Surface plasmon resonance imaging microarray for fusion protein expression analysis

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Surface plasmon resonance (SPR) is an optical technique used to detect the specific binding of unlabeled bio-molecules onto molecules attached to gold thin films by measuring changes in the index of refraction upon adsorption. The SPR technique can be expanded to SPR imaging and used for the high-throughput analysis of bioaffinity interactions by fabricating protein arrays on gold surfaces. A SPR imaging system was constructed and used to detect the affinity-tagged recombinant proteins expressed in Escherichia coli. In this study, we introduce a robust technique to rapidly detect the hexahistidine (His6)-, glutathione-S-transferase (GST)-, and maltose-binding protein (MBP)-fused proteins expressed in E. coli using SPR imaging measurement. The cell lysates were spotted on gold thin films coated with 11-mercaptoundecanol (MUOH)/dextran derivatized with Ni(II)-iminodiacetic acid (IDA-Ni(II)), glutathione, or cyclodextrin. After briefly washing the gold chip, SPR imaging measurements were carried out in order to detect the bound affinity-tagged fusion proteins. Using this new approach, rapid high-throughput expression analyses of the affinity-tagged proteins were obtained.