

# Single-Nucleotide Polymorphism Detection Based on a Temperature-Controllable Electrowetting on Dielectrics Digital Microfluidic System

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To use efficiently a digital microfluidic system with an electrowetting on a dielectric (EWOD) technique to detect a single-nucleotide polymorphism (SNP) in a specific gene sequence, we designed microheaters on the cover of an EWOD chip for temperature control of a bioreaction. The droplets on an EWOD chip were actuated with addressable electrodes. Multiple bioreagents such as DNA, micromagnetic beads, and buffer droplets have been manipulated using the EWOD system. Magnetic beads (MBs), whose magnetic property enabled them to be collected and purified with an applied magnetic field, were used to detect an SNP in a specific gene sequence. The microheaters were fabricated on a glass substrate with Pt deposition. After designing the heater circuit, the top plate was constructed with a bottom chip to complete the packaging of a temperature-controllable EWOD system. These microheaters in an EWOD system can provide an appropriate temperature for DNA ligase in experiments to detect an SNP. The temperature-controllable EWOD digital microfluidic system detected an SNP code in a specific gene sequence. This research will contribute to biomedical diagnosis through a lab-on-a-chip approach.

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