

A NOVEL PCR BASED DNA MICROANALYZER SYSTEM FOR DETECTION OF  
VIRAL GENOME

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ABSTRACT

A micro-fluidic assay to quickly analyze microscopic samples of DNA is being developed for field applications. It consists of a micro-PCR chamber, micropumps, and micro-heaters. Additional components of the device include gel electrophoresis micro-channels and solid core waveguide fluorescence collectors. The intended analyzer is a micro-fluidic platform that is principally based on the three-step polymerase chain reaction (PCR) mechanism. Currently, all off chip control is executed using a labview code. The micro-pumps, PCR chamber and capillary electrophoresis system have been designed fabricated and tested. For fabrication of the device, a regime has been developed for bonding PDMS surfaces to a variety of substrates (silicon in the present case). We have successfully achieved a compression in the cycle time by a factor of ten in our on chip PCR reactor as compared to the conventional PCR system and also amplify samples with pico-gram concentration. Fluorescent studies indicate negligible non-specific binding to our chip which has been a major problem in earlier assays. A working electrophoretic capillary and new biphasic gel material with extremely low background and high signal to noise ratio have been developed. We have further achieved low voltage capillary electrophoresis by doping different gel materials with conducting nano-particles. We envision this assay as a highly sensitive field deployable analyzer tool.