

Development of an automated DNA analysis system based on multiple channel electrophoresis chips

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A unique and advantageous platform technique for multiple channel electrophoresis chips developed for realization of a competitive medium-scale automatic electrophoresis system is presented. The technique is about preparation and operation of a multiple channel (24 channels at present) capillary electrophoresis chip that has neither built-in individual sample wells nor injection crosses. Electrophoresis channels, with 1 mm gaps, were laid on the chip in a linear/parallel fashion. Dense alignment of channels and ease in fabrication were facilitated from the unique design. Samples loaded to the vicinity of the entrances of channels by a set of sample pick-up/loaders were injected by an electric field applied to the tip of each pick-up/loader. Dispersion of samples during loading/injection was avoided by a surrounding hydrophobic medium, by which injections into neighboring channels was prevented. An innovative robotic mechanism for a 8-channel sample pick-up/loader set was devised for rapid and automatic sample transfer from a typical 96-well plate to the chip. Feasibility of an exceedingly simplified format of multi-channel CE chips was successfully demonstrated. Commercialization to a competitive medium-scale automatic electrophoresis system is expected.