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ACUPUNCTURE SAMPLE INJECTION FOR MICROCHIP CAPILLARY ELECTROPHORESIS AND ELECTROKINETIC CHROMATOGRAPHY

Ji Won Ha

University of Ulsan, South Korea

A simple nanoliter-scale injection technique was developed for polydimethylsiloxane (PDMS) microfluidic devices to form the well-defined sample plugs in microfluidic channels. Sample injection was achieved by performing acupuncture on a channel with a needle and applying external pressure to a syringe. This technique allowed us to achieve reproducible injection of a 3-nL segment into a microchannel for PDMS microchip-based capillary electrophoresis (CE). Capillary zone electrophoresis (CZE) and capillary electrochromatography (CEC) with bead packing were successfully performed by applying a single potential in the most

simplified straight channel. The advantages of this acupuncture injection over the electrokinetic injection in microchip CE include capability of minimizing sample loss and voltage control hardware, capability of serial injections of different sample solutions into a same microchannel, capability of injecting sample plugs into any position of a microchannel, independence on sample solutions during the loading step, and ease in making microchips due to the straight channel, etc.

jwha77@ulsan.ac.kr