
# DNA Sequencing with Piezoelectric Nanopore

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**The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing DNA and protein sequencing devices, such as nanopores, that use piezoelectric changes in nanopore diameter to achieve better resolution and enhance sequencing speed.**

## Overview

'Nanopore sequencing' holds the potential for sequencing a single molecule of DNA without the need for conventional tools like chemical labels or costly optical instruments. This promising method uses a voltage, thermal or concentration gradient to drive DNA strands and a stream of ions through a nanoscale pore in a device. Each nucleotide base of the DNA strand (A, T, C or G) passes individually through the pore and obstructs the flow of ions to a different, characteristic degree.

Ideally, measuring such changes in ion flow would enable the DNA strand to be sequenced one base at a time. However, these electrical fluctuations are very small and rapid. Existing devices do not have the resolution to deliver very reliable measurements.

## The Invention

UW–Madison researchers have developed a method for adjusting *in situ* the diameter of a nanopore used in a DNA sequencing device via piezoelectric tuning. The ability to control pore dimensions helps control the speed of the material passing through.

The substrate of the device is made of a piezoelectric material like quartz, which physically strains in response to an electric field. The substrate is positioned between reservoirs of conductive fluid and forms a nanoscale opening for DNA and ions. When an electrical signal is applied by a pair of electrodes on either side, the diameter of the opening changes due to piezoelectric shear strain. This constriction slows the passage of DNA through the pore long enough to identify one nucleotide at a time.

## Applications

- Developing new nanopore-based DNA sequencers

## Key Benefits

- More sensitive – allows measurement of each base by *in situ* 'grabbing' base pairs
- Overall more efficient, since speed can be controlled for one base at a time
- Reduces costs
- Moves technology closer to replacing extant sequencing tools

## Publications

- Stava E., Yu M., Shin H. C., Shin H., Kreft D. and Blick R. H. 2012. Rapid Fabrication and Piezoelectric Tuning of Micro- and Nanopores in Single Crystal Quartz. Lab on Chip. DOI: 10.1039/C2LC40925A

**Tech Fields**

- Research Tools : Genomics & proteomics

For current licensing status, please contact Jennifer Gottwald at jennifer@warf.org or 608-960-9854