

Biosensor Using Active Micro-Mixer in Lab-on-a-Chip

김지만, 박태정, 허윤석¹, 홍원희², 이상엽*
한국과학기술원 생명화학공학과 대사공학연구실;
¹한국과학기술원 생명화학공학과;
²한국과학기술원 생명화학공학과 분리기술연구실
(leesy@kaist.ac.kr*)

A critical requirement for achieving a total micro-analytical system of cells on-chip is to develop the cell lysis and solid phase extraction (SPE) steps. This work was developed by miniaturized sample preparation systems, in which cell lysis was needed to obtain intracellular materials for further analysis. We adopt the micro-magnetic stirring method for cell lysis of *Escherichia coli*. The cells and lysis buffer were well mixed by magnetic stirring in a SPE chamber. The contaminated materials and cell debris were removed by functional packed porous monolith. The micro-mixer was fabricated using the soft-lithography and replica molding. Before pouring poly(dimethylsiloxane) on the silicon wafer, a magnetic cylinder-disc was placed on the micro-cavity. The mixing effectiveness is dependent on the rotating speed of magnet. The reaction time was offered to the enzyme and substrate at the mixing zone for more efficient mixing at lower flow rates. Specific lipase reaction was successfully detected by colorimetric method. We also analyzed the immobilization efficiency of intracellular protein onto the gold micropatterns in microchamber. Using this microfluidic system, we developed a strategy for fabricating the gold binding polypeptide (GBP) as a fusion partner.