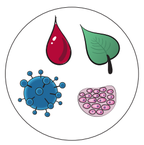
SMRT Sequencing – How it Works

PacBio Systems are powered by Single Molecule, Real-Time (SMRT®) Sequencing, a technology proven to produce exceptionally long reads with high accuracy.

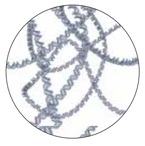
SMRT Sequencing allows you to accelerate your science with the complete range of PacBio applications to produce data you can trust.

SMRT Sequencing Advantages

- Long Reads
- Uniform Coverage
- Epigenetics
- High Accuracy
- Single-Molecule Resolution



From viruses to vertebrates

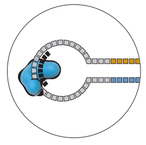


Isolate DNA or RNA

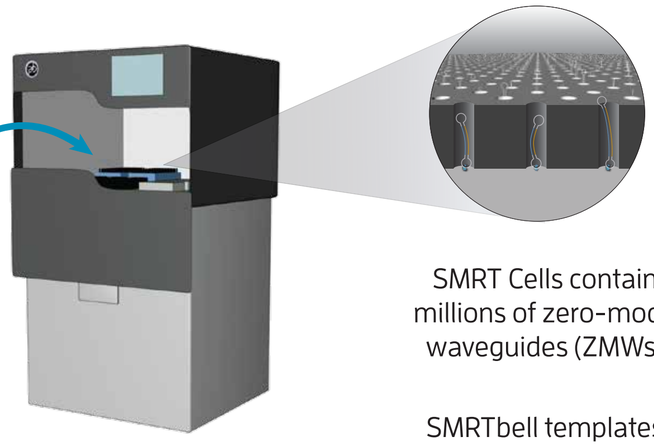
Ligate adapters +

Generate SMRTbell® libraries

+ Primer & Polymerase



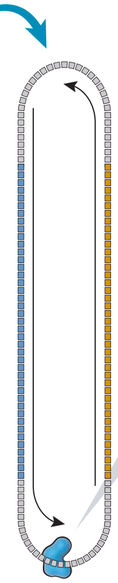
Prepare sequencing reaction



Use PacBio Sequel® Systems to sequence genomes, transcriptomes, and epigenomes

SMRT Cells contain millions of zero-mode waveguides (ZMWs)

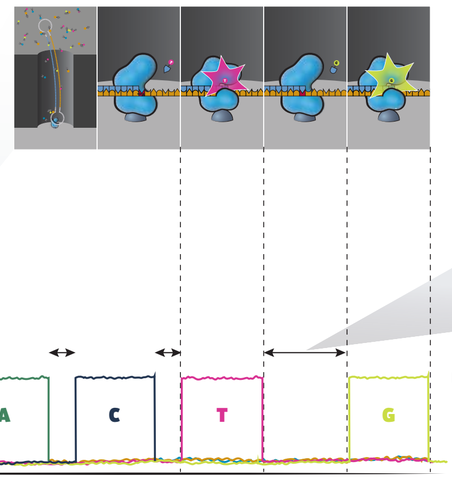
SMRTbell templates enable repeated sequencing of circular template with real-time detection of base incorporation



Single-Molecule Resolution

A single molecule of DNA is immobilized in each ZMW

+ Phospholinked nucleotides



As anchored polymerases incorporate labeled bases, light is emitted

Epigenetics

Directly detect DNA modifications during sequencing

Nucleotide incorporation kinetics are measured in real time

Long Reads

Long reads span large regions for improved assembly, variant detection, and haplotype phasing

Polymerase read

Sub reads

High Accuracy

Calling consensus from subreads increases accuracy

Highly Accurate Long Read

Uniform Coverage

Uniform sequencing coverage through low-complexity regions with no amplification bias

SMRT Sequencing enables the full spectrum of PacBio applications

- WHOLE GENOME SEQUENCING
- VARIANT DETECTION
- TARGETED SEQUENCING
- RNA SEQUENCING
- COMPLEX POPULATIONS
- EPIGENETICS

Accelerate Your Science

Improve human health

Propel agricultural advancements

Generate new biological insights