

NEXT-GENERATION BIOAEROSOL DETECTION & IDENTIFICATION

Assay And Sample Preparation Method Development For The Extreme Pcr Bio-id Rapid Detector (xbird) Prototype

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Existing PCR methodology is limited by the thermodynamic capacity of block-based systems rather than reaction components. Recently, an extreme PCR method has been described which allows 40 cycles to be completed in as little as 30 seconds. This new methodology works by incorporating gold nanoparticles, excited by an 808 nm laser, into the PCR reaction allowing for rapid heating and cooling. This extreme PCR technology is a subcomponent of the DTRA-funded xBIRD (Extreme PCR Bio-Identification Rapid Detector) device, an automated aerosol sample to answer prototype developed by a collaboration between DEVCOM CBC and MIT LL. We have leveraged this advancement to develop assays for BWAs compatible with rapid cycling, coupled them with sample lysis, and a DNA preparation method all amenable to a microfluidic device. Currently, we can complete 35 cycles in under 7 minutes and have achieved initial LODs of 50 GE/reaction.