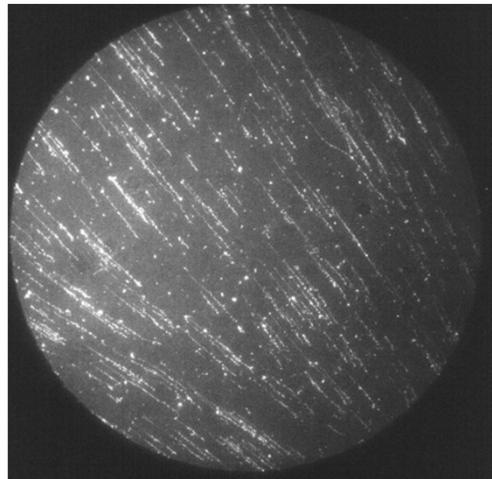
Element Workflow – Surface Amplification



10^3 copies of the substrate DNA
Very close proximity

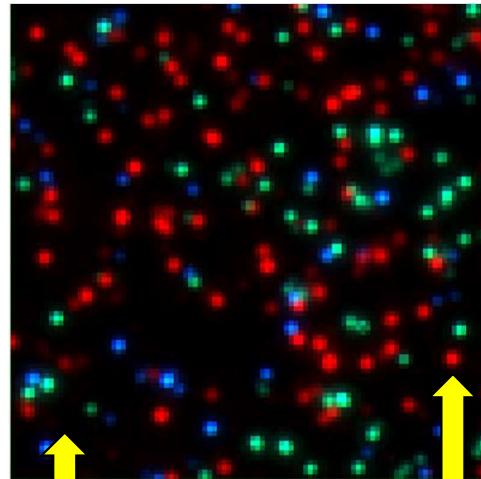
Proprietary Amplification on Low-Binding Surface

“Stretched”



Limited Throughput
Limited CNR

Element Polonies

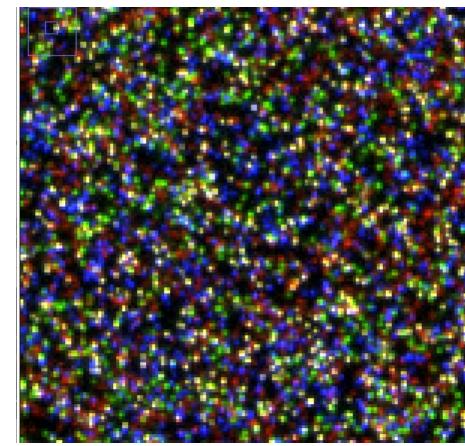
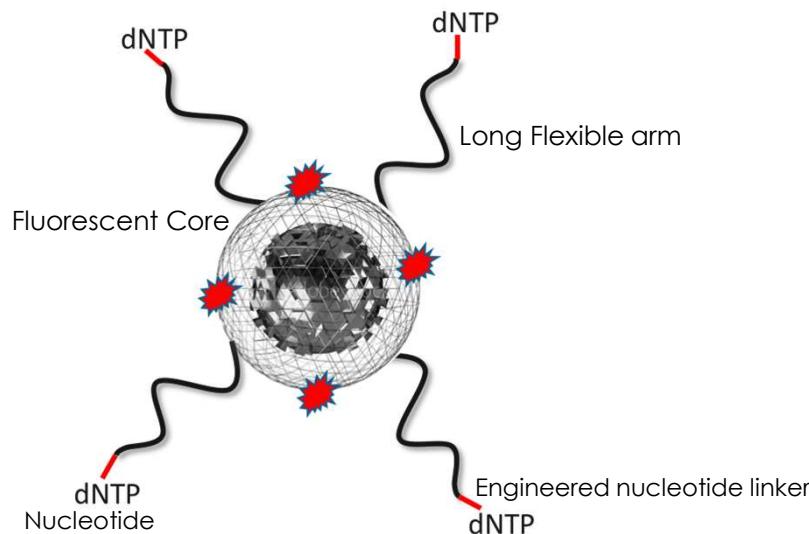
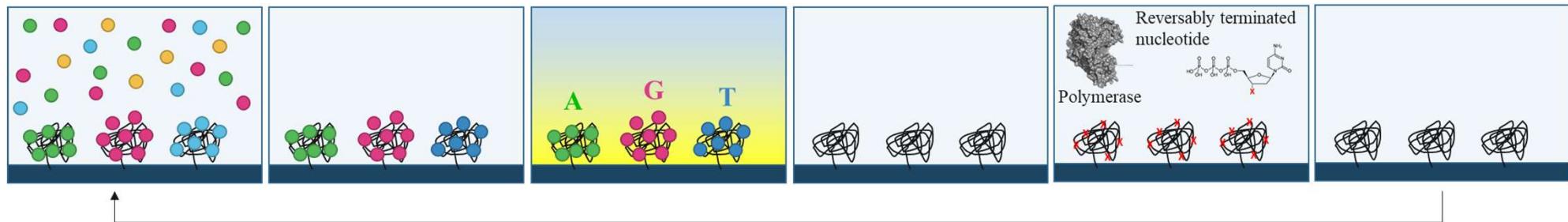


Element Proprietary
Low Background Surface
(“Night” Sky)

Element Proprietary
DNA Amplification
“Bright” Stars

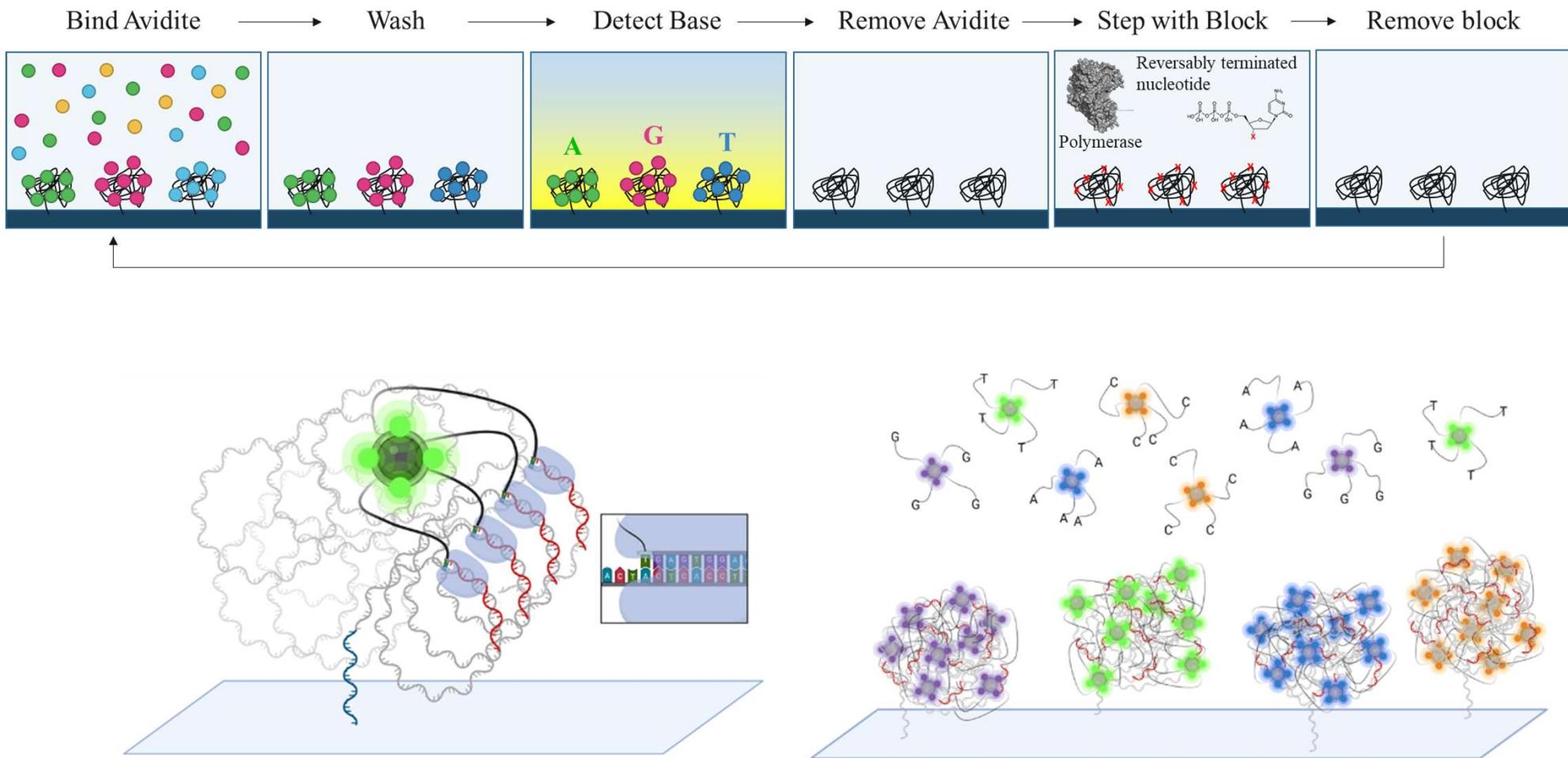
Introduction to Avidity Sequencing

Bind Avidite → Wash → Detect Base → Remove Avidite → Step with Block → Remove block

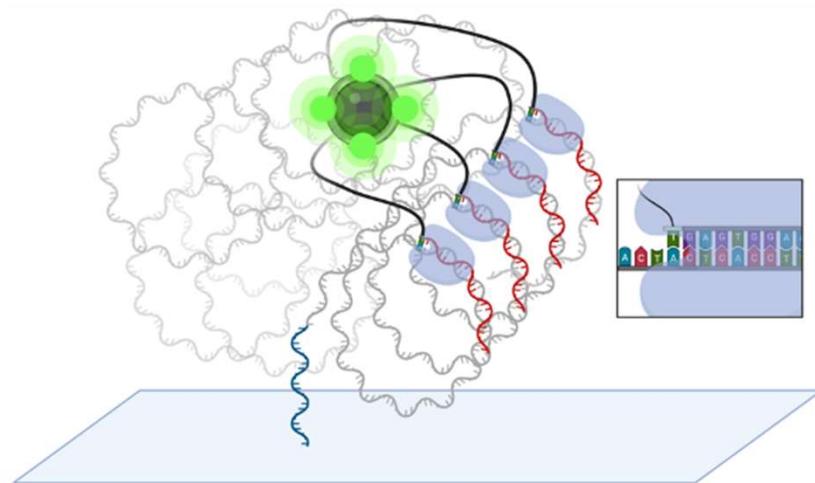
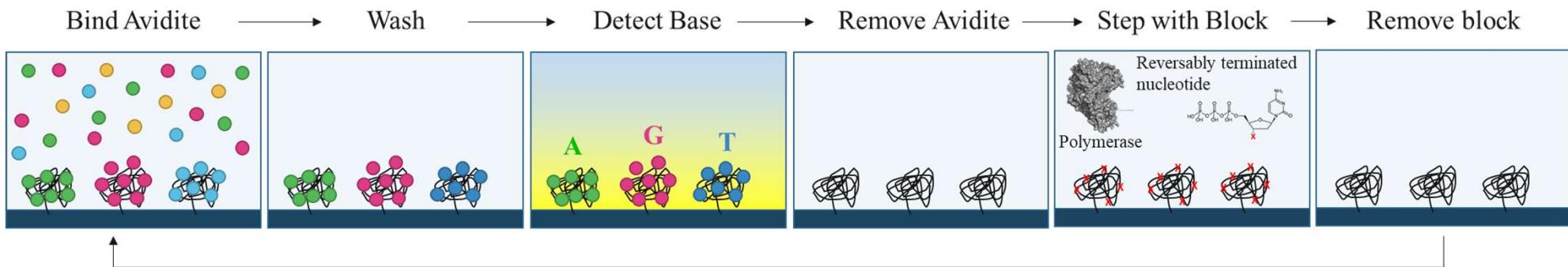


A field of monoclonal DNA colonies fluorescing due to binding of correct cognate avidite

Introduction to Avidity Sequencing



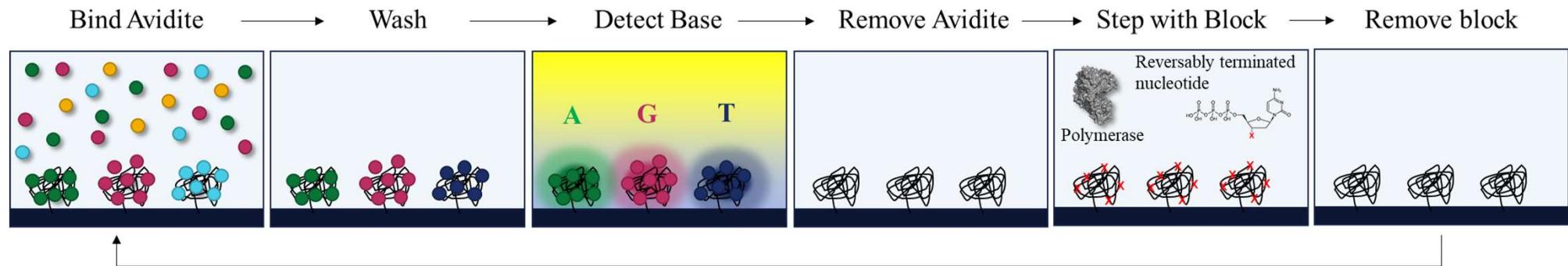
Introduction to Avidity Sequencing



Nature Biotechnology paper on Avidity Sequencing

Schematic of Element Sequencing Cycle

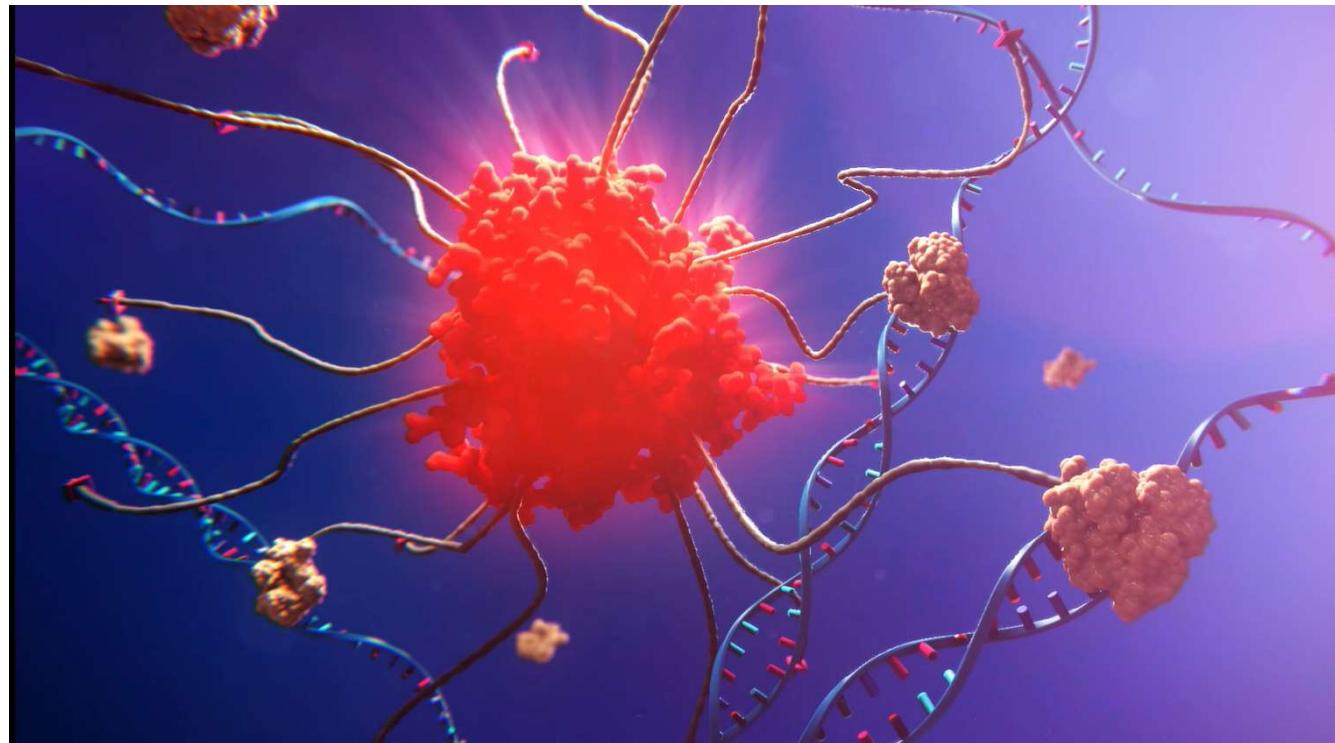
1 cycle of sequencing:



Instrument Workflow:



Avidity Detection

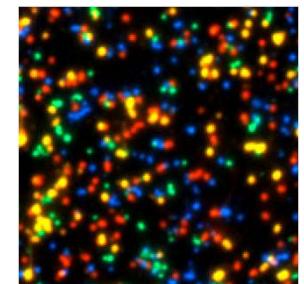


Many avidites bind to each Polony

Each avidite arm contains a nucleotide that is bounds to the polony via a polymerase

Avidite Cores contain Dyes
uses for imaging and
basecalling

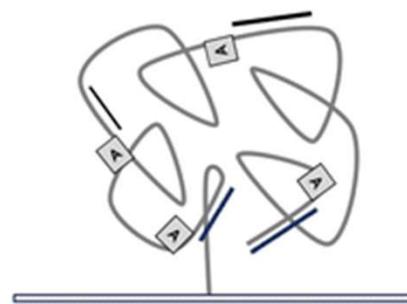
A = RED
T = BLUE
C = GREEN
G = Yellow



Element Avidity Sequencing Chemistry

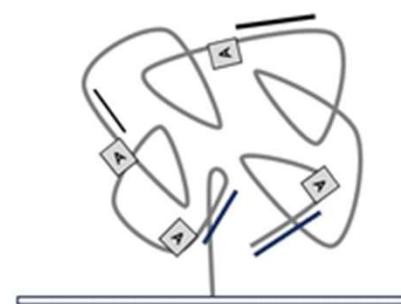
Avidity chemistry permits >100-fold reduction in reagent concentration – cost savings

Conventional NGS



Requires 1-10 μM of Nucleotides

Avidity Sequencing

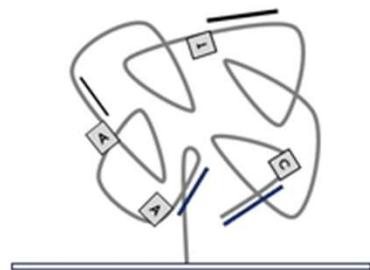


Requires 10's of nM of Avidites

Element Avidity Sequencing Chemistry

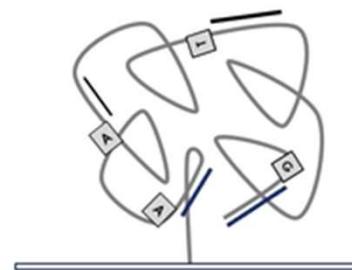
Avidity chemistry masks phasing/pre-phasing by consensus binding at multiple sites

Conventional NGS

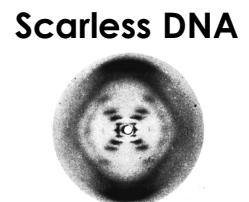


Color purity is compromised post-phasing/pre-phasing events

Avidity Sequencing



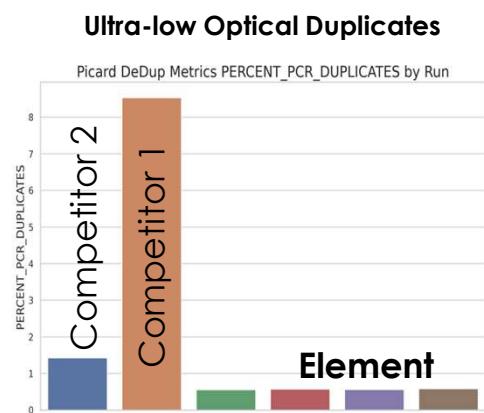
Avidity sequencing **preserves** color purity post-phasing/pre-phasing events



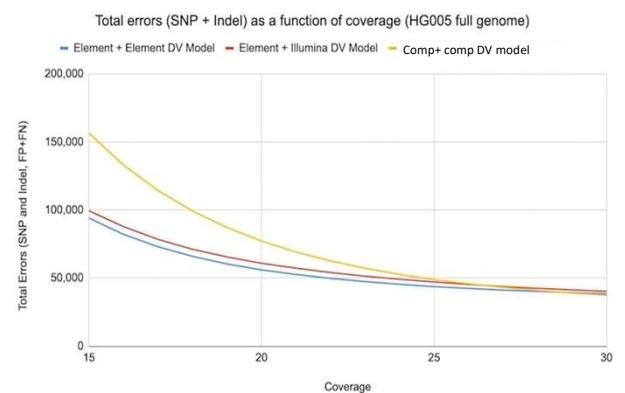
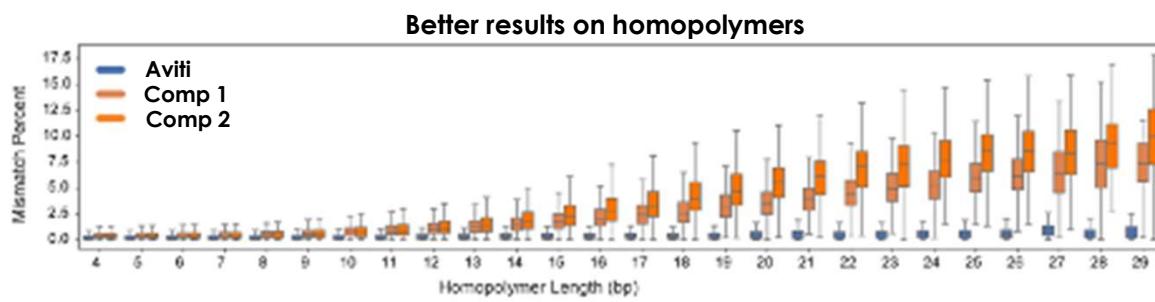
Advantages of Avidites as detection method

- Higher Specificity to pick the right base
 - Stronger binding
 - Phasing tolerance
 - Avidites Probe but do not modify
 - Lower INDEL errors
- Higher accuracy Sequencing
 - Requires less concentration = Cheaper Sequencing
 - “Cleaner” signal = Higher Accuracy
 - Scarless DNA compared to traditional SBS = Higher Quality
 - Better performance through difficult genome regions

Avidity Sequencing nearly eliminates index hopping, optical duplicates and homopolymer issues, with a decrease of systematic errors

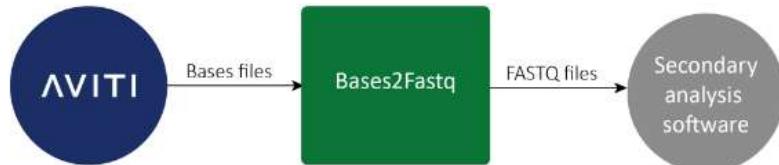


Less systematic errors allowing low coverage



Bases2FastQ

Enables easy integration with secondary analysis pipelines



Demultiplexing

The first step Bases2Fastq performs is demultiplexing. Demultiplexing identifies each sample by the index sequence added during library prep and assigns barcodes based on the sequence. If samples are not indexed, Bases2Fastq skips demultiplexing and assigns all barcodes to one sample.

Command-line arguments allow you to make the following adjustments to demultiplexing:

- Set a demultiplexing mismatch tolerance.
- Demultiplex barcodes from indexes that appear in any sequencing read.

FASTQ File Generation

The second step Bases2Fastq performs is converting the demultiplexed bases into FASTQ files. Bases2Fastq produces one FASTQ file per read (e.g., Read 1 or Read 2) per sample.

Command-line arguments allow you to make the following adjustments to FASTQ file generation:

- Trim or N-mask adapters.
- Divide FASTQ files by flow cell lane.
- Include unique molecular identifier (UMI) reads in the FASTQ file header. A UMI is a short sequence added to library molecules to improve sequencing quality.
- Generate FASTQ files using any read and any subset of cycles from the read.
- Generate FASTQ files for UMI and index reads.
- Deposit all reads that align to PhiX Control Library into an unassigned FASTQ file.
- Adopt a legacy file naming convention for compatibility with third-party secondary analysis software.

Computing Environments



Containerized



LINUX

Static Binary

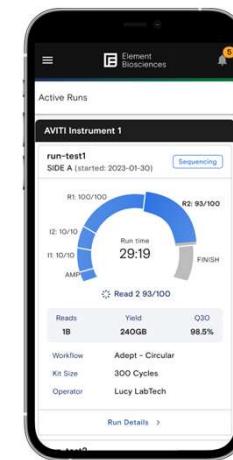
Elembio Cloud Platform: Your system, your data, your way

The screenshot displays the Elembio Cloud Platform's user interface. On the left, a dark sidebar navigation includes 'Element Biosciences' logo, 'Lucy LabTech' name, 'Runs' (Active Runs, All Runs, Run Planning), 'Connection' (Team Members), 'Analysis' (Notifications), and 'Log Out'. The main content area shows a sequencing run named 'run-test2' for 'AVITI Instrument 1: SideB'. Key sections include:

- Sequencing Overview:** R1: 100/100, R2: 100/100, I1: 10/10, I2: 10/10, Run time: 32:59, Ended 2023-01-29, AMP.
- Primary Analysis Metrics:** Reads: 1.5B, Yield: 240GB, Q30: 98.6%, Total Cycles: 300.
- Run Setup:** Workflow: Adept - Linear, Kit Size: 300 Cycles, Chemistry: Cloudbreak, Total Samples: 96.
- Latest B2F Metrics:** Assigned: 96.0%, % Unexpected Pair: 0.01%, # Samples: 90, Run Time: 45 min.

Below these are three detailed analysis sections: 'Q-Score' (Read 1, Read 2, % Q30, Avg Score), 'PhiX Error Rate' (Read 1, Read 2, % PhiX Aligned), and 'Indexing Assignment' (Perfect Match, Mismatch, % Assigned). A 'Thumbnail' section shows a flow cell image with a note about polony distribution. The bottom footer includes copyright information (© COPYRIGHT 2023 ELEMENT BIOSCIENCES Elembio Cloud UI V1.25 | API V1.00), social links (About Element, Contact Us, Twitter, LinkedIn), and legal links (TERMS OF USE, PATENTS, PRIVACY POLICY).

- Configure instruments and runs
- Monitor run progress
- Orchestrate analysis workflows
- Desktop and mobile



Integrate AVITI Into Your Data Ecosystem

Accessible, flexible, and open principles allow your data to flow where you need it

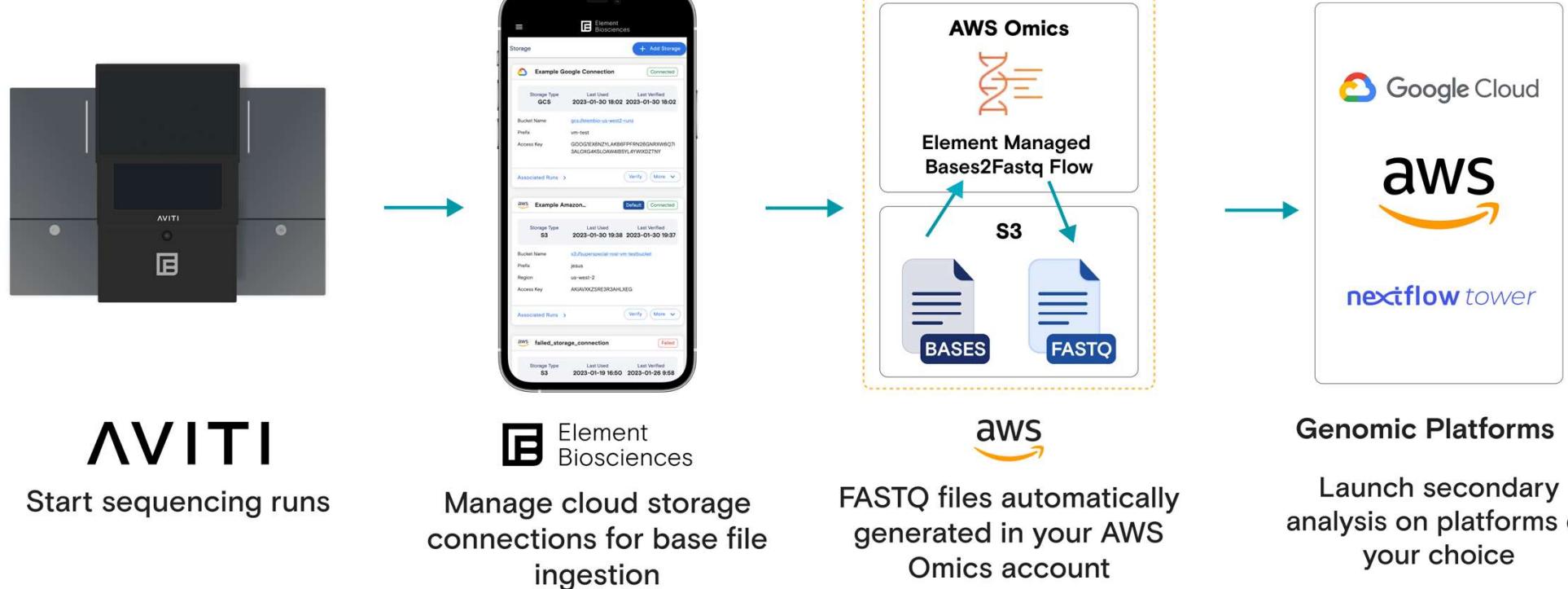


Slide 40

CH0 Removed a panel on Telemetry.

Chris Higgins, 2023-03-27T13:57:13.909

Cleanly transfer end user data with federated compute that keeps data in your environment



Our partnerships make end-to-end application workflows immediately accessible

Prepare



Sequence



WES, low-pass WGS,
RNA sequencing,
single cell genomics

Analyze



Our partnerships make end-to-end application workflows immediately accessible

Twist for Element Exome 2.0 plus comprehensive spike-in workflow

OVERVIEW ORDERING



Element
Biosciences



Element Bioscience's AVITI flexible platform. The AVITI configuration and through laboratories to avoid batch Element's Cloudbreak che need to convert linear libr

Twist now offers a complete and inclusive ex enrichment reagents for a platform. This workflow in Cloudbreak sequencing ch spiking their own content sequencing is an all-in-one sequencing.

Element Biosciences and Agilent Technologies have integrated Element's AVITI System with Agilent panels.

Element Biosciences Inc., developer of a new and disruptive DNA sequencing platform partnership with Agilent Technologies demonstrating the integration of Element's AVITI Technologies' industry-leading SureSelect target enrichment panels, providing custom genomic tools.

Target enrichment as a pre-sequencing DNA preparation method is invaluable for clinical where accuracy, cost-effectiveness, and throughput are critical. As a leader in hybrid Agilent's SureSelect sequencing panels are highly sensitive and enable detection of copy number variants, fusions, insertions, and deletions.

"Element's sequencing quality, lower duplication rates, and platform flexibility seamless used target enrichment technology. Our partnership with Agilent has validated our AVI hybrid-capture target enrichment solutions," said Shawn Levy, Senior Vice President of Affairs, Element Biosciences. "This partnership will advance target enrichment and sequencing on the AVITI system to deliver exceptional value and performance to our customers."

FEBRUARY 28, 2022 | PRESS



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Element
Biosciences



Element Biosciences Becomes the Newest Member of 10x Genomics' Compatible Partner Program (CPP) Across Multiple Single Cell Applications

Element Biosciences, Inc., developer of a new and disruptive DNA sequencing platform, today announced a partnership with 10x Genomics, a life sciences leader focused on mastering biology to advance human health, which demonstrates the seamless integration of the Element AVITI™ System and 10x Genomics' single-cell technologies.

10x Genomics' Chromium Single Cell and Visium Spatial platforms enable researchers to examine biology at true resolution, combining hardware, chemistry, and software to give single-cell and spatial views of biology at a scale and efficiency that is unprecedented. The combination of the AVITI System's performance, cost, and flexibility with 10x Genomics' leading single-cell assays provides customers with more access and choice for their biological research.

"We are excited about the partnership we've established with 10x Genomics and our new status as a validated CPP member," said Shawn Levy, Senior Vice President of Applications and Scientific Affairs, Element Biosciences. "As one of the most exciting new areas in NGS, we believe this will help bring 10x Genomics' and Element Biosciences' customers together for our combined performance and cost advantages in single-cell and spatial analysis."

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Acknowledgements



