



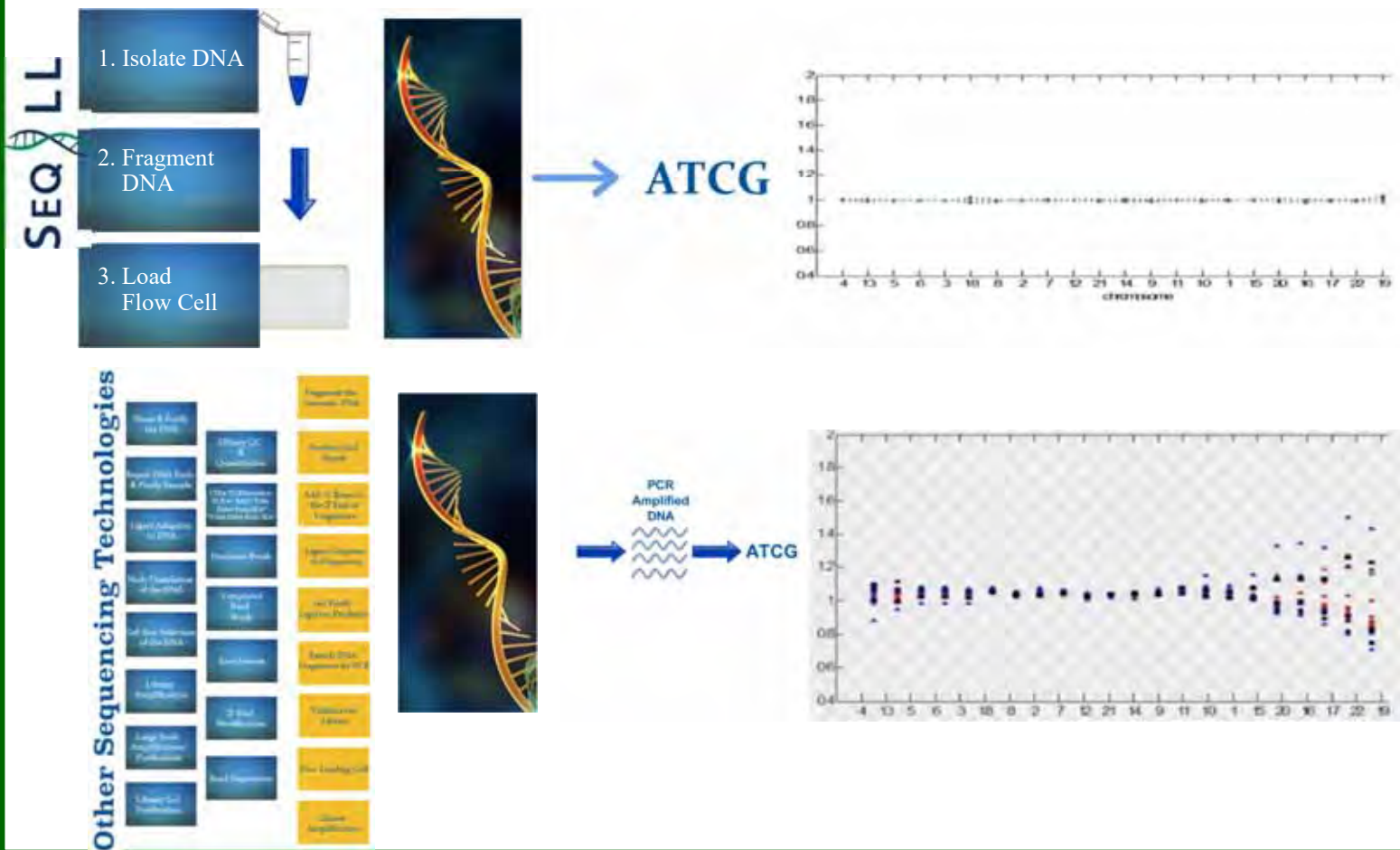
## Unbiased Quantitative RNA & DNA Specialty Sequencing Solutions

The **Heliscope** single molecule sequencer is the first genetic analyzer to harness the power of single molecule sequencing. True single molecule sequencing technology (tSMS™) enables detailed analysis and counting of molecules allowing performance of experiments with unparalleled accuracy and efficiency, free from the biases of PCR.

The tSMS Heliscope system offers critical advantages over technologies that require amplification. Detecting individual molecules gives you a direct look at your native short read RNA / DNA segments, providing greater resolution and sensitivity that other methods.



**Sample Preparation** is minimal thus avoiding the bias and errors introduced by the complex multi step procedures typically required.



**Sensitivity** - tSMS offers an unparalleled level of sensitivity as single molecules are identified and synthesized without having to resort to bias based amplification. This translates in many applications to being able to obtain accurate information earlier and allow treatments or decisions to be made sooner.



**Accuracy** - True single molecule sequencing provides an accurate set of data and results as well as a broader range of molecules to be evaluated. Low expressing transcripts and certain constructs are typically masked due to preferences in any amplification process and may be missed or have their numbers minimized in the final data analysis.



**Simplified Sample Prep** - reduces the hands on and linear time required to carry out a dozen of steps utilizing multiple technologies. A truer picture is also obtain of the molecules being studied as each prep step has inherent losses and biases. Direct RNA synthesis DRS, Direct capture and RNA Seq protocols reduce sample prep to 1-3 steps.



**Sample Accessibility** - increases as tSMS technology can address a wider range of degraded and damaged molecules.



**Rapid Protocol Development** - extensive library preparation is not required using tSMS for short read evaluation. This reduces the time required and adds to accuracy by eliminating library bias.



**Quantitative Capabilities** - are increased as single molecules can be evaluated and counted accurately.







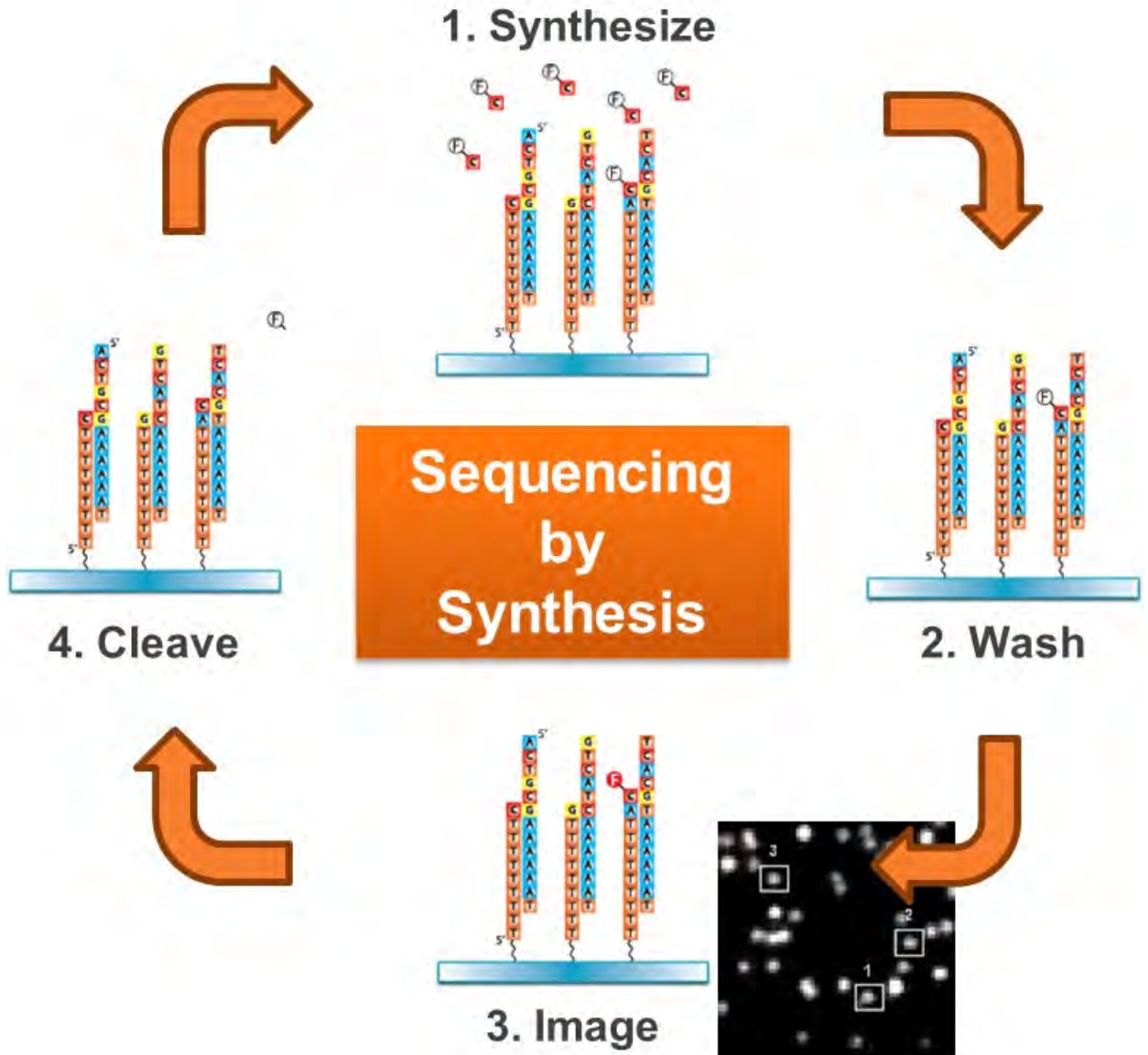
# What is tSMS Technology

The tSMS technology accurately interrogates billions of single strands of RNA or DNA in parallel by directly detecting single nucleotide incorporations on each of the single strands

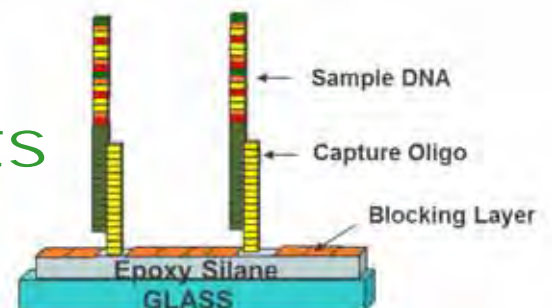
PolyA tails are appended to sample DNA and used to capture samples onto a surface within the flow cell.

Fluorescently labeled nucleotides (C, G, A, T) are added one at a time via our sequencing-by-synthesis process.

Thousands of images are taken across the flow cell surface after each base incorporation. The images track the nucleotide on each strand and are used to determine the exact sequence of each individual DNA molecule.



## Active Surface Components

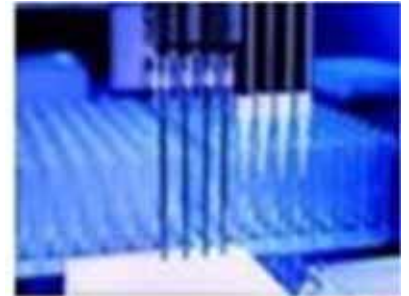


# System Components

To achieve its breakthrough performance and simple operation, the Sequencer integrates a number of advanced technologies and innovative solutions:

**Touch Screen Monitor and Graphical User interface** provides an intuitive work flow drive operation allowing the user to easily define, launch and monitor a run.

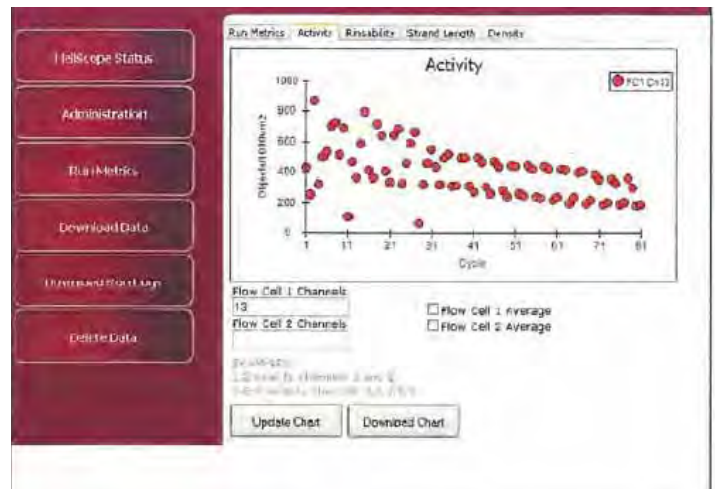
**Innovative Fluid Delivery System** has precision controlled reagent mixing optimizing the tSMS chemistry, enabling efficient strand synthesis and detection of base incorporation throughout the run.



**Advanced Optics Design** combines solid state lasers and cameras with a high speed thermally controlled stage and optics for accurate, repeatable positioning, producing the highest images for your single molecule sequencing experiment.

**Real Time system monitoring and Alerts** track key run metrics, including reagent levels, temperature, pressure and other critical operating parameters. All metrics are recorded to a run log file for quality control and auditing.

**Remote Monitoring** is supported via a web application that allows monitoring and administrative capabilities to manage security, define and change run parameters, download data and obtain run status from experiment in progress in real time.



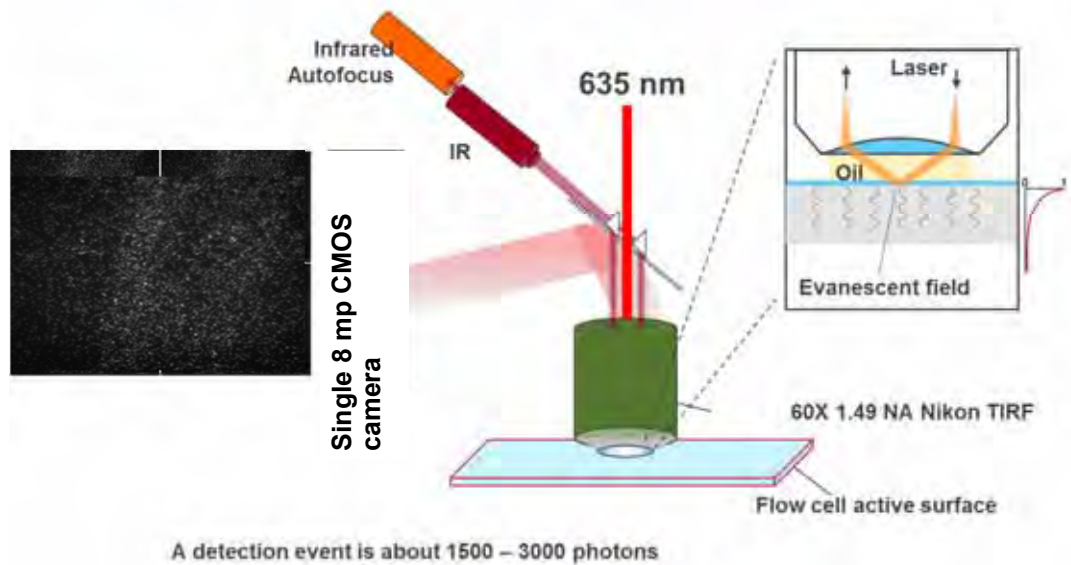
**Heliscope Sample Loader** - performs the operations required to prepare precision flow cells for sequencing, including re-hydration, sample loading, hybridization and washing steps. The benchtop system has individually addressable channels that enable loading and hybridization of up to 25 discrete samples per flow cell.



As the system can run two flow cells, both can be prepared in parallel to ensure uniform process conditions and consistency.



# Signal Detection & Image Formation



## Routine Usage Specifications

<b>Strand Output</b>	600M to 1 B strands per run 12M to 20M usable strands per channel
<b>Total Output</b>	21 to 35 gigabases per run 420 to 700 megabases per channel
<b>Read Length</b>	20 to 55 bases in length 35 base average
<b>Accuracy</b>	>99,995% consensus average at 20X Coverage
<b>Raw Error Rate</b>	Substitution: 0.2% Insertion: 1.5% Deletion 3.0%
<b>Template Size</b>	20 to 8,000 bases
<b>% GC coverage</b>	<20% coverage variation for 20 - 80% GC ( <i>E. coli</i> )

## System Specifications

<b>Catalog #</b>	30000
<b>Dimensions</b>	30"(76 cm) x 30" (76 cm) x 60"(153 cm)
<b>Weight</b>	1,000 lbs (455 kg)
<b>Power</b>	220 VAC, single phase, 20 AMP, 50/60 Hz, NEMA L6-20R receptacle.
<b>Environmental Operating Temp:</b>	15° C to 31° C; up to 90% RH; non-condensing; Temperature +/- 2.5° C

## Instrument Configuration

<b>Flow Cells</b>	1 or 2 flow cells processed simultaneously 12 or 25 independent flow channels / flow cell
<b>Sequencer Throughput</b>	>1 gigabase per hour



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