

DEVELOPMENT OF PORTABLE AND RAPID HUMAN DNA ANALYSIS SYSTEM AIMING ON-SITE SCREENING

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Last year, we presented a portable and rapid human DNA analysis prototype system that is based on micro-fabricated capillary electrophoresis (mCE) installed in the attache case.

We have improved its performance by increasing number of analysis loci; utilizing multi-color detection and increased number of lanes of microchannel capillary. To realized this improvement, we have designed and manufactured small size spectrometer for multi-color detection, and new chip layout design.

The system utilizes the following technologies: first, balloon-chip technology, which makes it possible to manufacture a disposable chip, manufactured by bonding several art-worked silicon-elastomer films; second, technology that is used to manipulate micro fluid accurately without using a syringe pump; third, a high-speed PCR for micro fluid; fourth, small size spectrometer for multi-color detection; and fifth, an electrophoresis analysis program.

The prototype system, which is installed in an suitcase, can be used to carry out DNA extraction, polymerase chain reaction (PCR), and eight microchannel capillary electrophoresis (mCE) in four, fifteen, and six minutes respectively, twenty-five minutes in total.