# Adaptive Focused Acoustics: The One Solution for all shearing needs

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Covaris®
the sample prep advantage™

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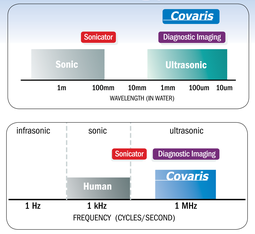
## Overview

- The Covaris Adaptive Focused Acoustics (AFA) technology enables unprecedented control of a critical preparatory step for Next Generation Sequencing.
- The development of validated clinical applications requires high recovery, high reproducibility, and automation capabilities.
- As the resolution of the genomic analytical techniques increases, the importance of a primary DNA shearing not introducing bias becomes critical.
- The core Covaris process was designed for process control.

## Adaptive Focused Acoustics™(AFA) Technology

Covaris' patented Adaptive Focused Acoustics (AFA) technology evolved from highly developed therapeutic lithotripsy (such as kidney stone treatment) and *in vivo* diagnostic imaging (cardiac monitoring). AFA works by sending high frequency acoustic energy waves from a dish-shaped transducer to converge in a small localized area creating a zone of precisely controlled kinetic/mechanical energy. Conventional low frequency (20kHz) sonicators have longer wavelengths (~10cm), than the Covaris acoustic transducer which operates at 500kHz with a wavelength of ~1mm.

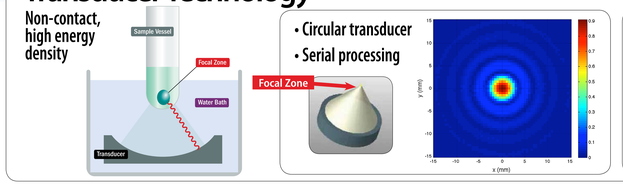



This enables the acoustic energy to be applied to samples in **closed tubes** in a **non-contact** and **isothermal** mode, avoiding both contamination and thermal energy sample degradation.

With these unique design features, highly precise, and highly accurate control is obtained with the Covaris technology, unobtainable with other acoustic-based technologies, such as low frequency, unfocused probe and water bath sonicators.

## Transducer Technology

Non-contact, high energy density




## Instruments

The **Covaris S-series** are single sample processing instruments.

The **Covaris E-series** are multi-sample preparation instruments capable of batch processing 1 to 96 samples in a walk-away fashion. They process up to 96 microTUBEs or up to 24 miniTUBEs in specially designed racks.

The **Covaris L-series** are similar to E-series, but allowing parallel processing of the samples for higher throughput.

**Sample processing settings are transferable between all the instruments.**

### S-series

- Manual
- Single
- Circular transducer
- Single sample processing

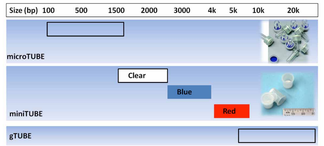
### E-series

- Automated
- Batch
- Circular transducer
- 24 to 96 sample processing
- Compatible with robot integration for full automation

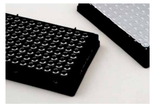
### L-series

- Linear transducer
- Highly uniform field along a row treats a full 96-w plate 8x faster, (384 plate > 32x faster)

## Supplies—Covaris consumables, specially designed to optimize AFA process




**Covaris 96 microTUBE Plate**
for automation friendly batch processing



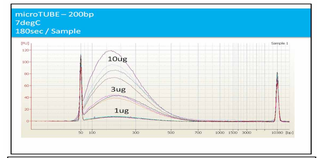
**Covaris Reagent Kits** *AFA optimized*
for easy and consistent Chromatin shearing

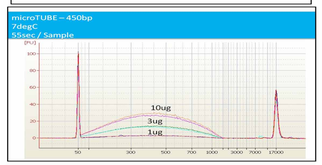
1. Non-ionic detergent
2. SDS buffers
3. TissueChIP

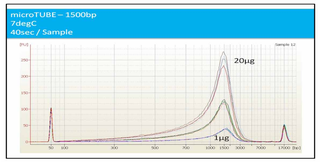
## DNA shearing (100bp - 1.5kb) microTUBE with AFA fiber

**Optimized for inertial cavitation**

- Tube propagates and focuses acoustic energy
- Fiber helps nucleation
- Glass for low impedance transmission of energy
- High energy process/ millions of bubbles collapse
- Shear DNA down to 100 bp one magnitude faster than other technologies



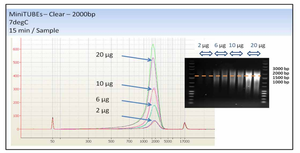



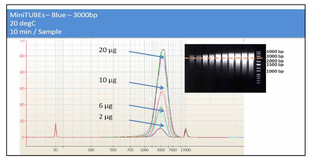



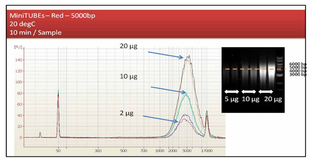

## DNA shearing (2, 3, & 5 kb) miniTUBE with textured AFA surface

**Optimized for non-inertial cavitation**

- Textured surface allows control of non inertial cavitation
- Generate microstreaming
- Each different miniTUBE, with a different textured surface, has a different shearing rate
- Gentle shearing for large fragment shearing (2-5kb)



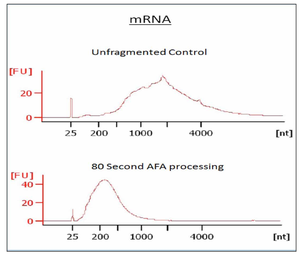



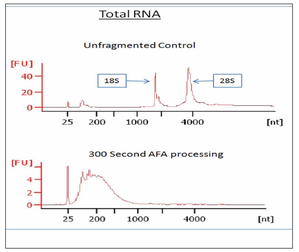




## RNA shearing (200bp) microTUBE with AFA Fiber

**Optimized for inertial cavitation**

- Tube propagates and focuses acoustic energy
- Fiber helps nucleation
- Glass for low impedance transmission of energy

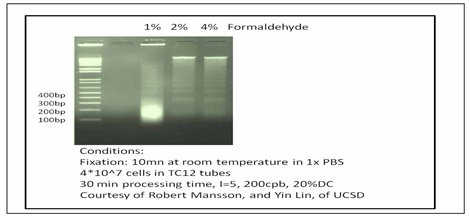


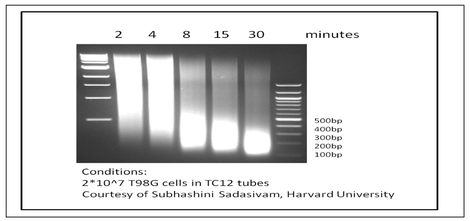

## Chromatin Shearing (200 bp) 12x24 AFA tubes

Chromatin Immunoprecipitation (ChIP) has become a powerful tool for evaluating *in vivo* interaction of proteins with specific genomic DNA regions and plays a crucial role in helping to better understand the mechanisms of gene regulation, DNA replication, and DNA repair.

Due to the increased sensitivity of applications utilized post-ChIP, and the desire from researchers in obtaining more statistically significant quantification of the results, the need for a gentle yet more efficient method of chromatin shearing has increased.



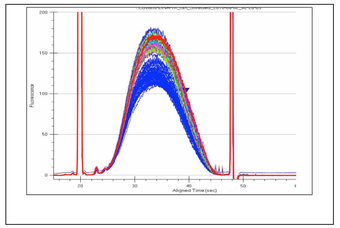

A fixation time course optimization is advised to ensure efficient chromatin shearing and high IP efficiency.

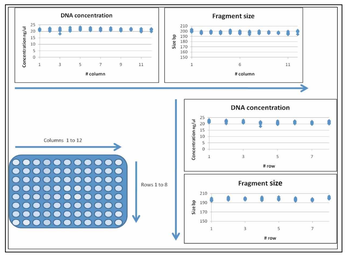



Controlled chromatin shearing is essential in obtaining the desired size range of fragments required by your application, without sacrificing the integrity of your epitope.

## DNA shearing in 96 microTUBE plate - automation friendly

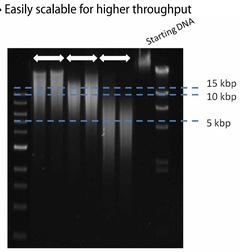
- Fully compatible with most pipetting robots on the market
- Especially designed for LE220, compatible with E-series
- Highly consistent treatment for all the samples in all wells






## DNA shearing in gTUBE

- New generation of tube specially designed for large DNA fragments shearing
- High speed process (less than 2min per sample)
- Easily scalable for higher throughput




DNA shearing with different parameters in gTube
Mouse Genomic DNA at 50ug/ml

## According to Current Users, Covaris is:

1. Reproducible
2. Precise
3. High Recovery
4. Outstanding DNA integrity
5. Economical: One Instrument instead of two
   a. HydroShear plus Nebulizing
   b. HydroShear plus Sonication
6. Breadth of fragment size output
7. No Cross-Contamination
8. Rapid: Higher Throughput/Shorter turn-around
9. Flexible
   a. Source Independent
   b. Broad Range of DNA input quantity
   c. Output of fragment size
10. Reliable

***" We have seen up to 20% more of the genome with a Covaris than with a sonicator"***

## Key Features

- Isothermal processing
- Non contact / closed vessels
- Precisely controlled energy delivery
- Automation ready
- Scalable process
- Broad sample volume/ concentration range
- Used by major genome centers

## Benefits

- No heat damage
- High recovery
- No cross contamination
- No clean up
- Standardized
- Highly reproducible process
- Validated, proven technology

***One instrument for multiple applications***