

Microfluidic Device for Enzyme-Linked Immunosorbent Assay (ELISA) and Its Application to Bisphenol A Sensing

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Bisphenol A (BPA) is a commonly used material made of polycarbonate, which is used in food containers. BPA is known to be an endocrine disruptor. To investigate the effect of BPA on health, animal experiments are necessary. To determine the intake of BPA in food or drink by animals, a BPA-sensing system that can detect a small amount of BPA in biological samples within a short reaction time is needed. We have developed a disc-shaped microfluidic device for enzyme linked immunosorbent assay (ELISA) with 32 microchannels and chambers. In order to establish a rapid and sensitive assay system for BPA in biological samples, in this study, anti-BPA antibody was immobilized on microbeads and introduced into microchambers on the microchannels in the device. A competitive immunoassay was performed using horse radish peroxidase (HRP)-conjugated BPA with a small amount of sample solution within 20 min. After the immune reaction, the HRP activity in each microchamber was detected by chemiluminescence. BPA could be determined on the microfluidic disk at a concentration range between 3.9 and 250 ng/ml. BPA-spiked rat serum was also determined on the disk.

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