# Electrostatic Control of DNA Melting Temperature

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- Biotechnology

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- Assays
- Biochemistry
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- Biomarkers
- Biosensors
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- Chemistry and Chemical Analysis
- DNA
- DNA & RNA Tools
- Genetic Sequencing
- Genetics
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Much of modern molecular biology is founded on polymerase chain reaction (PCR) technology. PCR-based methods are used in DNA fingerprinting, cloning, phylogenetics, mutagenesis, analysis of gene expression, and numerous other biological studies. In traditional PCR, double stranded DNA is melted at high temperature, annealed at a lower temperature with short complimentary "primer" DNA, and copied by a polymerase enzyme starting at the primer. The cycle is repeated to generate a suitable amount of DNA for further use. PCR is still typically carried out by thermal cycling and still carried out in sealed tubes or sometimes within oil droplets to combat evaporation.

Purdue University researchers have developed a technology that will allow PCR to be accomplished in sub-nanoliter-volume, oil-free droplets at a lower temperature. Positively-charged magnesium ions are typically included in a PCR reaction to stabilize the negatively-charged DNA. As opposed to melting DNA with heat, the Purdue researchers' technology applies an electrical bias to the droplet. The magnesium ions migrate towards the electrodes, and DNA is destabilized because the effective magnesium concentration is reduced. This technology can facilitate a lower-temperature, ion-controlled PCR reaction. Furthermore, the technology should also prove useful in related applications that rely on ion concentrations.

Advantages:
-Strengthens the interaction between analyte molecules and receptors
-Does not require high temperature to melt DNA

-Improves upon several biochemical sensing technologies

Potential Applications:
-Early disease detection
-Isoelectric protein separation
-DNA related applications

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**Intellectual Property:**

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