Chip-based Cell Cultivation System for Monitoring Protein-Protein Interaction

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The abbreviations used are: SPR, surface plasmon resonance; GST, glutathione S-transferase IPTG, isopropyl -D-thiogalactopyranoside PDMS, poly-dimethylsiloxane SDS-PAGE, sodium dodecyl sulfate-polyacrylamide gel eletrophoresis.

Abstract

Protein-protein interactions play key roles in all cellular processes and functions. Thus, identifying interaction partners of proteins enables us to understand these processes on a molecular level. So far, many techniqueshave been developed for the analysis of protein-protein interactions. However, little is performed for cell culture-free system with potent read-out. Thus, here we describe a chip-based cell cultivation system with surface plasmon resonance (SPR) imaging system for monitoring protein-protein interactions. For the development of chip-based cell cultivation system, we fabricated microwell chip, a gold chip placed with

punched PDMS. To test chip-based cell cultivation system combined with SPR imaging system for the detection of protein-protein interactions, we performed protein-protein interaction analysis by measuring the binding of yeast GAL4 dimerization domain (GAL4DD) to GAL11 protein (GAL11P) as model proteins. As results, our system developed in this study showeda simple and rapid analysis of protein-protein interaction, requiring no special equipment for cell culture, and recombinant protein expressionprior to immobilization of purified proteins on a chip. Together, our results suggest that the combination of chip-based cell cultivation system and SPR imaging system can be useful method to characterize proteinprotein interaction without any labeling of proteins in a time- and labor-saving manner.